The Street Railway Gazette.

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The Street Railway Gazette.

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The Sprague Electric Road at Boston.

The last issue of the STREET RAILWAY GAZETTE (December) contained an illustrated description of the Sprague Electric Railway at Boston. We here add cuts showing the poles and their relative positions. There have been several trial trips made over this railway already to test the apparatus, which has been found to be perfect, as our friend, *The Beacon*, declares, and the road will be put into commercial operation by the time this number of the GAZETTE is issued. Fig. 1. shows poles in position, before the overhead wires were put in place.

The West End Street Railway of Boston, of which this road is a part, is the largest street railway in the world. It extends over 212 miles of track, using 1,700 cars and more than 9,000 horses. The president of the West End Street Railway Co., Mr. Henry M. Whitney, of Boston, is universally recognized as being one of the most enterprising and successful street railway men in the country, and, aided by an efficient corps of assistants, has succeeded in giving Boston, since his administration, the most efficient street railway service which ever existed in that city.

Before deciding upon any electric system to be adopted upon the West End Road, President Whitney, accompanied by members of the Board of Directors and managers, visited all the principal electric railways in the country, operated upon the various systems, including visits upon three different occasions to Richmond, Va., to inspect the famous electric road in operation there upon the Sprague system. The awarding of the contract for equipping the West End Road to the Sprague Electric Railway & Motor company, of New York, proved how very highly Mr. Whitney and his Board of Directors esteemed the Sprague system.

This system of electric railway called for in his contract is wide and comprehensive. The main line from Boston westward, beginning at Park Square, will run down Boylston Street bridge and then down Chester Park to Beacon Street. It will then proceed over the Beacon Street extension to the Chestnut Hill reservoir, and to Allston and Oak Square, Brighton. From the East Park Gate over the new boulevard to the Chestnut Hill reservoir and Brighton the Sprague overhead system will be adopted. In the more crowded streets of the city the Bentley-Knight conduit will be used, and the Sprague cars will run over the whole system.

The power station from which the electric current is distributed to the line, is situated on Braintree Street, Allston, near the Boston & Albany Railroad, and also at the edge of the water, thus giving both water and rail facilities for fuel. This building, which is the most perfect electric plant of its kind in the country, is situated very nearly equi-distant from the extremities, and is, therefore, literally, a central station. The station, with the adjoining car house, is of brick and completely fire proof.

In its construction it was the aim of the West End Co. to get the best in every detail. The chimney stack is 100 feet high. The boiler house, which is both convenient and commodious, is at present equipped with three horizontal tubular boilers, furnished by the Jarvis Engineering Co. The engine room contains two high-speed automatic cut-off engines of the Armington & Sims pattern of 200 h. p. each. Each drives two powerful dynamos of 80,000 watts each, and wound for a maximum pressure of 500 volts. These dynamos are of the highest efficiency and simplest construction, and if need be can be placed under the charge of the steam engineer. The dynamos feed into copper bus wires supported on the walls by porcelain insulators.

Each machine has its independent ampere meter, and in addition there is a general ampere meter at the end of the positive bus bar. From this bar the current passes to special snap switches, each switch being connected through a three plug safety switch back to one of the feeders supplying current to the main line wire. These feeder wires tap into the line wire at different points on the line of road, thus maintaining the pressure approximately equal all along the lines. At the ends of the feeders in the central station, pressure indicators are attached, which indicate the voltage at the junctions of the feeders with the main current wire.

The engine room is brilliantly lighted by handsome electroliers, each of which has five incandescent lamps. All the surroundings of the machines are kept in the neatest condition.

Adjoining the power house, but separated by thick brick walls, is a commodious house for accommodation of cars, 107 feet long by 80 feet deep, designed to hold 24 cars.

The overhead system, which is built under the Sprague patents, is of the finest description and includes iron poles set in concrete throughout the entire length of the road. These poles are of a very neat and tasteful pattern, and support the span wires which carry the trolley wire at a height of eighteen feet over the center of the track. This overhead wire, which is used for a working conductor, is made of silicon bronze, of the small Sprague type, only 3.16 of an inch in diameter. This is the only wire suspended over the middle of the track, and its lightness and high tensile strength allows the overhead supporting structure to be of the lighest description possible.

FIG. 1.—SPRAGUE ELECTRIC ROAD AT BOSTON.

The return circuit is through the rail, and thence by both metallic and ground circuits to the station. Each section of rail is joined to copper ground wires throughout the length of the road underneath the string pieces. At intervals of 500 feet this ground wire is connected to an earth plate, and at seven points widely distributed. The ground wire is connected to the station, and there is also a main ground connection made there through a large sink plate.

In the overhead system a new method of switching has been adopted, which is at once ingenious and simple. Five or six feet inside the turnouts a small switch, with flaring rider, is interpolated into the main and branch wires, and a spring tongue upon this directs the path of the "trolley" with absolute certainty and ease. By this means switching is made very easy, and all danger of the trolley leaving the wire is obviated.

The cars can be run at widely different speeds, varying from the slowest crawl to twelve or more miles per hour. They can be started and stopped without the use of brakes in the space of three or four inches, and when making the normal running speed can, in an emergency, be stopped

and reversed without brakes within less than one-fourth of a car length. This is especially advantageous in crowded thoroughfares, and shows the superiority of the electrical car over the horse or cable cars. The control over the car seems marvellous, for one sees little or nothing save an almost imperceptible movement of the hand of the motor man, and the starting, although prompt, is very gradual and without shock or jar. The ordinary driver can operate one of these cars without the slighest trouble after a very brief instruction. The saving on the operating cost of the Sprague system, owing to the superior quality of the apparatus over an ordinary horse car line, constitutes a no considerable item. It has been found that the average cost of motive power per car a day throughout the United States, that is, for from 10 to 11 hours, and trips aggregating from 45 to 50 miles, is about $4 and this counts only those horses on actual duty on the road. The cost of motive power per day per car for equal mileage in Richmond is less than $2 on the heaviest sort of grade work, and at Boston it is estimated that even this low cost of operation will be reduced. For winter use upon this road the Sprague Co. is equipping three electric "working cars," furnished with snow plows, brushes, ice cutter and salt distributor, and each propelled by two powerful 30 h.p. motors. In front of the car is a revolving wheel which breaks up the snow crust completely, and behind are revolving brushes which sweep the tracks clean. It is estimated that this "working car" will clear a street railway track after a heavy storm more quickly than the ordinary snow plow drawn by 12 horses.

without the slightest delay in travel or inconvenience to passengers, so that the Sprague cars run over the entire distance.

The kind of truck used upon this road is the latest Sprague improved truck, which has been fully described in these columns. The equipment of this truck includes the new Sprague motor, which will be used for the first time, in commercial work, upon this road.

Sprague Electric Railway System an Emphatic Success in a Blizzard.

To-day's papers (January 10th) contain notices of the abandonment of horse car traffic in various cities from snow storm. Contrast the following:

(Telegram) Davenport, Iowa, Jan. 9, 1889. Sprague Electric Railway & Motor Co. Chicago, Ill. "Two inches to one foot of snow on track. Regular blizzard. Could not have been worse. Electricity signal success. Cars running uninterruptedly. President Allen, James F. Peavey, President Sioux City Railway Co., visitors and citizens enthusiastic over success of electricity.

JOHN HOWARD, Superintendent Davenport Central Railway Company.

Further information has just reached this office. Davenport *Tribune*, January 9th. (Morning paper.)

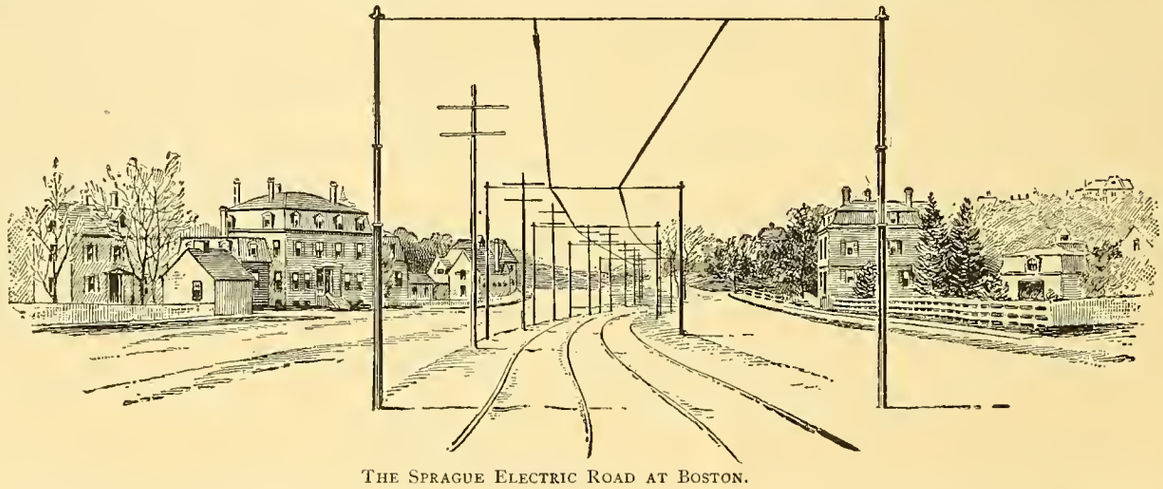
ELECTRICITY ALL RIGHT SO FAR.

"Where are the croakers now? Yesterday morning, when the rain ceased, the streets and rails became coated with ice, then it was doubtful to many if the cars would be able to ascend the Brady street hill, but they did not remain long in doubt, for the electric cars went up and down the hill at their usual speed. When the first car started over the hill an interesting pyrotechnic display appeared on the trolley wire, the current melting the ice and emitting sparks.

includes four powerful Edison dynamos wound for 500 volts, and 40,000 watts capacity each. The whole plant and power-house is arranged for an easy increase in this capacity when there is any addition to the number of cars run or increase in the length of line, and the motive-power can be increased 1500 h. p. without changing the line of machinery.

The overhead system on this road is particularly light and is remarkable for its neatness and unobtrusiveness. At night it is impossible to see any part of the overhead structure. It hardly seems possible that it can be a medium, of transmission of nearly 250 h. p. of electric energy distributed over so many miles of track, on which at any time the entire equipment of electric cars can be in operation. This working conductor is connected at intervals of 500 feet with the main conductor by short branch wires, and is of the same size as on all the Sprague roads, no matter whether one or one hundred cars are to be operated, or whether one or twenty miles of track are to be covered. The main conductor is itself supplied at several wide distributed points by feeders which come from the main supply at the central station, and which maintain the potential of the line constant at all points of the road.

The return circuit is made through the rails and thence by both metallic and ground circuit to the power station. Each section of rail is electrically connected with the next by copper plates, and at each five or six hundred feet along the line connected by ground wires with large earth plates, insuring practically no difference of potential between the rails upon any portion of the line.



THE SPRAGUE ELECTRIC ROAD AT BOSTON.

The system of wiring which the West End management has adopted for the crowded city streets is the Bentley-Knight conduit now in use in Allegheny City, Pa. Here the conduit is laid midway between the tracks, and is strongly bolted to the stringers and sleepers. Its cross section is about a foot square, and its upper part has a slot similar to that used in cable railways, its width, however, being only 5/8 of an inch, giving an opening so small that carriage wheels will not catch in it. Besides this it is so bevelled that horseshoe calks will not be held in it. Copper bars 1¼ inches thick, one on each side of the slot, firmly insulated beneath it, carry the current, one from the dynamo and the other returning from the motors. The current is taken from the conductors to the motors by "ploughs," as they are called, two to each car. These ploughs are thin iron plates about 10 inches square, hung from a frame work over the middle of the track and projecting into the slot. The motors are connected by controlling switches, and the car is operated substantially as is the overhead system. The ploughs are so arranged that they can be lifted out of the slot when any obstruction is reached. The current is taken up and returned by spring plates, which slide along the copper conductors at the bottom of the plough.

In switching, two ordinary tongue switches are used, one in the conduit and one on the rail. Brushes attached to the snow ploughs and cars easily keep the conduit and tracks clear, even in the severest snow storm or in case of slushy and muddy weather.

The change from the overhead system to the couduit is made while the car is in motion and

The Sprague Electric Railway at Cleveland, O.

As intimated in our last issue, another large and very important railway, installed by the Sprague Electric Ry. and Motor Co. of New York, has been put into successful operation, and is now doing commercial work in transporting passengers without delay of any kind. This is the East Cleveland Street Ry., of which Dr. A. Everett is President, and which has been installed during the past two months by the Sprague Co., and is operated on the overhead system, with small No. 6 silicon bronze wire as a working conductor, which is a feature on all Sprague roads.

The equipment of this road consists of 16 cars, equipped with electrical apparatus of the latest and most approved type; and all the latest improvements and devices used by the Sprague Co. upon their roads for increasing the durability and efficiency of their apparatus can be seen in operation here.

The power station, from which the electric current is distributed to the line, is situated on Cedar avenue, and is one of the most perfect electric plants of its kind in the country, and probably ranks next, if it does not equal, the Sprague electric power station at Boston in the completeness of every detail.

The size of the power station is 93 by 125 feet. The generating apparatus at present in-

The starting of the road upon the 29th of December, was in every respect a very great success. Not a mishap of any sort occurred. One of the motor-cars, towing a second ordinary car was started from the city terminus of the line, and ran out Euclid av. to East Cleveland.

Upon the first car was Dr. Everett, president of the road, accompanied by a large number of the directors of the company, members of the Board of Aldermen and other city officials and Mr. C. W. Foote, the Cleveland agent of the Sprague Electric Ry. & Motor Co. The cars were operated entirely by the railway company's drivers, and none of the electrical experts present touched the switches.

No attempt was made on the trip to show speed, but the distance was made in less than 12 minutes. On the return trip the run was made in 10 minutes. The trial was perfectly satisfactory to the directors, who expressed themselves as being very well pleased with the easy motion of the car in starting, rounding curves and in speeding.

The property owners, and citizens living along the length of the line, showed the greatest enthusiasm at the successful trip made by the electric cars, and greeted their appearance with cheers all along the length of the line.

On the return trip the car was raced by a number of gentlemen in carriages, but succeeded in distancing them all.

The Sprague company is to be congratulated upon repeating the recent success of the West End Electric Railway at Boston, at Cleveland, and upon having such a large number of electric railways in such successful operation.

Rules of Procedure for Street Railway Conventions.

We have been informed, since the December GAZETTE was issued, that our publication of the names of the representatives of the various manufacturers of street railway supplies, and dealers therein, who intended being at the Washington Convention, prevented a scene at the meeting. A supply man had incurred the sore displeasure of a member's delegate; and he resolved that the supply man should not be allowed to attend the meetings of the American Street Railway Association. Fortunately the offended party informed the company, with whom the obnoxious supply man was connected, of his intention. The parties acted with commendable discretion; the supply man confined his presence to the place of the exhibits, and kept as far as possible from the Association's meetings and the banquet. He wisely acted upon the truism that "discretion is the better part of valor." Every supply man may not have so much good sense. And it is none too soon for the Executive Committee of the American Street Railway Association to formulate rules of procedure applicable to such a case.

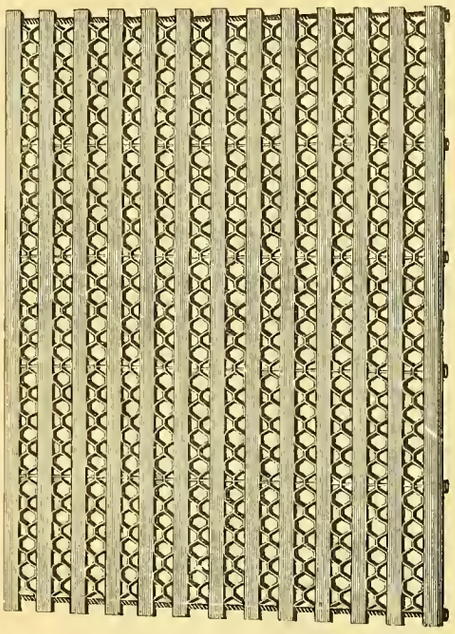
And, moreover, certain speakers "at every convention," we are told, have been in need of a "checkmate"—some one, duly authorized, to call them to order when they transgressed the laws of propriety, in language or otherwise.

Now, with regard to the attendance of supply men, they all know, and every body knows, that they attend the meetings of the Association by permission—we were almost going to say they are there "on sufferance;" but that does not express the true state of the case, for they are heartily welcomed to be present as a rule. The few difficulties that may arise on account of discordant personal elements are the only cases to be provided against. In *Robert's Rules of Order* (section 67) it is stated that "every deliberate assembly has the right to decide who may be present during its session; and when the assembly, either by a rule or by a vote, decides that a certain person shall not remain in the room, it is the duty of the Chairman to enforce the rule or order." We need not dilate upon the enforcement of a rule or order, for there is not the remotest probability of that ever becoming necessary. What is wanted is a rule, to get over such a little difficulty as we have specified, in the best way possible.

In the absence of any rule, the simplest way is to take a vote, or a motion, to expel an objectionable party; and in case a man demands the right to be present, there is no better way than to put the case to a vote, perhaps; but to pronounce a kind of public "excommunication" against an unwitting offender, when not so stubborn as to thrust his presence where not wanted, if he knows it, is rather harsh treatment. The better way, surely, would be to let him know (or inform his company) privately that his presence may be dispensed with. And we venture to declare that a by law to that effect would keep the course clear—for many years to come, at all events.

A New Car Mat.

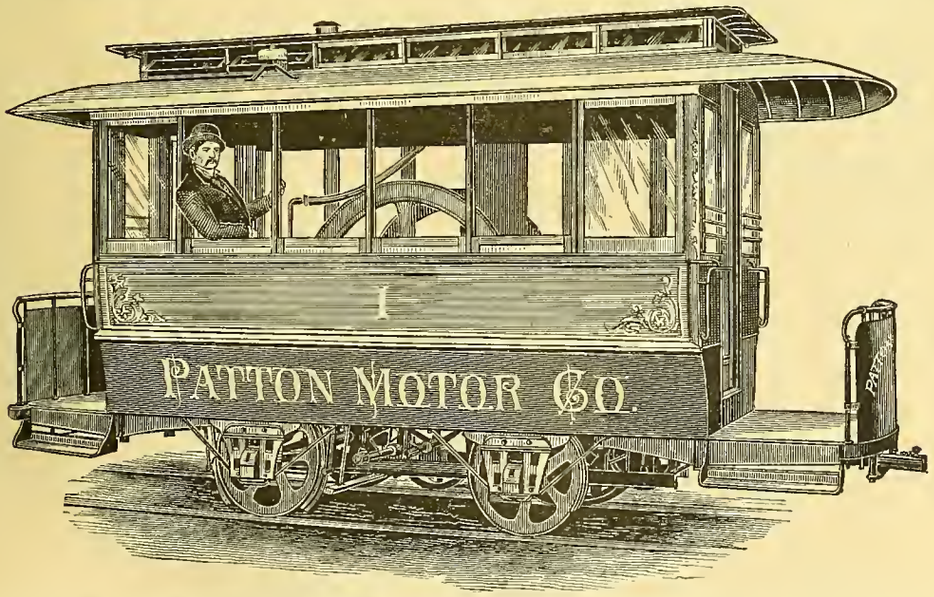
Messrs. Heckscher & Toffler (successors to Warneck & Toffler) have just placed upon the market a mat for street cars that appears to be pretty near what has long been wanted. It consists of strips of selected maple, ½" high and ⅝" wide, alternating with galvanized corrugated strips of steel, with steel rods running transversely through the wood and steel about every



six inches. It is very strong, light and durable, and answers the purpose of a scraper as well as that of a mat. The accompanying cut shows what it looks like.

The Patton Street Railway Motor.

Mr. W. H. Patton, a mechanical engineer of experience and acknowledged ability, towards the latter part of last summer, wended his way to the offices of the Pullman Palace Car Co., at Chicago, and asked that Company if they would build a motor for him. The reply was, "No, we have no time; many inventors come here intending to have great many cars built with peculiarities that are going to revolutionize, etc.



and in the end come to nothing." Mr. Patton responded, "Well, I only want you to build one motor car; it may be no more will ever be wanted." This was so different to the general ideas of inventors that the Pullman people thereupon asked him in, examined his drawings, etc., and ultimately built him a motor, of which the accompanying illustration is from the electroplate of a drawing from photograph.

Many street railway men and engineers have been to see the Patton motor at Pullman, where it has been experimenting on the side track of the Pullman Company. Among them was Mr. J. B. Parsons, General Manager of the West Chicago Street Railroad Co., who declared that this is the nearest to the ideal motor for street railways he has yet seen, and he forthwith ordered a Patton motor strong enough to do the work of a dozen horses to operate their ponderous sweepers and snow plows.

The Patton motor, which we had the opportunity of inspecting (and photographing) at Pullman recently, consists of an ordinary gas engine, which manufactures the gas from oil or gasoline for its own use; the motive power is applied to friction wheels by means of a rope cable, and a simple forward or backward movement of a lever controlling perfectly the action of the machinery.

At this writing the Patton motor has made its appearance on the West Chicago tracks, and excited much curiosity and enthusiasm; its appearance there is taken as a harbinger that "rapid transit" is coming. That seemed to be the idea, said the Chicago *Herald*, "and it was given an appreciative reception." The motor continued to run until "the crowds were so great that in sheer despair, and fear of accident from the jam, the motor was switched into the Western Avenue barns." It is brought out occasionally to show what it can do, and it attracts marked observations every time.

The fame of this Patton motor has already spread to the four quarters of the world. A gentleman has arrived from London, seeking exclusive rights to manufacture and use it in England. The Los Angeles (Cal.) *Tribune* says: "We shall arrive at the ideal street car motor one of these days. There is much hesitation about adopting the electrical system which depends upon wires strung over the streets. We have wires enough in the streets already. A motor run by accumulated electricity may yet be produced, but thus far none of the models have proved a success. A new motor for street cars which has been on exhibition at Pullman, Ill., is attracting much attention. The motive power is furnished by gas automatically made from petroleum and gasoline and exploded with air in the cylinder of of the engine. There is no smoke and the hot air resulting from the explosion may be used to warm the car—a great desideratum in Northern cities. The inventor claims to get a speed of fifteen miles per hour from his motor, and to run it at a cost of one dollar per day. This beats horses and electricity, and if the motor proves practical it is just the thing the street railroad managers are looking for."

The inventor informs us that gasoline, crude petroleum, kerosene or coal oil may be used, and that the cost of running the engine will not exceed one dollar a day, or ten cents an hour. He estimates the cost of the motor car and engine, to pull a couple of passenger cars loaded, on ordinary track, will be $2,500. It requires no great skill to operate it. Anyone of the most ordinary intelligence can learn all that is necessary to know in a short time.

The horizontal engine we saw on the motor at Pullman weighs 3,400 lbs., and occupies a space 7 ft. by 4 ft. An upright engine, built specially for the Patton motor, and to be used on the next to be built, only wants a space 3 ft. 4 in. by 2 ft. 3 in., and weighs but 1,600 lbs.

A striking peculiarity of the Patton gas motor is that the engine may be left to run continually, once it is started; the speed being regulated, and the car is stopped and started, by a lever (together with a brake lever) very much after the manner of operating a grip-car.

A New Car Brake.

A new and ingenious improvement in brakes for street, electric and freight cars has just been completed. The shape of the handle is similar to that now in use on horse cars, but its motion by the driver is forward and back and not rotary. When the brake is "let off" the rod which winds the chain revolves inside the end of the handle of the brake, upon which the driver does not release his hold—a manifest advantage over the present revolving handle, often so dangerous to passengers. The mechanism of the brake is so adjusted that a car can be stopped instantly or as gradually as may be desired. Altogether it is a most ingenious and simple arrangement, which promises to revolutionize the use of car brakes. Rumor says that a State senator residing in Chelsea, Mass., has the matter in charge, and that already capital has been raised to foster the enterprise.

The Silvey Alternating Current Electric Street Railway System.

A system of electric propulsion by alternating current motors has been devised by Mr. W. L. Silvey, of the Silvey Electric Co, of Lima, O. The advantages of such a system are apparent, says the *Western Electrician*, to whose managers we are indebted for the accompanying cuts. Currents of 1,500 to 2,000 volts may be employed in the line with safety to the motor, and in fact to the entire system. The distance that can be covered is from three to four times as great as can be covered by a direct current system; and the cost of construction and maintenance is in favor of the alternating system, says our contemporary. Mr. Silvey has devised several modifications of his apparatus, among which are the following: First, to use the alternating current to charge a series of converters located on poles along the track, all the primaries being connected in multiple arc to the high tension line, and all the secondaries joined in multiple to a secondary line situated directly over the track, as shown in Figs. 1 and 2. In this case trolleys attached to the car convey the current of 40 or 50 volts to the motor on the car. This low tension in the motor makes the matter of insulation very easy, and for this reason alone the burning out of a motor can be entirely prevented. In fact, such an accident would be directly attributable to dire carelessness.

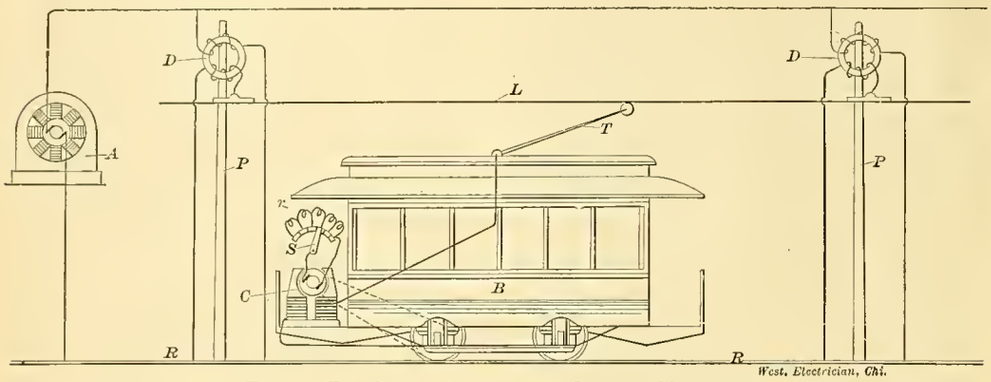


Fig. 1.—The Silvey Alternating Current Motor.

Still another way of coupling the line circuits, and the one Mr. Silvey considers preferable in all cases, is shown in Figs. 3 and 4. In Fig. 3 both the outgoing and the return wire are shown overhead, two trolleys being attached to the car. In order to simplify the system still more, the single overhead wire and the return through the rails are employed. In Fig. 4 the overhead line is charged by the high tension current of an alternating dynamo, one wire being attached to the rail for a return or ground wire, thus saving a large per cent of the line work. The current from the line is conveyed to the car by a trolley, while a converter is located on the car either underneath the floor, or under the seats. The secondary wire of the converter is attached to the motor, regulation being secured by a choking coil in the secondary motor circuit. This does away with switches entirely—a constant source of annoyance. The armature circuit is entirely independent of the field magnets, and the current in the armature being of so low a tension as three or four volts, there is little or no danger to the machine.

Inspection of Electric Railways.

By Edward J. Lawless.

Hearing many conflicting statements on the successful results of electricity as a motive power for street railways, the writer determined to visit those in actual operation in various cities, and see for himself what merit there was in each system.

THE VAN DEPOELE SYSTEM.

Accordingly a start was made on the 25th September last, the first city visited being Lima, Ohio.

Here was found an electric railway operated under the Van Depoele system. There are four miles of single track with turn-outs; a few grades not exceeding five per cent., and not many curves. On the main line five cars were in operation, and on a branch two trains consisting of motor and car. Those cars on the main line contained one 10-horse-power motor inclosed in the front end, the forward axle being driven by sprocket wheel and chain. The current is taken from double overhead wires, connection being made to motor by a trolley consisting of two small wheels running along the top of these wires. Cars are run singly and operated by driver only, the fares being collected by fare boxes. All these cars made considerable noise, something similar to that heard in a saw mill. The speed was limited to six miles per hour by city ordinance. It was observed, however, that when ascending even a light grade the speed slacked considerably.

On the branch line the motor was rated at 30-horse-power, no passengers being carried on the motor car. Better time was made here, but the same slackening of speed was observed when on a grade. The power is furnished from the electric light station. One Buckeye engine of 90-horse-power, one generator of the same power and one large boiler being devoted to the purposes of the road. Oil is used for fuel the cost of which is moderate. Both electric light and railway plants are controlled by one company.

One of the officials of the company claimed that they were very well pleased with the results; that the cost of operation was cheaper than by of horses, estimating the cost of power furnished at one dollar per car per day.

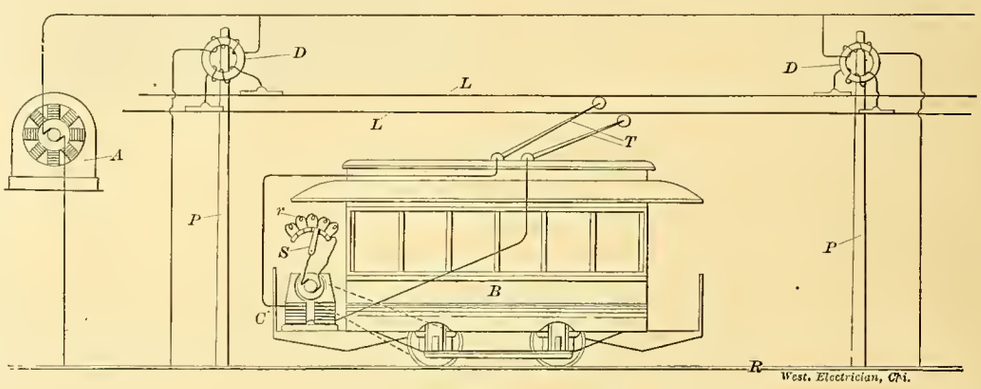


Fig. 2.—Silvey Alternating System.

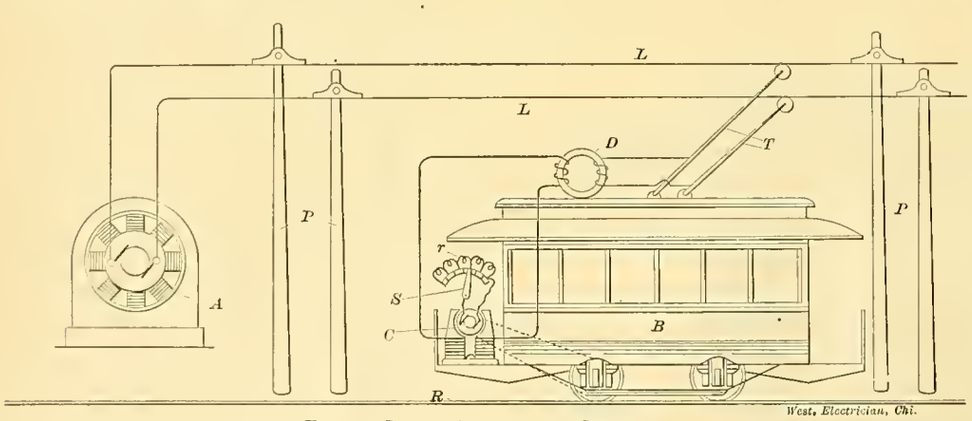


Fig. 3.—Silvey Alternating System.

An endeavor was made to sound public opinion on the system, when those interviewed claimed that it was too slow, cars barely crawling up a grade with a load, and, under such conditions, frequently stopping altogether, when they would have to back down the hill and start over again. The real trouble, however, seemed to me to be lack of sufficient power and too rigid economy to suit the taste of the public.

Lines under this system were visited in Binghamton, N. Y., where only two cars were found in operation, the power being furnished from the electric light station; and Jamaica, Long Island. In the latter was found a line about five miles long, and being almost level throughout, good time was made, cars frequently running up to fifteen miles per hour, while the public seemed well pleased with the service. It rained heavily all day at the time of inspection, but this did not seem to affect the running of the cars, or interfere with the electric current. The roofs of the cars, however, appeared damaged from the "trolley" having fallen on them. One engine, generator and two boilers handled the cars with ease.

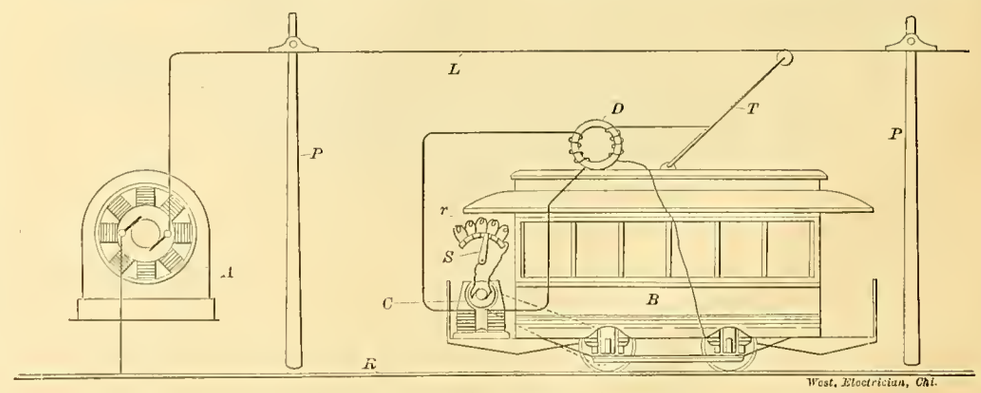


Fig. 4.—Silvey Alternating System.

THE BENTLEY-KNIGHT SYSTEM.

The city of Allegheny, Pa., was the next place visited. And here I must admit, as appeared to me, surprising results were attained. This electric line is operated under the Bentley-Knight system. The road is a most circuitous one; sixty per cent. of it being curves, and having a total rise of 295 feet in 4,900 feet, being an average of almost 6 per cent. The heaviest grade is about 10 per cent., and part of that on a reverse curve. The track which is not very substantially laid, although the rails are Johnson girder, is about four miles long, single, with turn-outs laid at irregular intervals. About one mile of this line is laid with conduit, the balance overhead double wires.

Five 16-ft. cars were found in operation, each equipped with two 15-horse-power motors, placed beneath the floor of the car, each axle being driven independently. The motors are controlled by driver in front operating the ordinary brake handle, one motion applying the current while a reverse motion applied the brakes. This I found fault with, as when on a grade it is sometimes advisable to apply the brakes before shutting off the current; with only one handle there is a time when you have neither current nor brakes, and a driver might get confused, when excited, as to which way to turn the staff. A particularly noticeable feature, and one in strong contrast to the majority of electric lines in operation, is the slight noise the cars make. This was accounted for by the use of a raw-hide pinion, which it was claimed not only deadened sound, but also gave good wear. The average time made by the cars was good; even on the heavy grades, a speed of not less than six miles per hour was maintained. Two small plows, raised and lowered by means of a lever on the side of the car, conveyed the current from the conductors in the conduit to the motors in the car, while with the overhead wires a trolley of rather primitive construction accomplished the same purpose. One of the wheels on each car was cast with an extra corrugated rim made to engage in a rack placed on the outside of the rail for a distance of a couple of hundred feet, at the steepest grade, to prevent the wheels from skidding when ascending, and the car from sliding when descending. Brilliant light was furnished in the cars with electric lamps. This is one of the attractive features of electric lines. It makes the cars bright, cheerful looking, and much pleasanter than a couple of dingy lamps with a strong aroma of coal oil.

The power house contained one 200-horse-power engine; four 40-horse-power generators, and two boilers 100-horse-power each; only one being in use at a time, the fuel for which was furnished at the rate of $60.00 per month, natural gas being supplied. Preparations were being made to put in additional generators, as there was only sufficient power for those cars in service, and it was the intention to double track portions of the line and put on additional cars.

Three days were spent watching the operation of this line and during that time no delay or breakdown of either cars or machinery was observed, the former making the return trip almost immediately on reaching the end of the line. The passengers seemed well pleased, once they got in the cars, but kicked vigorously at the long intervals between same, and unavoidable delays owing to the irregular placing of turn-outs.

An official of the road stated that during the last six months they had earned six per cent. on their investment, but did not expect to do as well the balance of the year owing to anticipated cold weather. It is surprising, however, that such a circuitous and hilly line, laid out with irregular switches and having an equipment of only five cars, could even pay operating expenses.

(*To be continued.*)

THE CAMBRIA IRON WORKS have received an order from a Denver street railway company for 5,000 tons of rails.

MESSRS. WM. SEAFERT & CO., Chicago, send us their neat booklet, entitled "The Seafert System of Generating, Transmitting and Utilizing Electrical Energy." The system is applicable to arc and incandescent lighting, galvanoplastic work, isolated and series motors, street railway propulsion and the general transmission of power.

The Thomson-Houston Electric Railway at Danville, Va.

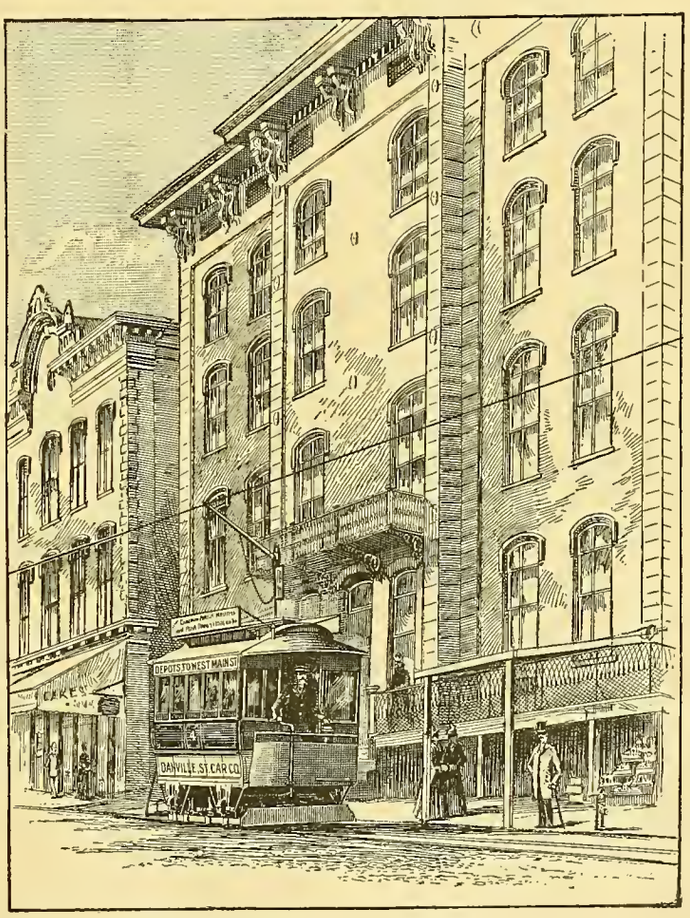
The President and directors of the Danville Street Car Co., having operated a street car line for about one year with mule power, came to the conclusion that unless some more economical method could be introduced the venture would not prove one of much financial profit. They had seven cars of the pattern known as "bobtail," which were drawn by mules and operated by one man.

The grades of their road were heavy and very long, and the result of these was soon apparent in the cost of maintaining the mules and in the small receipts which slow speed could only return. The people either would not or did not care to patronize a car toiling along at a two mile pace when they could walk at a rate nearly double what the car was making. To therefore give the public better service by increased speed and carrying capacity of the cars, and to reduce the time intervals, some different method of car propulsion was investigated. Realizing that electricity was playing an important part in this direction they proceeded to investigate it. After examining all systems and visiting electric roads in their own state, and having bids submitted by the various electric railway companies, they came to the conclusion that the Thomson-Houston system was the most substantial, durable, and economical. A contract was therefore given to that company and work was soon commenced. The entire length of the road is a little over two miles, and for 4,150 feet of this distance the ascent averages 4.3%; for 2,100 feet of this the ascent averages 5%; for 1,000 feet the ascent is 7%, and a short distance of this 1,000 feet stretch the grade exceeds 7½%.

Up these grades, which the electric car surmounts with ease, it was with difficulty that four mules could haul an ordinary load at a very slow speed. There are three diamond pointed turn-outs with the necessary overhead frogs owing to the fact that the track is single the entire length. One noticeable feature which this road brings out is that it is perfectly feasible to have a car operated by one man, even though there are a number of switches in the line. It is not in every case the wisest or best plan to pursue, but in some localities it may be the only one possible. It is a note-worthy fact that a man easily handles a car, and this is due to the admirable perfection to which the overhead switches and the trolley wheel have been carried out. No trouble whatever is experienced, although the driver rarely gives the overhead matters any attention. The cars were equipped with motor trucks of 10 h. p. capacity, the controlling mechanism being concentrated at one end. The overhead system was built according to the well known admirable plan of the Thomson-Houston Electric Co.

The road was started in operation on the 20th of November and has been in operation ever since. Four cars are daily run on a scheduled basis which reduces their former mule schedule nearly 25 per cent. Since the road was started scarcely an electrical trouble has been experienced, and it has been the universal comment of the residents of Danville that their railway company has materially added to their welfare and comfort and that they could not have selected a system which would have worked to any better satisfaction than the Thomson-Houston.

Considerable extensions are contemplated on this line in the spring, and other cars will in all probability be added.



THOMSON-HOUSTON ELECTRIC RAILWAY AT DANVILLE, VA.

The power station is located upon the opposite side of the Dan River some 2,000 feet away from the line. The generator is of 80 h. p. capacity and is driven by a 75 h. p. water wheel.

"MOTES" versus mules, is the subject of a pithy paragraph in the Omaha *Bee* (Dec. 13), in which it mentions that as soon as the electric trains run on schedule time, three horse cars will be put on the transfer line. It is stated that if the electric system proves satisfactory after a few months' trial, the service will be extended to the Main street line the first thing in the spring, and later to the entire system. If the season was not already so far advanced, it was the intention of the company to put in another switch in front of the Bradley building, on South Main street, and put a ten-minute service on that line, but it will not now be attempted. For the next three months it will be a fair trial of mules versus "motes," and the indications are ten to one in favor of the latter.

MR. C. B. HOLMES, Chicago, has purchased the Daft electric road at Los Angeles. His belief in electric propulsion is recorded in our Street Railway News, under California.

Thomson-Houston Electric Railways.

Wichita, Kansas, Dec. 7th, 1888.

Thomson-Houston Electric Co., Boston, Mass.

Gentlemen :—Our road has now been in operation under your system for the past four weeks. The trial trip was an immense success, as evidenced by our daily papers. Regular trips were immediately commenced, which have since been continued. We are especially pleased with its operation. As long as we get as efficient service as we now have (and we know of no reason to the contrary) we shall consider that we have the best system of street motive power in existence today. We think that it excels the cable road in every feature. Yours very truly,

Riverside & Suburban Railway Co.

[Signed] Thos. G. Fitch, Supt.

Scranton, Pa., Dec. 20th, 1888.

Thomson-Houston Electric Co.

Gentlemen :—I have your favor of the 19th. Referring to your inquiry as to your motors, I reply that the one longest in use has, since the first two weeks it commenced to run—early in August—and the stiffness worn off, stood the heavy work of our road admirably. We used it first under a large open car, and frequently carried up the heaviest grades over seventy-five people, and on one or two occasions, over one hundred people.

We changed to one of your heavy Pullman cars in October, and for about six weeks it cost nothing for repairs ; all that was spent on it was for oil, waste and cleaning. These cars weigh as much empty as an ordinary street car does when loaded. They are especially built for strength, the wear and tear on our heavy grades and numerous curves and switches being very heavy.

We have had running for about ten days one of your trucks under a long car with a seating capacity of about forty people, built by Jones Bros., of Troy. This car is the fastest car on an up-grade I ever saw. It is somewhat l ghter than our two Pullman vestibule cars, but with its capacity well filled, it fairly jumps up the hills.

We have now three of your trucks in business, and expect by the middle of January to have two more. The trucks are awaiting the cars. Very truly yours,

[Signed] Geo. Sanderson, Pres.

Des Moines, Iowa, Jan. 3rd, 1889.

Theo. P. Bailey, 148 Michigan ave., Chicago.

Dear Sir :—Yours of Jan. 1st at hand. Replying thereto, will say that we are so well pleased with the operation that I start for St. Louis to-night after two more cars to bring our number up to eight. We are also making arrangements to build a new power station of 300 horse power capacity.

Above all, the people are enthusiastic over it and well pleased with it. Hurry up the trucks. The storm did not bother us as much as I expected.

The receipts from four cars electrically are four times more than five cars by horses.

With compliments, yours truly,

H. E. Teachout, Secy.

OMAHA & COUNCIL BLUFFS RY. & BRIDGE CO.

Council Bluffs, Iowa, Dec. 31st, 1888.

Thomson-Houston Electric Co., Chicago.

Gentlemen :—In reply to your letter of inquiry as to the operation of your electrical system upon our railway between Omaha and Council Bluffs, we take pleasure in stating that our road has now been in continuous operation, on schedule time, for a period of three weeks ; the cars run exceedingly smooth and noiselessly, and we have experienced no difficulty from snow and ice in their operation.

As you are aware, our motor cars are equipped with two 10 horse power motors, and that we tow one or two additional cars with all of these motor cars. Such trains are scheduled upon most of our line at a speed of fifteen miles per hour, and we frequently attain a speed of twenty miles per hour.

We have not had an armature or motor burn, and upon a few slight changes being made, we believe that ours will be a model electric railway.

Very respectfully,

[Signed] T. J. Evans, General Manager.

The Peckham Elastic Street Car Wheel.

Probably there has never been a more thorough recognition of the conservatism with which new inventions are regarded than that which has guided the Peckham Streer Car Wheel and Axle Co., of 239 Broadway, New York, in the introduction of their elastic and interchangeable street car wheel. Two years ago, when the wheel was first presented to street railway managers, no one would accept its practicability, even though no fault could be found with the principles or details of its construction. "Seeing is believing," they said ; so the company let them see. And now after a trial of nearly two years, the company are offering the wheel to roads, and no one is found to raise a doubting voice as to the practicability and desirability of the new construction.

Some simplification of the details, whereby the first cost is lessened, and the wheel remains today as it was two years ago.

The elasticity and interchangeability of the wheel has so strongly recommended itself to the electric railway builders and owners, that the former are recommending it and the latter adopting it. With the ordinary wheel and axle, the motor which rests upon the latter is directly subjected to every jar and shock that comes from the rolling of the wheel over the irregularities of the track. To those who think this a small matter, a trip over an ordinary track on a springless car is recommended. In the Peckham wheel, however, the interposition of the rubber cushion checks the vibration of the wheel before it has been communicated to the axle, and leaves the motor resting on a dull non-vibrating bar. That this is the case was clearly shown by the axle at the recent Street Railway Convention in Washington ; when struck with a hammer it gave only a non-metallic sound, in which there was no ring whatever.

The delicacy of the electric apparatus is such that the advantages gained by the use of the elastic wheel will undoubtedly add considerable to the length of life of the motors.

For the regular street car traffic the interchangeable feature of the wheel is the one that most strongly commends itself to the consideration of managers ; though its elasticity and the prevention of axle crystallization that results therefrom is also appreciated ; inasmuch as both contribute directly to the lessening of expense, delay, and accidents.

In the future issue we expect to illustrate the motor wheel as it has finally been adopted for use on electric motor cars.

The Julien Cars in New York.

Mr. Wm. Bracken, managing director of the Julien Electric Traction Co., writes :

In a late communication we informed the Street Railway Gazette that we hoped by our new method of regulations to so economise the use of the current from our battery as to make three round trips, or 36 miles, with one charge of battery on the Fourth and Madison Avenues line. I now take pleasure in informing you that we have accomplished that result, and that our large 18-foot cars, carrying unusually heavy loads of passengers, are now making three round trips, from 86th St. to the Post Office and back (or 36 miles), without any change of battery ; so that now we change the battery but once a day, thus making a great saving in time. When you consider the long steep grades on Madison Avenve, and the number of very sharp curves throughout the line, you may imagine how much farther one of our cars will run on a more favorable surface. But we do not intend to end here, as we now hope to be enabled to make a fourth trip, or 48 miles, on one change, for the reason that at the end of our third trip now we find the voltage of the battery is still above 2 volts per cell. When the battery is fully charged the voltage stands at about 320 (144 cells). At the end of the third trip the voltage is still 300, and the car acted with as much force and life as it did on its first trip. We now go from 86th St. to the Post Office and back, 12 miles, on an expenditure of less than 15 electrical h. p. Therefore we make the 36 miles on 45 electrical h. p. hours. Calculating the cost to be 2 cents per h. p. hour, you will perceive that it costs but 30 cents for energy for a round trip of 12 miles, or 2½ cents per mile. Assuring 75 miles for a car-day the cost would be $1.87.

These data are taken from our books at our electric station—which books are open for your inspection. They indicate the ampere hours and the h. p. hours put into the battery each day, and the cost of the same.

But this is by no means the limit of economy which we hope to reach, for we are now having manufactured a motor far more efficient than those at present in use. Our new cars will be at least two tons lighter than those at present running so that with these two advantages in our favor it is reasonable to hope that we shall reach still greater economy.

Julien Storage-Battery Patent Sustained.

The Commissioner of Patents at Washington has just rendered a decision supporting Mr. Julien's claim for an inoxidizable alloy as against the claim of the Faure-Selon-Volckmar combination.

The Electrical Accumulator Co. of New York, with a view no doubt of testing the validity of Mr. Julien's patent, filed an application in the patent office some time ago for a patent, claiming, among other things, an alloy containing lead and antimony for a support plate in a secondary battery. The Patent Office thereupon put them in interference with the Julien Electric company. Much expert evidence was offered on both sides. Prof. Morton, Mr. Reckenzaun and Mr. Madden testified on behalf of the Electrical Accumulator company, and Prof. Barker, Dr. Van der Weyde and Mr. Salom testified on behalf of the Julien Electric company. The case was then argued before the Commissioner by able counsel on both sides, and the Commissioner, after due consideration, decided in favor of the Julien Electric company, holding that an alloy of lead and antimony had no novelty, but that an alloy of lead, antimony and mercury, as claimed by Mr. Julien, has specific advantages and novelty.

It was proved on behalf of the Julien Electric company, and it has been admitted by the examiner in his opinion, that while an alloy of lead and antimony has serious disadvantages as a support plate by reason of the crystalline structure of the metal making it liable to oxidation and consequent disintegration, yet the presence of mercury removes this defect and makes the alloy homogeneous and practically inoxidizable.

This decision is not only a great triumph for the Julien Electric company, but is of wide spread interest to the electrical community, who we all know are looking forward to a storage battery constructed on scientific principles.

Heim's Hose Bridge.

Mr. Chas. J. P. Heim, of St. Louis, is the inventor of a device to lift the hose, and bridge it, so that the cars can proceed unhindered by fire, when the water hose crosses the track. Vexatious delays, on account of fires, can thus be readily overcome. A number of these hose bridges are being made for the North Chicago Street R. R. Co., whose experiments therewith have proved most satisfactory. Mr. Yerkes' order is to be filled first, and then orders will afterwards be attended to in the order they are received.

We understand these bridges are to be kept at the barns, and taken hence each time they are wanted, to the locality of a fire. This is good; but we would venture to suggest that a far better plan would be to make arrangements with the fire department to carry one or two of these bridges on each hose cart; then the track may be kept clear constantly, and the hose placed on the bridge at first, instead of being subsequently lifted up while the water is being pumped. Anyway, the bridge does its work admirably by the independent action of the railway company: the device lies flat on the ground, is easily pushed under the hose, which is lifted up as the "bridge" is gradually erected.

New York and Brooklyn are threatened with a general "tie-up," according to a despatch of January 10, because the street railway companies will not accede to the men's "agreement," which is recorded in our Street Railway News.

Mr. C. B. Clegg and his Employees.

Our readers are familiar enough with banquets to street railway presidents and their associates, connected with the American Street Railway Association and the Ohio State Tramway Association. We have now much pleasure in chronicling a charming banquet given by a well-known street railway president to his own men. Mr. Charles B. Clegg, president of the Oakwood Street Railway Co Dayton, Ohio, and the employees of that road, had a jolly good time on Saturday night preceding New Year's day. A local paper says: Among the social events intended to mark the closing of the old and the beginning of the new year, there are attached to few, if any, more of genuine enjoyment and expression of good will, than characterized the annual banquet given by Mr. Charles B. Clegg, President of the Oakwood Street Railway Company, to the employees of the company, Saturday night (Dec. 29).

Mr. Clegg instituted the feature of an annual banquet to the employees when he assumed the presidency of the road, and regularly maintains it. The banquets are usually given at the close of the holiday week, and are a matter of considerable preparation, as every substantial and delicacy in the way of the edible, enters into it. The repair shop, connected with the depot and stable buildings, was fitted up for the banquet Saturday night. When the last regular car came in at 11 o'clock, Mr. Clegg and his guests, comprising all the employees, some thirty in number, filed into the banquet room, where enjoyable hours were passed until nearly 3 in the morning. An orchestra added its strains to the agreeableness of the occasion. Mr. Clegg presided, and in referring to the pleasant relations that existed between the company and its employees, and the enjoyment of these annual occasions, announced that it was the intention of the company to increase the salaries of its employees, beginning with the new year.

The honors were not all on one side, however. Mr. Ingham Ross, night watchman at the stables, on behalf of the employees and as an expression of their respect and esteem, presented the president with a handsome gold-mounted ebony cane. Engraved in gold is the inscription, "Presented to Charles B. Clegg by the employees of the Oakland street railway, Dayton, Ohio, 1888."

Mr. Clegg was greatly surprised, and feelingly responded to the donors. In his reply, among other things he said, that while he had not yet grown so infirm that he needed the services of a cane, yet he was not insensible of the power and influence of the sentiment that prompted the gift, which at any hour of life can not but prove a powerful ally in life's journey. He said that he had in the past a fancy in collecting canes of different wood, and in his collection nearly every clime is represented. However extensive the list might be, he said, or rare and costly the wood, he would prize above all the gift thus tendered by the company's employees. The banquet broke up about 3, when the boys hitched four grays double to an Oakwood car and brought the president and musicians to Main and Third.

Ammonia Vapor versus Electricity.

The ammonia vapor engine, invented by a New Orleans man (Mr. P. J. McMahon), strikes the *Times-Democrat* as "admirably adapted for use as a street car motor, offering, as it does, the minimum of cost." The way it expatiates upon electricity is amusing, if not edifying, and there is much truth, in the introduction, to help swallow the rest. Here is what it says:

It has been long recognized that the present system of propelling cars by mule or horse power is unsatisfactory, and that something better should be substituted for it. For years past, New Orleans has been discussing this problem, and a number of motors have been proposed, The matter has recently come up again, and, during the past two months, has been discussed in the city council, the press and public meetings. While there was much difference of opinion exhibited, all parties seemed to agree on electricity as a promising motive power. Some wanted the dangerous and hideous wire system, others the heavy and expensive electric motor; and thus a very decided quarrel was started between these rival electric forces.

There is no doubt that electricity will move horse cars, but its superiority over mules is doubtful. It is certainly, as far as the world has gone in electricity, a very expensive force, and if it possesses any advantage in cost, that advantage is too slight to give much encouragement or to induce us to change our whole car system.

It seems to us that there are other cheaper and better systems—that, knowing how expensive electricity is, we should not accept it as offering us our only improved motor, but should investigate other methods as well. It is strange indeed that while New Orleans is quarrelling over rival electric motor systems, a patent taken out by a New Orleans man should be recommended in England as offering the very power needed for moving horse or tramway cars.

The Detroit Storage Battery.

The Woodward Electrical Company, of Detroit, Michigan, are making quite a stir in the street railway community. They state four whys showing that "the Detroit Storage Battery" is particularly adapted for traction purposes:

1. The plates possess great solidity, which enables the cell to withstand the hard usage it is liable to, in working railroads, street cars, etc., better than any other cell on the market.
2. The Positive plates do not buckle and the cell gives no trouble whatever.
3. The plates are constructed of porous lead; the pores are filled with the active material, and being of a wedge shape form, it is quite impossible for the parts to be shaken out by the vibration or jolting of the car.
4. These cells will withstand the high rates of discharge which they are often called upon to do in starting the cars or ascending steep grades.

General Manager F. B. Trout informs us (January 4) that the street railway companies are crowding them for their batteries, which they can not make fast enough, being now something like 21,000 cells behind orders. They expect to reach their new factory about Feb. 1, when facilities will be completed to turn out 1,000 cells per day. Mr. Trout says: "We appreciate the fact that we have the only battery to-day suited for traction work."

A public exhibition of this battery was made at Detroit so far back as the last week of August, 1887, as reported in the STREET RAILWAY GAZETTE, Vol. II, p. 187, and since then perfections in details have been accomplished and a strong company formed with Gen. Russell A. Alger on the board of directors. Our readers may expect further information concerning this battery in the near future.

The Crowded Street Car.

The shades of night were falling fast,
In one box-car were fifty massed,
While thirty more were packed outside.
The tender-voiced conductor cried:
"Move forward, please!"

At every corner more piled on,
'Till every inch of space was gone.
No nickel-bearer was denied,
And still the meek conductor cried:
"Move forward, please!"

The shivering shop-girls stand in groups,
Who fain would ride within those coops.
To board the cars they vainly tried,
And yet the slim conductor cried:
"Move forward, please!"

To realize th' ideal jam
'Twould need a big hydraulic ram
To crowd the passengers inside
Who heard not when the fellow cried:
"Move forward, please!"

One day a man of fearful might
Packed all the people in so tight
They stuck together in a lump,
As solid as a hickory stump—
"Move forward, please!"

EUGENE WOOD.

—*From the Chicago News.*

General Superintendent John Harris.

Cincinnati stands at the head of the street railway communities in the work of suppressing strikes. The enchanting letters, "U. S. MAIL LINE," on front of their cars, contributed somewhat to that end; Col. Kerper's vigorous action in moving the strong arm of the law startled the strikers and took the wind out of their sails; and the friendly feeling—brotherly love, we may say—existing between the presidents and managers of the various street car lines in the Queen City so discouraged the malcontents that they were greatly confused and unnerved. But the man that killed their Goliath, and made strikes a thing of the past, is Mr. John Harris, general superintendent of the Cincinnati Street Railway Company.

The name of General Superintendent John Harris is quite familiar to the readers of the STREET RAILWAY GAZETTE by this time. In Cincinnati, and in every city in Ohio, as for the matter of that, his name is a household word. We have reported presentations and serenades to him before. Now comes news of two handsome presents to him in one day. This is how the events were set forth in a Cincinnati newspaper the next morning:

"*Doubly Caned.*

"Three hundred members of the Street Railway Employees' Protective Association assembled at Eagle Hall, Eighth and Central avenue, for the purpose of manifesting their appreciation of the many courtesies extended them by General Superintendent John Harris, and also for his efforts in aiding in making the parade of October 5, when the street railway boys visited the Centennial with Mr. Harris as Grand Marshal, a success.

"When Mr. Harris entered the room last night he was accosted by Mr. W. H. Armstrong, a driver on the Fifth street line, who, as spokesman for the members of the association, briefly recounted the many favors received from Mr. Harris, and concluded by handing the completely surprised superintendent a massive gold-headed cane, a magnificent specimen of the jeweler's art. It was inscribed, "Presented to John Harris by the Street Railway Employees' Protective Association," and bore also the monogram "J. H.," and in another place, "Nov. 3—John Harris—1888." Mr. Harris was, as stated, greatly surprised, but he managed to stammer out his thanks, and the boys made merry until a late hour.

"Mr. Harris was the recipient of another cane, also gold-headed, yesterday, sent him by the street railway boys of Louisville, in recognition of courtesies extended on the occasion of their visit to the Centennial."

We dwell upon this subject of testimonials because these events are but the indications of the friendly feeling which keeps out dissatisfaction; and others may take a hint therefrom—not to imitate, but to observe that friendliness is a powerful harmonizer. This is what Mr. Harris wrote, acknowledging receipt of one of the gold-headed favors:

Cincinnati, Ohio, Nov. 10, 1888.

To the officers and members of the Street Railway Employees Mutual Protective Association.

Dear Sirs and Brothers:—To have won your approval and that of the association you so kindly represent, is indeed sweeter to me than anything else that life with all its prizes could offer. I am bold enough to say that I have endeavored to win the good will of my fellow-employees, of all grades and classes, but I am modest enough to assure you that this gift you presented me with on the night of our last meeting, and which was so totally unexpected, so affects me as to leave me poor of speech, but rich in thankfulness and gratitude. With thanks, I am Yours truly, JOHN HARRIS, Supt.

U. S. MAIL LINES will have a thorough trial at Baltimore, where letter boxes are placed on all cars. Postmaster Brown (whose interesting letter on the subject appears in our Street Railway News, under Maryland) says that the fact of the cars being letter carriers will not prevent strikes.

AN engineer, of great ability, is located in Chicago, who intends to bring out a new motor.

"A Street Car Reform."

Such is the heading of an article, a column and half long, in the Los Angeles *Tribune* of Dec. 30, showing that the public of that charming city are benefited and pleased with the change recently effected in street railway proprietorship and management. And it can not fail to be gratifying to Mr. C. B. Holmes and the rest of the purchasing syndicate. The *Tribune* says, among other things :

The street cars of the cable system are hereafter to be run for the accommodation of the public. This statement, rash as it seems, is a cold solid fact, and the change is due to the change in management, eventuating from the taking possession of the lines by the Chicago syndicate. The superintendent under the new regime, Mr. J. C. Robinson, has been connected with street car systems all his life, and is the man who introduced the cable system into the large eastern cities and into Europe. He has shown that he knows his business by the way in which he has gone to work to reform the street car service of the city, the greatest abuse that the citizens have ever suffered under. The first step was the introduction of a set of rules for the guidance of the conductors, under which they are enjoined to be polite, courteous and obliging ; to answer civilly, as best they can, any enquiries addressed to them by the passengers ; to provide seats for passengers ; to assist elderly persons, ladies and children on and off the cars ; to look out for passengers who may desire to get on or off. Besides these rules, compliance with which will be compulsory on pain of dismissal, there are also various rules governing the collection of fares that are not of particular interest to the public at large. Mr. Robertson will also do away with the bell punch, introducing the way bill system, which will be an even more effectual check upon dishonest employees—and which will forever kill the "brother-in-law" business. Under this system each conductor is furnished with a way bill, to be carried in a conspicuous place, upon which he must enter at once upon receiving it the fare of the passenger, and he must turn in this bill at the end of every run with the amount called for upon it. The fares are entered upon the bill in sight of the passenger, and as the writing must be done with a blue pencil, there is not the slightest possibility for peculation.

Mr. Robinson has instituted still another improvement in the street car service, and that is the putting of conductors on the Ninth street line, in addition to the other trunk lines. This gives all the lines running through the city a full complement of men and, besides giving employment to a great number of laborers, will add largely to the public convenience.

But the greatest reform of all those introduced by Mr. Robinson, with the beginning of the new year, will be in the running of the cars. Printed time tables have been prepared, similar to those in use on the Southern Pacific and other railway systems, and all cars will be run on schedule time.

A Safety Guard for Cable Cars, Etc.

Mr. R. M. Edwards, a stationer on Montgomery street, San Francisco, has for some time been studying the subject of accidents on cable-cars, and has taken out papers for a patent safety guard, which he is confident will not only prevent the many fatal accidents which occur, but will make it impossible for any one who may be run over by the dummy to be mangled, as many of the victims are. Mr. Edwards' invention consists of an oblong wooden frame, which is attached to the front of the dummy and elevated not more than two inches above the ground, the frame covering the entire front of the dummy and also the width of the track. In this frame are fitted seven wooden rollers covered with rubber, and revolving at such an angle that a person striking against them is by a simple momentum of the dummy thrown aside, off the track and away from possible injury by either dummy or car ; the guards now in use and consisting of a flat table-board, serving only to roll the victim over and over on the track in front of the dummy, and thereby bruising and mangling him. The frame in Mr. Edwards' invention, although oblong, projects from the dummy somewhat in the style of a locomotive cow-catcher.

A Victory for Overhead Wires and Poles.

Col. Kerper has come out on top, as usual, in his effort to operate his electric road at Cincinnati. He was in the midst of a sharp legal fight when the Ohio State Tramway Association held its annual meeting, last November, in the Queen City, and he brought "The Lunch" to a close in good time, so as to have a good rest preparatory to pushing his "case" ahead next morning.

The *Cincinnati Enquirer*, of Dec. 13, says :

The Circuit Court yesterday decided the case of the Mount Adams and Eden Park Railway company against Howard and John F. Winslow. The company had sued the Winslows to enjoin them from removing a pole erected in front of their premises by the company, on which to place wires for use in operating an electric street railroad on Walnut Hills.

Judge Maxwell refused to make the injunction perpetual, holding that before such a pole could be erected, the consent of the abutting property-holder must be obtained. The Circuit Court held the contrary. It decided that a street railroad can be operated on the streets when granted the right to do so by the municipal authorities, without obtaining the consent of a particular property-holder, unless some special or particular injury is thereby done to him.

The Court also found that there was no danger to life or property from the use of the wires, and the passage of an electric current over them ; that they will not work any substantial injury to the premises or impair the rights or impede the access to the property. The judgment of the lower Court was reversed. Mr. Kerper says that he will now proceed with the construction of the road, and with improvements make it a success.

The Barr Cable Railway System.

Col. P. F. Barr, of the St. Paul (Minn.) City Railway Co., writes, under date of December 15 :

During the year 1887 this company constructed two and one-third miles double track cable railway, and it was put in operation about February 1st of the present year.

This was constructed very similar to other cable railroads in existence. During the progress of this work, and after examining all other roads which had already been constructed, the writer became convinced that a more simple, durable and consequently cheaper conduit could be constructed.

Plans were made and patents obtained with this idea, and late in the season this company commenced the construction of an additional line of cable railway, two and two-thirds miles, double track, under this system ; about one mile of which has been completed, and work closed down for the winter. They succeeded in being able to construct five hundred to six hundred feet of double track per day, of as substantial, if not the most substantial, of any road in existence at a very much reduced cost.

It is expected that construction will be resumed about April 1st next, and that the road will be in full operation about June 1st.

All persons interested in street railroad transportation are cordially invited to examine this construction, either now or hereafter, and any further information desired will be freely given.

An Ex-Conductor's Tale.

"I see by your last week's issue a communication regarding a new horse railroad, and thinking that perhaps a statement from an old Boston conductor as to what a car on a good paying line could accomplish might be of interest to some of your readers, I send you the following : In one day on my regular route I carried 1069 passengers, running nine trips for the day's work. This was one extra trip. I earned for the company that day rising $55. This was on the Bay View branch of the South Boston Horse R. R., on open car No. 67, with a seating capacity of 40. My last trip from Scollay Sq. to the Point I took 101 fares, and I was beaten by three cars on the Dover St. line. In this connection I will say that I frequently took 85 or 90 fares off a box car with a seating capacity of 22 on a single half trip from Boston out on a rainy night."

AN OLD CONDUCTOR.

Met on the Road.

IN NEW YORK.—Geo. F. Small, one of the Hale & Kilbourne Mfg. Co's. oldest and most competent salesmen. All delegates to the recent convention in Washington will remember Mr. Small, and those among our street railway readers who were not know him well anyhow. He was en route to Buffalo on a flying trip, from which point he went east to spend the holidays with his wife and daughter at their charming residence in Allston, Mass. "Here's tae ye, auld man."

***

ON C., H. & D. TRAIN en route to Findlay, O., from Cincinnati, Col. Geo. B. Kerper and Mr John Harris.—With commendable foresight they telegraphed to Mr. Chas. B. Clegg to join them, adding, by way of a postscript, that some lunch, etc., would be acceptable upon arrival at Dayton. Mr. Clegg received the telegram too late to do justice to the latter part thereof. However, he met the two gentlemen at Dayton, and after partaking of a "depot" lunch went on north with them to Findlay (and here all further trace of their movements was lost).

***

IN NEW YORK.—Charles B. Kaufman, representing the A. French Spring Co., of Pittsburgh. Mr. K. has been "on the road" so long that he is well known to a large number of both steam and street railway officials. Report has it that more than one man almost dreads to see Bro. K. enter his office, knowing fully well that he rarely leaves without an order, whether the party is ready to place it or not. If such reports count for aught, then, friend Kaufman, thou hast, indeed, an enviable reputation as a salesman.

***

IN CINCINNATI.—Harry Simpson of the Lewis & Fowler Mfg. Co. Few men have more friends than has Mr. S. A long career of experience in selling goods, coupled with a gentle dignity, but thorough genialty of manner and a blameless record, has brought Mr. Simpson to his present position. In his early days he was a street car conductor, and the practical experience thus gained has fitted him to a remarkable degree to place the merits of registers before the street railway fraternity. "A prosperous New Year to you, friend Simpson, and many of them."

***

AT SPRINGFIELD, O.—Gen. Asa Bushnell, vice-president of the Citizens Street R. R. Co., of that city. The first time that the writer had the pleasure of meeting this gentlemen personally was in '87, when, with admirable grace and infinite tact, he presided at the banquet given by his company to the members of the O. S. T. A. at the Arcade hotel at that place. Gen. Bushnell has long been prominent in Ohio politics. He is a staunch republican, one of the most popular members of the Lincoln club of Cincinnati, and if the heartfelt wishes of the voters of Ohio counted for anything, he would have been the governor of that state long before this. But politics are treacherous things at best, and even more uncertain than a woman's love. Not long ago the General was returning from a political meeting when, without a moment's warning, some miscreants set upon him and injured him severely, striking him on the head with a brick. No cause but "general cussedness" can be assigned for this cowardly attack, and, although several men were arrested for the assault, yet no conviction followed. It is doubtful if the ill effects of that assault will ever be totally eradicated. A more public spirited citizen than General Bushnell would be hard to find, and his winning manner endears him to all who have the good fortune to meet him.

***

IN JOHNSTOWN, PA.—Augustine W. Wright. Who is there in the street railway business that does not know Mr. Wright ? If there are any let them stand forth as curiosities. Mr. W's. book (the original of which appeared primarily in the STREET RAILWAY GAZETTE) "American Street Railways," is meeting with a large sale, and the increased demand for the same evidences the fact that its publication was by no means inopportune.

***

IN SPRINGFIELD, O.—Wm. H. Hanford, superintendent Citizens Railway of that city, and upon whose shoulders the chief burden of its management rests. On arrival at the uptown office of the company on Jan. 3, Mr. Hanford was visited by an employees' committee of two, consisting of Messrs. Delleger and Leaher who, on behalf of their association, presented Mr. H. with a beautiful gold chain and locket, together with a massive gold ring. This mark of esteem at the hands of his men caused Mr. Hanford no little satisfaction, and it goes without saying that the testimonials will always be highly treasured by the recipient.

***

ON Pennsylvania limited en route to Louisville, Mr. A J. Moxham, president Johnson Co. (late Johnson Stee. Street Rail Co.) Mr. Moxham's name is almost as familial as a household word with the majority of street railway ofr ficials. Mr. Moxham is one of those eminently successful-men who have undoubtedly risen above his fellows by the closest personal application to the business of his company, and by an undisguised desire to have all work leaving its mills of such quality as to be beyond inspection, which accounts for the fact that the Johnson Co. stands to-day without a peer in its line of business.

TRAMP.

The council has passed an ordinance authorizing the Metropolitan Street Railway company to run its cars on Twelfth street, east of Charlotte, on Eighteenth, east of Olive, and on Fifth street, west of Wyandotte, Kansas City, at a speed of ten miles an hour.

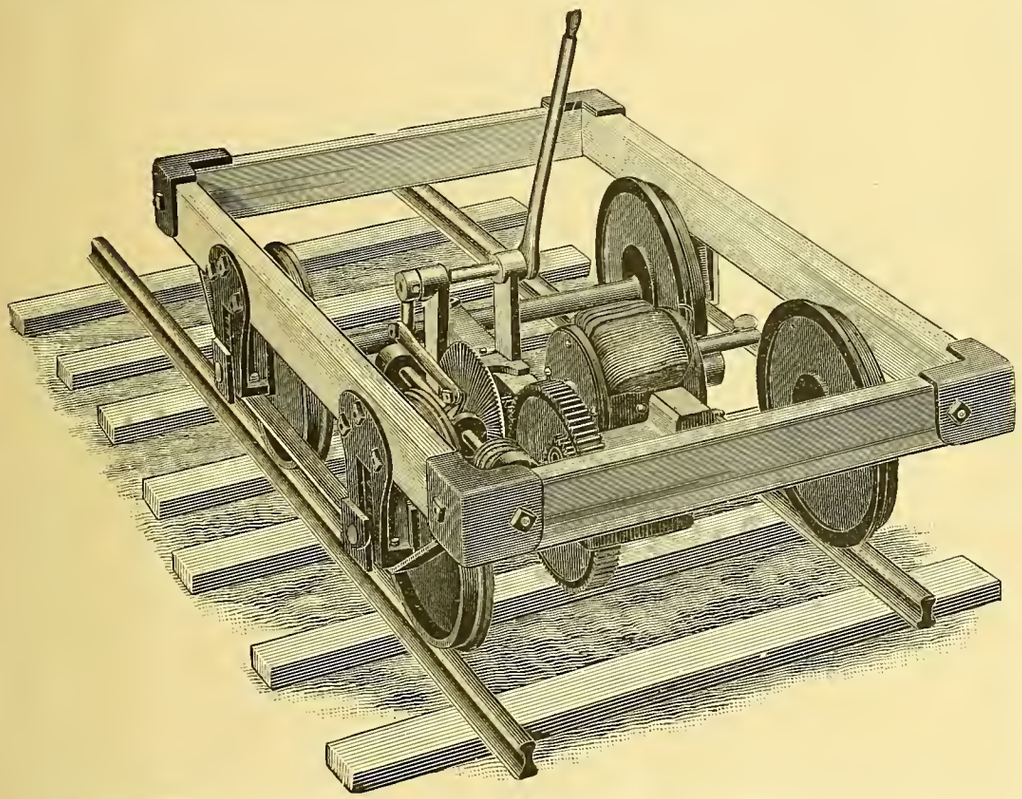
The Metropolitan Cable company is making exhaustive experiments with heaters for street cars. The Kansas City Cable company is satisfied with the system it has adopted.

New Gearing For Electric Railway Cars

We illustrate herewith a new gearing for electric motor cars, whereby the high speed of the motor armature and the force transmitted to it by the electric current are multiplied into varied units of power in either a forward or backword direction on the axle, or the same locked rigid at the will and under the control of the operator, by means of a single lever, without stopping the motor or changing its velocity or direction. The operator requiring no knowledge, whatever, of electricity in the running of his car.

The designers and constructors of this system are Messrs. Jones & Rogers, mechanical engineers, of Cincinnati, Ohio, who, in addition to years of labor in the railway and mechanical field, have spent the past four years in a careful study of the electric railway problem, realizing that electricity was the coming mode of transmission in place of the mule.

Referring to the illustration, the pinion on the armature of the motor drives the large gear which is loose on the axle, and carries a triple differential train, the center gear of which, on



one side, is keyed to the axle, the one on the opposite side has a worm wheel fast to it and is loose upon the axle. Now it will be noticed if no further mechanism be applied and the motor started, the large gear will rotate, causing the differentials to rotate on their own axis, and to revolve around the axle of the car. In this condition the center gear on the axle stands idle, acting as a driver, and the loose center gear carrying the worm wheel is driven backward and no work is performed, but when the backward motion of the loose gear is retarded, the power from the motor is transmitted to the opposite gear and the loose gear becomes a driver. The amount of fixed or increased retardation given this loose gear establishes the amount of power and speed transmitted to the axle in a forward direction, and the increased impulsion given the loose gear in a backward direction proportionately establishes the power and speed of the axle. All these combinations of speeds and powers are attained and established by means of a worm fast on the spindle shaft and meshing with the worm wheel previously mentioned, the shaft being driven by the small sliding pinion driven by the large face wheel on the end of the armature shaft and operated by means of the upright lever. The worm wheel, worm shaft, small pinion and face wheel, taken collectively, are called the governor and simply regulate the amount of power to be transmitted from the motor to the axle through the differential train, and may be removed and power still transmitted but without the variations gained with it.

In moving or switching cars by hand at the car-house the axles are free to rotate without driving the gearing or motor, and in case of accident to the motor out on the line, the following car can tow the broken one in with no further trouble than would be necessary in hauling an ordinary coach. All back lash of the gearing being removed.

Another important point of advantage which shows that Messrs. Jones & Rodgers appear to be in the right course lies in the fact that they have made nothing arbitrary requiring alteration or change of present systems, as all electric systems and car constructions are left the same and they build the connecting link of proper economical transmission of power between the motor and the wheels.

"Perfect" Motors.

A peculiar feature in the proceedings of the Ohio State Tramway Association, fully reported in our last issue, is the number of "perfect" motors spoken of. The Hon. G. Hilton Scribner, New York, it was said, is importing a "perfect" motor discovered in Europe. Mr. Wm. Richardson, the famous "Deacon," has seen it. No sooner was that statement made than Mr. Henry Martin announced that he has supplied the needful to a mechanic who is now perfecting a noiseless and moveless cable that will never break nor cause the slightest inconvenience in any way. The policy of Mr. Martin and his protege is to keep it dark for the present. Mr. Martin was good enough to take us to his confidence only so far as to say that the cable will not move, but the "grip" will "walk" along the cable, instead of the cable pulling the grip. Thus pulleys will be dispensed with, and there will be no waste of power, which is a striking feature of cable railways as at present operated. From Denver, and from San Francisco, came further announcements of perfection in street railway operation, the particulars of which may be seen in our report of the O. S. T. A. meeting.

So lively was the talk of "perfect" motors, other than electric, at the meeting referred to, that electricity would have been forced to the shade had not the man from Ashtabula put in an appearance. As it was, the revival of the Grove battery kept electricity in the front. And altogether there was quite as much new "information" held forth at the Ohio State meeting as there was at the meeting of the National Association in Washington the previous month.

But outside of these association meetings, there is much activity in the news of "perfect" motors. Some time ago we recorded the report of a new perfect steam motor at Palmyra, Wis. General Manager Griffith assures us that the Palmyra motor will soon be on the market; and in all probability our readers may look out for the Palmyra advertisement in our next issue. Col. Thos. Lowry, it is said, has ordered several of the Palmyra motors already. We hear also that Col. Lowry has other perfect motors on the tapis.

In another part of our present number is an illustrated description of the Patton motor, something very different to everything yet developed for street car propulsion.

One thing is very evident, namely that the air is full of the spirit of invention in the street railway community, and the concensus of indications lead to the expectation of some extraordinary development in the near future.

Mr. Elias E. Ries, of the Ries Electric Railway and Traction Increasing System, has just been granted three important patents on electric railway motors. These motors differ from all motors heretofore constructed, in that they can be operated either separately or simultaneously, by two or more independent currents differing from each other in electro-motive force and current strength. The object of this construction is said to be to permit the motors to be operated either from the line conductors (overhead or underground) or from a few cells of secondary battery carried upon the car as a reserve force, or by both together. The motor windings are so arranged that the motor operates at its full efficiency under each condition. One-half of the motor may even be made to act as a generator for recharging the battery, when the motor is doing less than its normal amount of work. This form of motor has been devised especially for use in connection with the Ries combined line and secondary battery system, and possesses numerous points of superiority and practical advantages over the motors heretofore constructed for street railway work.

The St. John (New Brunswick) *Sun*, Nov. 19, is authority for the statement that "a novel electric railroad has been completed, running from the shore of Lake Lucerne over a bed cut in the solid rock to the summit of the Burgenstock, 1330 feet up. It has a gradient of 32 to 58 per cent. The electricity is generated by a water wheel in the river Aar.

The Thomson Houston International Electric Company has opened a branch office in New York, at 115 Broadway (Boreel Building), and Mr. Louis W. Magee has charge. Mr. Magee will spend half his time at the New York office and the remainder at the Boston office, *i. e.*, Tuesday, Wednesday and Thursday in New York, and Friday, Saturday and Monday in Boston.

Mr. T. William Harris, of the firm of T. William Harris & Company, New York, has been elected secretary of the Pomeroy, Middleport & Syracuse Street Railway Company. This road will extend from Middleport to Syracuse, O., a distance of over ten miles, and will be built in a most thorough manner for a heavy freight and passenger business.

Mr. W. L. S. Bailey, engineer of the Chicago City Railway Co., having profited by experience in the construction of 120 miles of cable and horse roads, is rapidly becoming famous as a consulting engineer and street railway expert. He has recently furnished plans and estimates for several street railways, some already built, and several now in course of construction.

Cable yokes are placed along the sides of Madison street, beginning at the western extremity, for a long distance, preparatory to converting that important thoroughfare to a cable railway.

The property owners interested in the movement to secure a street car line in the extreme southeast portion of Kansas City met two or three times recently in the rooms of the Boston Loan and Trust company in the American National Bank building. There is a determination of the citizens in that section to have a road. In order to get it a bonus of $10,000 will be given.

The Street Railway Gazette.

P. G. MONROE, - - - - - - PRESIDENT.
S. L. K. MONROE, - - - - - - TREASURER.
E. V. CAVELL, - - - - - - MANAGER.
WILLIAM HUGHES, - - - - - - EDITOR.
EDWARD J. LAWLESS, - - - ASSOCIATE EDITOR.
H. D. COZENS, - - - GENERAL EASTERN AGENT.

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Matter for publication should reach the Chicago Office by the 1st of each month. All communications should be addressed, THE STREET RAILWAY GAZETTE, Chicago, Ill.

Articles and papers on subjects relating to intermural transit always appreciated; the GAZETTE's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways—on the surface, elevated or underground. A special column is devoted to the publication of trade notes and items from manufacturers and dealers.

THE STREET RAILWAY GAZETTE wishes a happy and prosperous 1889 to all.

"MUST go," is the refrain to a new public sentiment at New Orleans. We have heard often enough that the horse "must go," the mule "must go," the car stove "must go," and lately that the bob-tail car "must go." Now the *Times-Democrat* (New Orleans) declares that "the smoking car must go" off the tracks of street railways.

ELECTRICITY SUPREME, is the caption of an article in the Pittsburgh *Dispatch*, showing that the cable car system is only temporary, and that electric motors will eventually drive them into obscurity. A prominent mechanical engineer is reported as prophesying that "the cable road system will not last longer than five years," and then the conduits will be occupied by electric wires.

DETROIT has made a big stride in street railway legislation. When the mayor vetoed the first electric railway franchise, last September, he strongly urged upon the council the necessity of dealing with the street car question in a more comprehensive way than by peddling out one franchise at a time, and passing ordinances for lines "for which there is no more popular demand than for a fifth wheel to a wagon." We report the passage of four new ordinances in this number.

EXPIRING franchises have attracted special attention in several cities recently. The Kansas City *Times* thinks that "in view of the fact that new street railway and cable franchises are constantly asked for, and that many are sure to be granted within the next few years, it would be well to consider carefully a point not hitherto discussed in council or in the public prints. That point is this: Hereafter all franchises of that sort should be made to expire at the same time—that is to say, all franchises granted to any one company should be timed to end simultaneously." The city editor of that paper seems to have been inspired with that idea by the application of the Metropolitan company for a loop line franchise to last several years after their other franchises expire. He finds that the live franchise will keep life in the dead ones.

INSPECTION of electric railways, by Mr. Edw J. Lawless, cannot fail to be interesting. The first chapter appears in this number of the GAZETTE. Mr. Lawless is a cable man, and so he is not liable to be carried away by any blind enthusiasm for electric propulsion. On the other hand, he writes down the result of his observations in a fair and candid manner; and as a clear proof that he is not too prejudiced against electricity it may be mentioned that he has reported favorably to the Metropolitan company, Kansas City, for placing electric motors on the Armourdale and Rosedale lines, where there are but light grades. And, moreover, Mr. Lawless has obtained a franchise for an electric road at Springfield, Mo., which he is now constructing, we understand. The *Penny Post* (Kansas City) says: "Mr. Lawless, as superintendent of the Metropolitan lines of this city, has attained a prominence throughout the country as authority on street railways second to none. For some time he has been investigating the use of electricity as a motive power, and has spent several months in the East for this purpose. He returned perfectly satisfied as to the practicability of electricity as a motive power, and proceeded at once to make arrangements for demonstrating it. His connection with the new line at Springfield insures its success."

DOGS in street cars are certainly out of place, we think. We read last summer of a man in Boston taking a turkey with him into a street car and placing the bird, or fowl, by his side on the seat. When the conductor collected the fares, the man paid ten cents, saying "for me and my friend"—pointing to the turkey. When the car became full, a man standing requested "that thing" to be taken from the seat. The owner refused to do so, and when the conductor was appealed to, he said he had received a fare for the turkey and therefore could not interfere. The Brooklyn *Eagle*, of Dec. 10, relates a more curious case, where a dog is in question. It states, "that Mr. D. J. Evans, the superintendent of the Brooklyn City Railroad, has granted permission to a woman to carry a dog in the cars of the company for three months from date, 'providing that the cars are not crowded and no complaint is made by the passengers.' The name of the woman is not mentioned, but the dog, a small black-and-tan, is called Fido, as many other dogs are. Why discrimination is made in this case is not clear. Certainly the superintendent does not explain. Is it because Fido is an especially harmless little dog or because Fido's owner is a strikingly handsome and attractive lady? The company has a rule against carrying dogs of all kinds in its cars, and some sound explanation may be reasonably expected of any departure from it. If the superintendent frankly admits that he simply desired to make himself agreeable to Fido's owner he cannot consistently refuse other similar applications, especially if the ladies are good looking. If, again, he bases his action on the harmlessness of the dog he stands in no better light. Expert testimony can doubtless be procured to show that there are hundreds of dogs in Brooklyn just as small and gentle and well behaved as Fido is. One of two arguments must be advanced, but in either case the superintendent leaves himself open to a charge of gross inconsistency. So far as we can see, there is but one way out of the dilemma, and that is for the company to run a car or cars intended exclusively for patronage by dogs. A sort of pound could be established near the City Hall, and a lady doing shopping down town, having shipped her dog and received a check, could recover him on presentation of the check at the company's pound."

PRESIDENT GEO. E. C. JOHNSON, LaFayette Street Railway Co., Indiana, is on the way to Florida—for the winter. He called on General Manager J. B. Parsons, West Chicago St. R.R. Co., before migrating and said, in course of conversation, that his electric railway at LaFayette is "working very well indeed." It is the Sprague system, and has been in successful operation about three months.

Personal Notes.

MR. CHARLES B. CLEGG stands at the head of our Santa Claus items in this number. Not only did he make Christmas pleasant to the employees of one of his street railways, but, on the principle that "one good turn deserves another," the employees gave a very nice present to Mr. Clegg in return.

MAYOR JAEGER, of Eberfeld, Germany, has written Mayor Roche asking full particulars of Chicago's cable system. It is proposed to establish cable lines in Eberfeld. Mayor Roche has sent a STREET RAILWAY GAZETTE to Mayor Jaeger.

MR. EDWARD LAUTERBACH is one of the directors of the Philadelphia Traction company. He is one of the most prominent of New York attorneys. He is a strong factor in many big corporations. He is vice-president and counsel of the Pacific Mail Steamship company, vice-president and counsel of the Third Avenue Surface Railway, of New York; general counsel of the Richmond and West Point Terminal company, counsel of the Chesapeake and Ohio Railroad company and president of the Metropolitan Electrical Sub-way company which is now engaged in the task of putting New York's telegraph, telephone and electric light wires underground. He was one of the authors of the Reading Railroad reorganization scheme and one of the committee appointed to carry it into effect. His experience with elevated roads was gained in the Union Elevated Railway of Brooklyn and the Brooklyn Elevated Railway, both of which he originated and built.

CAL WAGNER, the old minstrel, who recently abandoned that line in which he had been a great card, is construction superintendent of the People's Street Railroad, Syracuse, N. Y., a belt double track line running around the town and through some of the principal streets. That he is no fool is evidenced in our report of his action in our Street Railway News in another column of this number.

COL. THOMAS LOWRY, the magnate of St. Paul and Minneapolis, returned from the East yesterday, and says he will adopt a new motive power on his lines in Minnesota next spring, says the Chicago *Tribune* of Dec. 19th. It will be either that of the motor or storage battery, in operation on the Fourth avenue line in New York, or that of the conduit system in vogue in Boston, where the electric wire is sunk in a conduit not quite so deep as the cable and is controlled by a lighter grip.

Col. Lowry reached Minneapolis a couple of days later, and forthwith sent a contribution of $100 to the *Tribune* Christmas tree. And in its issue of Dec. 21 that great leading paper of the vast Northwest said that Thomas Lowry's generosity in matters of this kind is known the length and breadth of the Northwest. It is the largest single contribution which has been received, and many a poor child's prayer on Christmas day will be one of thanks that such generous hearts as that of Mr. Lowry are possessed by Minneapolis. In addition to this cash gift, Mr. Lowry has kindly donated transportation on all street car lines, including the motor, for the children who will come and go from Harmonia hall on Christmas day.

MR. SUMNER C. WELCH has been proved, by due process of law, innocent of the charge of which he was spitefully "convicted" by Judge Hawes. The majesty of the law has become involved in some curious complications by the clear acquittal of a man by a jury after he had been sentenced to six months imprisonment, practically for the same imaginary offence, by the judge. Lawyers John Lyle King and Charles E. Pope were authorized by a resolution of the county board last September to assist the state's attorney in the case of the appeal of Sumner C. Welch to the Appellate court, for which they should receive $500. At a recent meeting of the board the resolution was rescinded on the ground that Welch, after a trial in the Criminal court, had been found not guilty. But the worse predicament of all is that the sentence of six months has not been served. The Appellate court liberated Mr. Welch, on bail, until his trial. The trial is over; Mr. Welch is innocent; but the previous sentence stands!

MAP OF CHICAGO,

SHOWING ROUTES ASKED FOR BY THE DIFFERENT

ELEVATED RAILROAD CORPORATIONS.

EXPLANATION.

- Inter Ocean Alley Road.
- Onderdonk Alley System.
- Hannah System.
- Meige System.
- State Street "L" Road.
- State Street Alley Road.
- Jennings System.

TO RAILROAD DEPOTS.

RAILROADS.

	Depot No.
Baltimore & Ohio	5
Chicago & Alton	3
Chicago & Atlantic	6
Chi., Bur. & Quincy	3
Chi. & Eastern Illinois	6
Chi., Evan. & Lake Sup'r	3
Chi. & Grand Trunk	6
Chi., Mil. & St. Paul	3
Chi. & North-Western	2
Chi., R. I. & Pacific	4
Chi., Santa Fe & Cal.	6
Chi., St. Louis & Pitts	2
Chi., St. Paul & Kan. City	7
Chi. & Western Indiana	6
Illinois Central	1
Kank. Line (C.L.St.L. & C.)	1
Lake Shore & Mich. So.	4
Louis., New Alby & Chi.	6
Michigan Central	1
New York, Chi. & St. L.	4
Pitts., Ft. Wayne & Chi.	3
Wabash	6
Wisconsin Central	7

RAND, McNALLY & CO.'S
STANDARD MAP
OF CHICAGO.

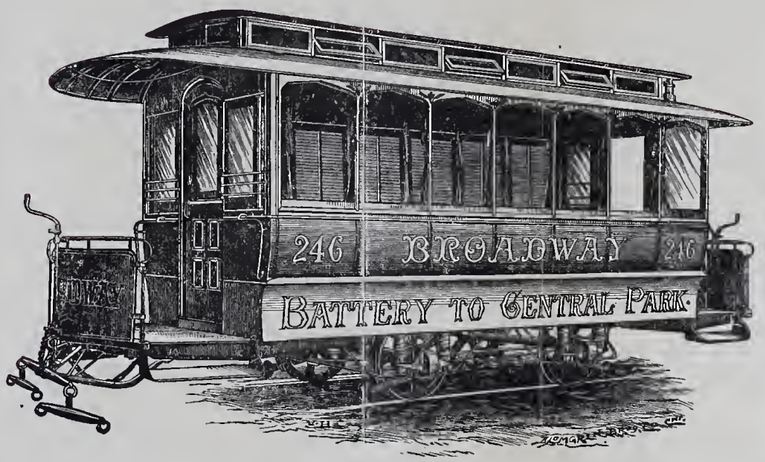
Pullman's Palace Car Company,

MANUFACTURERS AND BUILDERS OF

Railway and Tramway Cars

OF EVERY DESCRIPTION.

PULLMAN, ILL.



DETROIT, MICH.

Address all Correspondence to C. L. PULLMAN, Contracting Agent,

PULLMAN'S ✣ PALACE ✣ CAR ✣ COMPANY,

CHICAGO, ILL.

Street Railway News.

ARKANSAS.

Stuttgart.—A street railway will be built here in the spring. The Little Rock *Gazette* has said before, this is one of the growing towns of Arkansas, and is bound to be a good one.

CALIFORNIA.

Alameda.—The automatic street indicator is now in successful operation on one of Mr. Meetz's street cars.

Mr. Meetz informs us that he will proceed with the construction of the extension to his road as rapidly as possible.

Fresno City.—The Board of Trustees of the city of Fresno passed an ordinance, Dec. 3d, to the Fresno Railroad company, to build a street railway and operate it by "horse power, stationary steam power, electricity or other power, for the term of fifty years."

Los Angeles. — Mr. C. B. Holmes, of Chicago, has purchased the electric road which has been operated here for some time, but recently abandoned. Mr. Holmes, while presiding at the Washington meeting of the American Street Railway Association, was quite inquisitive concerning the state of the art of electric propulsion; but he did not express his own views thereon. But when subjected to an "interview," at Los Angeles, he said that "he had always been interested in electric roads, and believed in the future of electricity as a motive power for street lines." The electric road at Los Angeles was shut down by "the assignee," the 15th of October last. Mr. Holmes availed himself of the opportunity to buy it, and he guarantees a regular ten-minute service. The electric syndicate is independent of the cable company.

Marysville.—Next March or April will witness the laying of street car rails between Yuba City and Marysville.

Oakland.— The proposed cable road in Oakland to Piedmont has progressed so far as to have surveyors at work. It is stated that a cable system invented by Herman Isaacs will be used.

San Diego.—The San Diego Street Car company have completed the work of putting down their track on Fifth street between J and K.

San Francisco. — The cable of the new Polk street and Pacific avenue branch of the Sutter street railway system has been laid. It took only about two hours to do it, and the work was accomplished with complete satisfaction, and without any interruption whatever. The cable is 20,000 feet in length, and weighs something near 41,000 pounds.

New franchises were passed last month. The Omnibus Railroad Co. have obtained rights to run its cars on the southerly side of Market street, and to operate a cable road for forty years along certain routes. Mr. W. H. McLaughlin, and others associated with him, have the privilege of constructing and operating a "dummy" line; for forty-one years.

The Pine Street Cable Ry. Co. obtained a franchise December 17.

The Polk street and Pacific avenue Cable Road was opened to travel for the public Dec. 1st. The line is operated by the Sutter street company.

A syndicate's agent has been acquiring land on the line between Oakland and Piedmont, and it is believed that another cable road will soon be an outcome of this investment. It is whispered that the Southern Pacific company is behind the project.

A TIMELY DONATION.

The directors of the Market Street Cable Railway company, through their secretary, J L. Willcut, have sent the park commissioners their check for $3,200. This is the amount necessary to complete the tunnel in the park under the driveway, between the terminus of the Haight street road and the new children's play-ground. On December 6, President R. P. Hammond, of the park commissioners, addressed a letter to Colonel Charles F. Crocker, setting forth the condition and describing the location of the play-ground, and deploring the lack of $3,200 to complete the tunnel. On the same day Mr. Willcut replied, saying among other things:

"The directors of our company, as you are aware, have always been willing to assist in any measure of improvement necessary for the more perfect enjoyment of the park by the people, and learning from your letter that the funds at the disposal of the commissioners are insufficient to enable them to perform the proposed work unaided, they desire upon the present occasion to unite with the commissioners in carrying their plan into effect, and have instructed me to inform you that they will cheerfully donate the sum mentioned by you for the construction of this tunnel, viz., $3,200, for which amount I herewith inclose a check in favor of the park commissioners. Very respectfully, J. L. WILLCUT,
"Secretary and General Manager Market Street Cable Railway Company."

San Jose. — A petition has been presented to the board of supervisors for a franchise for a railroad along San Carlos street and Stevens Creek road from the city limits to the foothills, to be operated by horses or electricity. This scheme, as we understand it, does not conflict with the petition for a similar franchise from the town limits of Santa Clara to Saratoga, but is rather supplementary thereto, although asked for by different persons. The intention is to use the storage system of electricity, on the plan now in successful operation in Sacramento.

COLORADO.

Denver.—The Ransom Steamer has made very favorable impressions here, on the suburban roads of Argyle Park and Berkeley. The Denver *News* says Mr. Ransom's claims for the superiority of his locomotive "appear to be well founded."

Denver rejoices in a "ponderous cable." On Dec. 18, the machinery of the cable plant was put in motion at 2:30 o'clock in the presence of Governor Evans, Colonel M. A. Downing and a number of stockholders of the enterprise. When the moment of the starting drew near everybody became nervous and excited except the constructing engineer for John Witherell & Co., Mr. H. C. Wheaton. He cautioned the workmen in the pit beneath the monstrous drum and quietly requested the crowd to stand back. He then walked to the 800 horse power engine and let enough steam into the cylinders to warm them. He placed his hand on the valve wheel and Governor Evans, who stood behind him, raised his hands in expectancy. Mr. Wheaton signaled the chief engineer, D. B. Higgins, who reached for the valve wheel of the smaller engine. Both the ponderous piston rods moved forward at the same time, and the heavy drum revolved slowly. Wheaton turned to see the actions of the machinery and the old governor grasped his hand enthusiastically. There was a rush to the point where Wheaton stood, as everybody wanted to shake the hand of the man who could so accurately place so ponderous a system of machinery. Colonel Downing was beaming with joy as he shook hands with everybody, and remarked: "It is magnificent; so mathematically correct." The heavier engine labored slightly, but that did not amount to anything, it being caused simply from a little roughness of the cylinders, which the "follower" was grinding. In twenty minutes time it had ceased entirely. Our friend, Mr. Engineer H. M. Lane, the gentleman who engineered the laying of the plant in the ground, threw the lever forward, the groove truck descended and caught the cable, the gong was sounded and the magnificent, well-lighted and well-ventilated car moved majestically down Fifteenth street. Fully 500 people witnessed the start and cheered the event to the echo.

While Denver is rejoicing over the new cable road, the city laments the muddle made by its council in granting two franchises (to different people) over the same streets. The facts are, that with the exception of Fifteenth street, Broadway and Colfax avenue the Denver City Cable company has been granted a franchise to use all the streets of the city for cable purposes. When this ordinance was passed a franchise was in force conceding certain rights to an electric motor company, but worded so as to admit of an elastic construction as to the kind of power to be used. This franchise gives its owners the right to lay track on unoccupied streets or upon streets already tracked, if the consent of a majority of the property owners can be secured. Upon the faith of the city of Denver, given through its lawmaking power, the Denver City Cable company has let extensive contracts, involving large capital, for its cable system. This includes a line through Larimer street and to the eastern limits. The occupancy of Lawrence street by the Denver Tramway company for a similar purpose will seriously deteriorate the value of the Larimer street line and probably result in two unprofitable enterprises. It will also prove a detriment to the business section of Denver to have two cable roads on parallel lines so closely connected. It must be regretted that an injury so serious is entailed upon the Denver City Cable company because of miserable slip-shod legislation. That company under its old name deserves better of this community. It has given to the city a good railway service and has contributed in a most essential way to our growth and prosperity.

A fearful calamity occurred under part of the cable road Dec. 26, when five persons were killed. It was not the fault of the cable, however, but resulted from gross recklessness of the Denver Gas Co., whose men were excavating under the cable road on whom the track caved in. Fortunately no cars were passing over the place at the time.

CONNECTICUT.

Bridgeport.—Superintendent Lashar hopes to begin work on the Broad street horse railway line next spring, provided the company gets its charter, as petitioned for to the legislature. "It will be a big improvement, and help travel to and from the park."

Hartford.—More cars are to be put in operation shortly.

DAKOTA.

Deadwood.—"Deadwood is looking for an era of unprecedented prosperity," says a well-known street railway man, on the road, writing Dec. 18. "The iron for the street railway is for the most part in place and spiked down. The cars are here and in a few days the road will be in operation. It has been built and equipped almost entirely by Mr. J. K. Miller, one of the most energetic business men that ever crossed the Missouri river, and there is no question but that it will be a paying venture from the start. The work on the narrow gauge from the Bald Mountain district to the new reduction works is well along, and is being pushed as rapidly as men and money will do it. The reduction works will be ready in sixty days or less, and it is hoped that the railroad will be in shape to begin hauling ore by that time."

Rapid City.—The Rapid City *Journal* says, "that Fred T. Evans, of Sioux City, who is largely interested in real estate in this city, has sold his street railway for a handsome sum and proposes to transfer the scene of his operations to this field. Mr. Evans expressed his opinion while in the city the other day, that a narrow gauge road should be constructed as soon as possible to the tin mines, and proposed to unite with the people of this city to construct the desired line. Whether the people of this city are ready and willing to engage in such an enterprise is not a question, as their activity and energy is equal to their ambition, and the last is monstrous. Clear the way and the road will be built."

DISTRICT OF COLUMBIA.

The Washington *Press*, of Dec. 13, has the following, captioned "The Universal Motive Power:"—

Mr. H. C. F. Forrest, a member of one of the Chicago street railway companies, is stopping at the Arlington, and last night a reporter of the *Press*, for a few minutes, heard considerable about railroads.

"Washington has in some respects the best and in others the worst street car service of any city in the country," said the gentleman. "The electric railway running out New York avenue is a splendid piece of railroading and deserves commendation. The senseless hue and cry raised by your citizens against that road shows how little sensible Washingtonians are to their best interests. The poles used are not objectionable when regarded simply as disfiguring the beauty of the streets, and the overhead wires can hardly be considered as dangerous. Out in our little western town where hard, practical common sense prevails, such a road would be welcomed. But here your citizens rail and howl against this

road, and would do away with it if possible. Your other roads are all very good as regards management, but Washington is too large a town for horse car railways. I hardly think that the average Washington citizen would be willing to put up with the inconveniences attending the use of cable cars. After a representative citizen had walked from one end of town to the other in consequence of the breaking of a cable, he would long for the horse car with a soulful yearn. Neither of these, however, are the cars of the future, and it is certain that all the cars in this city will at some time be run by electricity. The storage battery holds many possibilities, and will some day be the universal motive power."

The Washington *Post* of Dec. 29 says: The Columbia Street Railroad completed arrangements a day or two ago by which on the payment of two cents to the driver transfers are given to the Belt Line at Fourth street and Massachusetts avenue northwest, and also at Eleventh street and New York avenue.

ILLINOIS.

Bloomington.—The Market Street line is completed and in operation. The rails, which weigh 37 lbs. to the yard, came from the Cambria Iron Works, Johnstown, Pa., and they are laid on oak ties. This line was constructed very easily and at small cost, as there was no paving to be done. Superintendent Irvine says that tracks may be laid in the ordinary streets of this city for $2,000 per mile.

Chicago.—The "L" road projects are moving forward somewhat. There are seven distinct companies, who seem to hate each other like sin, trying to obtain franchises. The most successful hitherto is the Meigs party, who have obtained an ordinance. The West Chicago Street Railroad company may still oppose the erection of such a road. The Onderdonk alley system has met with a serious set-back: a franchise may be granted, but with such conditions as to make it unacceptable. One of the morning papers has asserted that Mr. Onderdonk is working in the interest of the big railroad companies that are anxious for ingress into the business portion of the city, and that a franchise is sought under which a walled-up railroad may be built and operated. That may be true or otherwise. Certain it is that the Onderdonk scheme has not such a bright prospect of success has it had before the last eclipse on the sun.

Joliet.—The Joliet Light, Power and Transit company, at Joliet, received license of incorporation from the Secretary of State, January 4, capital stock, $300,000; to build and operate cable, horse, or dummy railways in the City of Joliet, and for the manufacture of gas and electric light and power; incorporators, Lewis E. Ingalls, John R. Staley, and Jason L. Wilson.

Moline.—Work on the bridge railway line, to connect the Rock Island tracks with those of Moline, was commenced December 19, in two places, and the work was pushed to completion vigorously, under the direction of Mr. Luck, constructing engineer of the Chicago City Railway company.

Springfield.—The Citizens' Street Railway company has placed heaters on the platforms of their cars. They will greatly add to the comfort of the patrons of the line during cold weather.

INDIANA.

Elkhart.—The Elkhart Street Railway company hope to have electric cars (Fisher system), running by the time the February Gazette is issued.

Irvington.—The Irvington Street Railway company contemplate extensive improvements right away.

Jeffersonville.—At the regular city council meeting, December 18, a resolution, revoking the franchise of the Jeffersonville and Ohio Falls Street Car company on account of the time expiring, was read and adopted.

An ordinance granting the exclusive right of way to M. V. McCann, James Burke, Albertus Jones, Laban Phelps and C. L. Head to construct and operate perpetually a street railway, under the agreement that work should be commenced within six months and to be in operation within one year, was referred to special committee.

La Fayette.—Superintendent Murdock has resigned, and Treasurer Knight has charge of the street railway at present.

IOWA.

Burlington.—Suit has been brought against the Union Street Railway company on an account for material furnished, accompanied by a petition for receiver, and an order was issued by Judge Phelps, December 12, appointing Mr. F. G. Jones to that position.

Davenport.—Mr. C. C. Luck, Mr. Holmes's constructing engineer, has being doing similar work on the Davenport and Rock Island Bridge as that reported under Moline. The street car lines of the three cities will thus be united.

Sioux City.—The city council of Sioux City has granted a franchise to the Rapid Transit Railroad company to build two miles of elevated road, connecting the residence portions in the east and west ends of the city. The road is to be completed in three years, and work will be commenced at once. Major Cheney is at the head of the movement.

An amendment to the cable railway ordinance was passed Dec. 4, extending the time from January 1 to May 1, 1889, for the completion of the line. The power house and car building (combined), if constructed according to the plans submitted to the council, will be 175 feet long by 152 feet wide and two stories high. The west two-thirds will furnish room for ten cars, and the power plant will occupy the remaining third. It will be constructed of brick and will be a solid and substantial structure with a neat finish. A cupola surmounted by a flag staff will ornament the roof. Some alterations in the plans will probably be made, but they will not depart much from the above description, we are informed.

KANSAS.

Topeka.—The Metropolitan Street Railway company entered into a contract, Dec. 11, with the Thomson-Houston Electric company, to operate the south side street car line by electric motor after March 1.

The rival street railway lines of the city had a little "sport" again, Dec. 21st. About 11 o'clock the night previously, the Rapid Transit company, under direction of General Manager Patton, began building from Clay street north on Fifth street at about the same time the City Railway forces, under direction of Superintendent Littlefield, began building from Buchanan street north on Fifth. The result was that by noon the City railway had about two blocks of road in operation, while the Transit company had one block between Clay and Buchanan streets and a short strip between the City railway track and the entrance to Potwin Place. The City railway track was operated by one car which Superintendent Littlefield had placed in position as soon as the rails would hold it.

In the afternoon the attorneys of the City railway, Messrs. Gleed & Gleed, got a restraining order of Judge Guthrie, and all work was stopped at night until the question is settled.

KENTUCKY.

Louisville.—The City Railway company's Portland stables were consumed by fire, Dec. 19, from causes unknown. There were 195 mules in the stalls, and the watchman and a number of other employees set to work to get these out. Their task soon got very difficult, as the building was filled with smoke and flame. All the beasts were rescued, however. The loss is almost entirely (if not quite) covered by insurance.

The Louisville City and Central Passenger Railway companies announced, January 1, that passengers who wish to can transfer, on Fourth street, to and from the Second street and East and West Walnut street cars without extra fare, the transfer to be made to cars in meeting. These additional transfers will be of great benefit to the public. These two companies are now practically united; and considerable extensions and improvements are contemplated.

LOUISIANA.

New Orleans.—The *Picayune*, *Items*, and *Times-Democrat* are devoting special attention to electricity just now. The *Picayune*, Dec. 13, in order to "pile up the agony" against electric wires above ground (whether for lighting or power purposes), published an account of the burning out of the heart of a willow tree stump on Common street, near Bolivar, to which was attached a guy wire, supporting one of the poles of the Louisiana Electric Light company. The article dwelt with horrifying emphasis upon the probability that: "In damp or wet weather it is more than probable that the electric current, which always seeks the shortest possible means of reaching the ground, is diverted to these guy wires and renders them instruments of certain death, much more dangerous than would be shotguns loaded to the muzzle with buckshot and slugs and standing at full cock, for, with the latter, death could only come from a touch on the trigger, while a hand inadvertently placed against the tree or post would be productive of instant death, and the wire, tree or post would be still charged *to kill thousands more* should only portions of their body come in contact with the conductors of the death dealing current."

The *Items* and the *Times-Democrat* exposed the fallacies of the *Pic.'s* strange representations.

We understand that at a meeting of the presidents of the street railway companies of New Orleans, held Dec. 27, the subject of smoking cars was brought up; and a majority of the presidents declared in favor of abolishing them on their lines. It was agreed to put this "much needed reform" in operation on January 1.

MAINE.

Biddeford.—The directors of the Biddeford & Saco horse railroad held a lengthy session, but failed to agree upon a successor to Superintendent Akarman, who resigned. There were three candidates, Charles H. Andrews and George R. Andrews of Biddeford, and Fred B. Wiggin of Saco. The first-named was subsequently elected, we understand.

Brunswick.—Public opinion is in favor of a street railway here. The Brunswick *Telegraph* says: That a horse railroad in Brunswick and Topsham would prove a profitable investment to its stockholders there is but little doubt. Such has been the case in the villages of Fryeburg with a population by census of 1880, of 1638, and Fairfield by same census numbers 3041, while Brunswick and Topsham at that date numbered nearly 9,000 inhabitants, and at the present date would probably exceed 10,000.

Camden Harbor.—Messrs. W. T. Cobb, W. S. White, W. W. Case and others will apply to the next legislature for a charter to organize a corporation to contract and operate a horse railroad for the transportation of passengers within and through the towns of Camden, Rockland, Thomaston and South Thomaston, with authority to use steam, horses or electricity as a motive power.

Hallowell.—A correspondent says: It is reported that the Hallowell, Me., Light and Power Co. have sold out to the Kennebec Light and Heat Co. of Augusta, and that a petition to the legislature for a charter for an electric road to connect Augusta with Gardiner and to run through Hallowell has been largely signed by citizens of the latter place.

Stillwater.—An electric railway from Old Town to Stillwater is talked of, and it is proposed to utilize the roadbed of the old Veazie Railroad for the line. The road between the two places is very level.

Waterville.—The Waterville & Fairfield Horse Railroad company give official notice that they shall apply to the next Legislature for an amendment to their charter to allow them to use electricity to propel the cars. That notice has appeared in the Augusta *Journal*.

The Portland *Express*, Dec. 31, contains the following extraordinary paragraph:

"Hon E. F. Webb, of Waterville, who is largely interested in the Waterville & Fairfield Horse Railroad, which has been agitating the question of running cars by electric motor, has been in Massachusetts investigating the matter. He says the latest investigations convince him that it is not practicable to try and run the cars by electricity, and he doubts if they even ask the Legislature for that right."

We have sent the Hon. E. F. West a copy of the STREET RAILWAY GAZETTE, from which he may learn that electric railways are actually in successful operation.

MARYLAND.

Baltimore.—Mr. Wm. H. Brown submitted a resolution recently, which was adopted, asking the city counsellor by what authority the Catons-

ville Railway company charges five cents fare to Loudon Park cemetery on week days and ten cents on Sundays, and what action is necessary to regulate the same; also, whether this road can charge more than five cents within the city limits.

"U. S. Mail Lines."

The following letter from Postmaster Brown, of Baltimore, to the New York *Tribune*, is interesting in connection with the making street railways "United States Mail Lines:"

BALTIMORE POSTOFFICE, November 26th, 1888.

Editor New York Tribune:

DEAR SIR—I hope you will give me an opportunity to answer the following communication, which appeared in your journal on Saturday, the 24th inst., as special correspondence from Washington, under the head of "Street Cars as Mail Carriers:"

"Postmaster Frank Brown, of Baltimore, has been in the city for two days, placing before the Postoffice Department an apparently innocent plan to expedite the mail service in his city. Mr. Brown claims that his plan was original with him, and that it is intended solely for the improvement of the service. He proposes that the government shall place mail boxes on the horse cars which run in the neighborhood of the postoffice. The box, according to his plan, will be placed on the back of the car. Collectors stationed at some convenient point will empty each box, the car standing long enough for that purpose. Then the merry mule will proceed once more upon his course, returning ere long with the mail box fresh laden.

"Upon investigation, this scheme, which 'originated with Mr. Brown,' is found to have greater significance than would first appear. The question was quietly discussed at the convention of street car men recently held in this city. Mr. Brown's proposition was approved by them, and it has their sanction now. If mail boxes are placed upon the cars, the street car companies become mail carriers. To interfere with the transportation of the mails is an offense against the government of the United States. If Mr. Brown's plan should be adopted, and in any of the great 'tie-ups' which have become frequent in New York City, Chicago and St. Louis, the strikers and their friends should interfere with the operation of the street car line, the aid of the federal government might be invoked, and deputy marshals ordered out to aid the company in its controversy with its employees."

Ordinarily, I do not notice newspaper articles commenting upon my administration of the Baltimore postoffice, but when an article appears which is calculated to give the impression to its readers that I have originated a scheme in the interest of individuals or corporations, to the detriment of the United States government, of which I am a sworn officer, I feel called upon to express my indignation at any such insinuation, and the only excuse that can be given for the same is the ignorance of your correspondent as to the suggestions made by myself to the department.

If your correspondent had taken the time to have made an inquiry of that branch of the department to which this matter was referred, and with which I consulted, he would have known that this point had been thoroughly discussed months ago, as every intelligent citizen knows full well that it would not be necessary for me to ask the government to incur the expense of placing letter boxes on street cars, if the roads were to be mail routes and thereby protected by the government, as the corporations, I have no doubt, would pay large sums of money to the government for this privilege and protection; therefore, the "innocence," if any, rests with your correspondent.

My ideas in reference to using the street cars for the collection of mail have been so thoroughly set forth in a number of articles that have appeared in the Baltimore papers, and commented on by Washington correspondents, who have daily access to the postoffice department, to such an extent that I did not suppose it was possible for them to be misunderstood; but for the benefit of your readers I will give, in brief, my views in this connection.

Shortly after becoming postmaster of Baltimore, I was impressed with the possibility that the street car lines could be used for improving the postal service, provided the corporations could be induced to allow collection boxes to be placed in their cars. Following up this idea, I had personal interviews with several of the presidents of railways in this city, some of whom were eager to accede to my request, and were willing to bear the entire expense of an outfit, provided their lines were established as mail routes. This, I informed them, could not be done, as the government would not place itself in a position to protect their lines against strikes and "tie-ups," as your correspondent puts it. It then became difficult for me to secure their approval. After many interviews, I finally succeeded in getting the consent of several companies.

It is my intention, if approved by the department and the companies, to place letter boxes on the rear dash of every car in Baltimore city, and to have collectors collect mail from all sections of the city and deposit it in the first car that passes them; the collector to remain on his district and continue collecting and dispatching to the main office during the entire time he is on duty. Under this arrangement the dispatch and delivery of the mail would be greatly facilitated, as many of these letters would arrive at the office in time to make trains that they now miss, and, in addition, the citizens of this city would have the full benefit of the special delivery system, as a letter placed in a box on one of these car lines will proceed immediately to the Postoffice (instead of remaining in a street box, to be taken up by collector), and on its arrival at the main office be delivered by special messenger.

As the cars pass the nearest point to the Postoffice they would not be called upon to stop, but only to slow up sufficiently to allow the collector to open the box, take out the mail and close it. No additional expense would be incurred by the department, other than the cost of the boxes which would be nominal. The city being covered with a net-work of railways, every section would have equal advantages, so far as the rapid collection of mails is concerned, and the letter-carriers would not be forced to carry immense bags of mail through rain, slush, heat and cold to the Postoffice. The street lamp-post boxes would remain intact as at present. In the event of a tie-up or strike, these street boxes would be used as they now are, and the letter-boxes on the street cars would be unused, as the cars would be packed in the sheds of the various companies. In case of a fire which might blockade the cars, the collector on whose district the blockade occurred would be ordered to proceed to the fire immediately, empty the boxes, deliver and report to the office.

Hoping you will insert this in your paper, and thereby correct the wrong impression that your special from Washington may have created, I remain yours, very respectfully,

FRANK BROWN, Postmaster.

Postmaster Brown says he has no stock in any street or horse railway company, and laughed very heartily at being charged as the author of a deep scheme.

MASSACHUSETTS.

Boston.—The West End Street Railway Co. have equipped their cars from Newton to Boston with stoves, and now it is quite comfortable to ride on that line. The cost of heating the cars will not average over 30 cents each per day.

A new hot water heater is being put in one of the Washington street, East Boston and Chelsea cars on trial.

As soon as the cars are completed the West End will commence operating a new line. Cars will run from Scollay square via Tremont and Boylston streets, and West Chester Park to Huntington avenue. This line will be known as the Boylston street Back bay line.

The railroad commissioners, January 2, granted to the West End Street Railway company the right to run an electric railway from Bowdoin square to Arlington.

It is rumored in South Boston that a strong petition will be presented to the Legislature this winter asking for the incorporation of an elevated railway company, with power to build and operate an elevated railroad from the city to Roxbury and South Boston. Electricity will furnish the motive power, and the Riley system will be used.

The West End St. Ry. Co. announced that they would open their electric line January 3d, but it was given out the previous evening that, for the present, no cars will be run except for testing purposes. This delay in putting the road in regular operation was determined upon after the test made the previous day. The second car run out met with an accident at the corner of West Chester park and Boylston streets, by the breaking of the spring brush on the plough. A delay of three quarters of an hour was caused, but finally the car got under way again.

The cars themselves, says our New England correspondent, are models of excellence. They were built by the Newburyport Car Manufacturing Company. They are painted a robin's egg blue, the distinguishing color of the Back Bay cars. Each car is supplied with a heater and five incandescent lamps—three in the car and one on each platform. The kind of truck used is the latest Sprague improved truck, with Bemis gear.

Brockton.—Brockton's electrically propelled street cars are a great curiosity to strangers, and even to our own folks the novelty has by no means worn off.

The poles and wires along the highways are by no means as unsightly as a good many expected they would be. If the new motive power proves equal to overcoming real winter conditions of ice and snow, its practicability will admit of no further questioning.

Lawrence.—A special meeting of the Merrimac Valley Horse Railroad directors was held, at which communications were received from Hon. William A. Russell and Hon. John A. Wiley of North Andover, tendering their resignations as directors, which were accepted. James H. Eaton, treasurer of the road, and Franklin Butler were chosen directors to fill the vacancies. Treasurer Eaton tendered his resignation as treasurer, but at the request of the directors he consented to continue in that position until some subsequent period, but owing to his other duties he will soon be compelled to relinquish that office. It was voted to procure indicators for registering fares on the several cars which have heretofore never been used on the road. The matter of purchasing additional horses and cars was discussed. The newly constituted board is composed of live business men, who propose to infuse new and young blood into the enterprise, and provide better accommodations for the patrons of the road than ever before.

MICHIGAN.

Benton Harbor.—A steam motor tramway is to be built between Benton Harbor and St. Joseph. The projectors of this railway are Messrs. J. H. Graham, of St. Joseph and Benton Harbor, and Andrew Crawford, of Chicago, and the gentlemen propose, if the matter is favorably received by the communities, to invest $50,000 in building and equipping the road. They do not ask any bonus, or other privilege than the usual rights and franchises granted to similar corporations, says the *Palladium*, but they purpose "at this insignificant cost to furnish our people with what may really be considered one of the greatest public improvements ever proposed for this locality. It will meet two great wants, in the way of rapid passenger transit and industrial transportation facilities, and in either capacity ought to have an unqualified general approval."

Detroit. What is commonly called the Snow or Talbot Electric Railway Co. have obtained an ordinance granting them permission to construct and operate electric lines along several streets. Eight tickets will be given for twenty-five cents, for use in certain hours morning and evening; employees of the road shall be electors of Detroit; the company pays 1 per cent of its gross earnings to the city, and a tax on its real and personal estate; commutation tickets, six for twenty-five cents, shall be sold for use at all hours of the day; eight school children's tickets for twenty five cents shall be sold, and the life of the franchise is twenty-one years.

A special session of the council was held Dec. 29th, when franchises were granted to the three old companies—The Ft. Wayne & Elmwood Ry. Co., The Detroit City Ry., and the Grand River St. Ry. Co.

Escanaba. A street railway ordinance has been passed, after two months of useless opposition. The railway is to be in operation by Dec. 31, 1889. The *Mirror* says:

Why any objection to a street railway was raised in the first place is entirely beyond our comprehension. A number of local capitalists were ready to invest their money, and every reasonable thinking person must admit that the project would not pay the proprietors for years. In the meantime, accommodations were offered the public, and nobody could lose a dollar save those whose money "made the mare go."

Marquette. The city council having granted the right of way, a powerful company of Eastern capitalists has been organized, with Timothy Nester president, to build and operate an electric railway between here and Presque Island. It is understood that the railroad companies will enter a pool for the purpose of building a mammoth summer hotel and 100 cottages on Presque Isle. The length of the road will be about six miles, and is expected to be in operation about June 1. The total cost of the railway and Presque Island improvements will be over $1,000,000. Work has already been begun and and will be rushed right along.

St. Ignace.—St. Ignace now has a street car line equipped with two cars. Trips every fifteen minutes.

MINNESOTA.

Duluth.—For some time past the management of the Duluth street railway and other prominent capitalists have given great attention to electricity as a means of locomotion. They propose to build an electric railway to West Duluth at first, and after a time on to Spirit lake and Fond du Lac. The Duluth *Tribune* says: There can be no doubt that electricity is the coming means for providing rapid transit in crowded cities. Cable cars will not be able to compete, either in cheapness of construction or in economy of operation, with cars operated by electrical appliances. Such cars are now used in many parts of the continent, and they, although the different systems are none of them perfect, give the highest satisfaction.

The Minneapolis *Tribune* says: The Duluth Incline Railway company has filed articles of incorporation with the secretary of state. The capital stock is $1,000,000. The object of the company is to build an incline railway up the hills in the city, principally at West Duluth, to be run by steam power and to be used for the conveyance of both passengers and freight of all descriptions to all parts of the city, charging for passengers and per ton of freight a fixed fee. The company expects to derive its greatest revenue from the conveyance of freights from the lower part of the city to the dwellers on the hills, both above and below the proposed boulevard limit. It will carry both wagons and merchandise for a small fixed fee per ton, and it is estimated that a very large business will be done in this branch of traffic. The company will have its lines in operation long before the long talked of cable roads.

Minneapolis.—The *Tribune* of Dec. 23 says: The Street Railway and Motor company's annual report of improvements, passengers carried and mileage increase, has been issued, and shows the following facts:

Improvements—Four miles constructed, $39,279.60; paving, $9,974.34; new equipment (62 new open cars), $45.489.12; new buildings, $3,518.05; 185 new horses, $24,712; number of passengers carried, 13,477,083; car mileage, 285,504; number men employed, 603; total number horses and mules in use, 1,152; total mileage in operation, 63.

Motor Improvement—Construction, $10,833.61; equipment, $24,681.43; passengers carried, 3,259,136; men employed, 162; total miles in operation, 25.

The increase in the number of passengers carried on both horse car and motor lines is very great. In the former case it is 404,020, in the latter 708,308, about 25 per cent. of the whole. The increase in the number of men employed is five on the motor and thirty-four in the street railway system.

St. Paul.—The St. Paul City Railway company have ordered sixty new cars of the LaClede car company, St. Louis. Forty cars are to be ready by May 15, and the remaining twenty by Sept. 1, 1889. These cars are for the East Seventh street cable line, which is expected to be ready for operation May 15. The cars, made according to designs furnished by Col. Barr, vice-president of the company, are promised to be the finest ever made for cable roads. The great improvement in the grip cars will be in resting the grip on the axles instead of the floor of the car, as is the case in those now in use in St. Paul. This, they say, will do away with the disagreeable jar felt whenever the grip is applied.

THE M'GLAUFLIN CABLE RAILWAY SYSTEM.

What sounds very much like the Rassmussen system is described in the St. Paul *Tribune* as the invention of Col. McCrory. It is not yet patented. After mentioning that the cable railways now in vogue—the California system—cost from $85,000 to $110,000 per mile, a description of the McGlauflin system is given as follows:

Col. McCrory set to work with an idea of simplifying the work. He enlisted in the work Eugene O. McGlauflin, of Anoko, an experienced engineer, who is thoroughly familiar with the California system. After studying the question for several months the inventors believe that they have solved the problem. Their system will be known as the McGlauflin system. The cost of a cable line, according to their plans, will not exceed $3.500 a mile, and it can be laid at the rate of one block a day. Under their system the conduit will not be more than 20 inches in depth and about the same width. It will be formed of two-eye rails, which are practically the same as the iron joists in a fire proof building, only deeper and with a wide T. These two-eye beams, forming the conduit, will rest on an iron tie, which are bent upwards to support the rails. the rope or cable will run on wheels in the center of this conduit, and only about eight inches beneath the surface of the ground. A wire broom attached to the grip is intended to keep the conduit clear. Double pulleys will be located at the end of each rail, which will act as a governor on the cable. The system is very simple and it appears perfectly practicable. Another feature about the system is the safety brake, which renders an accident absolutely impossible. It consists of an iron clamp above and below the T of the eye beam. These clamps, when set, must necessarily stop the car or tear up the road. The entire system has been pronounced feasible by those who are familiar with the workings of cable lines.

MISSOURI.

Kansas City.—The Armourdale branch of the Metropolitan street railway is to be equipped with electric motors; the Thomson-Houston Electric company having undertaken to furnish electrical equipment for five cars. The line extends from Sixteenth and Bell streets, Kansas City, Mo., to Twenty-Second and Osage, Kansas City, Kan.

It is probable that before the next number of the STREET RAILWAY GAZETTE is issued some changes will be made in cable railway matters which, if successfully pushed, will result in greatly improving a system that is now almost perfect. And that they will be successfully pushed there is now hardly reason for doubt. It means a connection of the southwestern portion of the city with the northeastern, and the north and east with the south and west. "These changes alone are now needed to make Kansas City's cable system the finest in the world," says the Kansas City *Times*.

Mr. H. C. Doggett, agent of the West Side Cable company, is obtaining signatures to a petition for rights to make changes and considerable extensions, and to connect with the Union Cable line now in course of construction. The change in the plans of the West Side company is made principally in order to accommodate the traffic the new court house at Fifth and Oak will create and to supply a means of rapid transit to the market square.

The Union railway company is also circulating a petition that contemplates a change in the original plans and will add greatly to the facilities of its road.

Still another improvement is contemplated by the People's Cable company. Mr. Robert Gillham, the President, says that his company will begin in the early spring to build its extension of the Brooklyn avenue line from Tenth street to Pendleton Heights.

It is now announced that the proposed line from the terminus of the Brighton Hill and Chelsea Park branch of the L road to the western terminus of the Riverview cable line will be built early in the spring. The line will be two miles in length and will be constructed by the Kensington railway company, which was organized in Kansas City, Kan., recently. It will be operated by cable. The company has a capital stock of $50,000, and among its directors are J. I. Reynolds, Chester Bullock, D. D. Hoag, Robert Gillham, W. A. Bunker, M. C. Gillham and W. E. Barnhart.

Rich Hill.—The citizens here are agitated over a proposed electric railway.

St. Joseph.—A syndicate of eastern capitalists is negotiating for the purchase of three street car lines of St. Joseph at $1,500,000.

St. Louis.—The proposition to make the extension of the franchise of the Southern Railway company 25 years instead of 50 years, was lost in the city council Dec. 18th. The present franchise runs to 1909, and the company pays $1,000 every six months to the city for it.

In a special letter dated St. Louis, Dec. 5th, we are told that a great many improvements are being talked of in St. Louis Street Railway circles at present. The Lindell Railway company contemplates extending its "Yellow Line," from its present route to Vandeventer ave. out as fas as Taylor av. And the above named company's "Blue Line" will run out to Forest Park, it the franchise can be obtained.

The Broadway line is about to try the electric motor, overhead wire system, on the southern end of its line.

Mr. Scudder, Mr. Maffitt and Mr. Lionberger, the two latter very prominent street car men, have been to St. Joseph examining the Sprague motors there, and are said to be very much pleased with them. The "Post" of a few days ago said that Mr. Maffitt intended introducing electric motors on his Laclede Avenue Line very shortly. A rumor is afloat that Mr. Julius Walsh has gone out of the street railway business, in all his lines, the Union, the Cass Avenue, the Citizens Cable Co. and the Northern Central, representing a capital stock of $2,200,000, thus giving up his presidency of all these lines; but he intends to retain some stock in each road.

This has since been accomplished, as the following despatch says:

ST. LOUIS, Mo., Jan. 9.—The Chicago syndicate that recently purchased four street railways of this city were formally given possession of their property to-day. C. L. Hutchinson, C. B. Holmes, and D. G. Hamilton arrived here this morning and held a consultation with the outgoing directors. Julius S. Walsh, president of two of the lines, handed to the gentlemen the resignation of all the directors. The Chicago men at once assumed the management, but the resignation of the directors was not accepted until their places can be filled. The gentlemen made a tour of inspection of the lines and examined the property thoroughly. They declared themselves well satisfied with the appearance of the lines. They will go over the books before returning home. No radical changes in the motive power will be made for a time, but improvements are contemplated.

A new bill authorizing D. H. Bates, S. S. Fisher, Charles Sutor, Maurice Prendeville, Daniel S. Bentley, John B. O'Meara, Geo. F. Branham and Ben Von Phul to construct a double-track, standard-gauge electric elevated railway, about 12 miles long, in the city, was introduced in the House of Delegates by Mr. Comfort, Dec. 18th. The road by the terms of the bill is to run at an elevation of 16 feet from the street, except where the line runs under Tower Grove park, and along Arsenal and Palm, where the road may come as low as 12 feet above the street. It is to stand on wrought iron supporting columns and handsome, and to have artistic stations not fewer than four to the mile, well heated and lighted by electricity. The road is to be lighted by electricity every night. The speed is not to exceed 20 miles an hour, and the fares are fixed by the bill at five cents from 5 to 8:30 a. m. and from 5 to 7 p. m., and 10-cent

fares for other hours, with children at half rates. The road to pay to the city three per cent. of earnings for the first five years, and five per cent. for the rest of the term of its franchise, 50 years. It is claimed by the proprietors that the road can be built and equipped with the overhead wire system for about $1,500,000.

Springfield.—Mr. Edward J. Lawless, since his resignation of the superintendency of the the Metropolitan Ry., Kansas City, has obtained a franchise to build a five-mile electric road at Springfield.

MONTANA.

Bozeman.—Messrs. Sam Hauser & Co. have been awarded the contract to finish the Rocky Fork and Cooke City railway. The iron is now moving westward and forces are being concentrated as rapidly as possible, says a correspondent, writing Dec. 26th. The road will be finished before March 1st.

NEBRASKA.

Kearney.—An ordinance was passed by the city council Dec. 11, granting the Kearney Street Railway company the right to erect poles in the city for wires that will enable the company to operate its line by means of electric motors. Work will begin on the system on or before April 10, and shall be completed before September 1, this year. The Thomson-Houston system will be used. Additional stock to the amount of about $100,000 has been added recently by eastern capitalists.

Lincoln.—The North Lincoln street railway filed articles of incorporation Dec. 19th. Their line is expected to run to Wyuka cemetery, the Christian University and to all other points of interest in the city. The capital stock is $30,000. Geo. E. Bigelow, L. C. Humphrey and D. L. Brace form the board of directors.

The question of wages is in a curious state here. The *State Journal* recently stated: "The report of the committee appointed to look into the matter of the hours and pay of the street car drivers, did not give the drivers any great amount of consolation. They found the hours from fourteen to sixteen per day, and reported that, in the opinion of the committee, the hours were excessive. The report was adopted, and the committee was discharged. What more could be done is a question that is now asked."

Omaha.—In the United States court, last month, the injunction suit of the Omaha Horse Railway company vs. the Omaha Motor company came up. Judge Dundy said that it was very evident that both parties wanted the exclusive right to certain streets in the vicinity of the new bridge. This was just what he proposed to avoid. The court then ruled that the horse car company should be allowed to go ahead and lay the track on the contested territory. Before doing this they must enter into an agreement, backed by a good and sufficient bond, that they would not only at once complete this track, but also that they would permit the motor company to use the same with all privileges.

Judge Dundy has disposed of the street railway injunction by granting the horse car company the right to again proceed with track laying, the same to be used jointly with the motor folks.

Mr. Geo. F. Wright applied to the city councils of Omaha and Council Bluffs for an ordinance establishing the fares on the electric railway connecting the two cities as follows:—Single fare 15 cents, round trip 25 cents, twenty rides (good thirty days) $2, twenty-five rides $2.25, fifty rides $3.75, and 156 rides (good ninety days) $9.35. The ordinances have been "laid out," and the single fare must not exceed ten cents.

The Union Pacific R. R. Co. have been permitted to discontinue running its ferry train.

The horse car company does not consider it practicable to put stoves in the small cars on the South Thirteenth street line, because they would take up too much room. The company will probably adopt McLaughlin's chemical heating apparatus.

THE NEW THOMSON-HOUSTON ELECTRIC RAILWAY.

"Drawn by Lightning," is the heading of a long and lively article in the Omaha *World*, Dec. 15, describing the operation of the new electric railway between Omaha and Council Bluffs. We reproduce a few extracts:—

The electric motor railway on the new bridge has been in operation six days, and for six days this remarkable conveyance has been studied by thousands of people. Than the mysterious power which gives these cars motion no less fascinating is the deep interest with which it all is regarded.

Since the first day, every train on every trip has been crowded with passengers. It is stated by an attache of the road in a position to know, that during the past six days each train's hourly receipts have averaged $25.

These trains are usually made up of two coaches, in the foremost of which is situated the little yet very intricate machinery which propels the train. The crew is composed of two men. One is honored with the title "conductor," the other is content with simple "motor man." The latter takes the place of engineer or gripman, and manipulates the little brass crank located on either platform of the motor car, which turns on the lightning and sets the train in motion. * * * From Omaha to the eastern end of the bridge there is but one track. At the last bridge approach the track becomes double, and from thence to the terminus in Council Bluffs the trains have full and unobstructed sway. The trip across the bridge is made at a moderate rate of speed. Once across this structure, however, the valve is pulled wide open, and across the low and level land of the bridge addition the motor and its mass of human freight flies at a rate equal to any freight train.

The passenger at all sensitive or observing can not fail to feel a sensation as he moves across terra firma at such a rapid rate by means which he knows have ever been invisible to the human eye. One knows that the motor car pulls the coach and that the cog wheels and machinery in the bottom of the car give motion to the motor, but what puts this machinery in motion? All know of course that it is electricity—that mysterious agent by which so much has been accomplished for men and yet whose real and fundamental origin can never be understood in this world. The passengers of these trains comprise the same human material as those of the much abused broncho car; and yet the pastime and conversation is far different. The patrons of the horse car company take up the time of their journey with complaints against the company, reading newspapers and talking politics. Those of the motor car forget all discussion and observation and trials and complaints, and give all attention to comments upon the wonderful conveyance which is carrying them across the country. The coaches are crowded and the platforms filled. Those on the latter enjoy the fresh breeze which they secure as they are whirled over the narrow Missouri and the broad bottom preliminary to Council Bluffs.

If for a moment the train stops to remedy a wheel or clog or for any purpose every man on board climbs off to inspect the machine. No opportunity is lost to get a view of the "thing." When the train arrives at Council Bluffs it is greeted by another curious crowd which inspects it, watches it reverse and gazes upon it until it is lost to sight on its return to Omaha. The comments of the assorted crowd of passengers and the incidents of a trip on this novel conveyance are interesting and amusing.

A very fleshy man stepped from the train during one of its stops. Without warning the train started off and left the passenger in the homeless stretch of prairie adjacent to the Bluffs. The train was stopped in time for the lone fisherman to board it. As he did so he remarked with a sigh, "I've run after horse cars, but darn me if I'd run after this blamed thing."

A lady returning to the Bluffs laden with bundles accumulated in a tour among Omaha stores exclaimed, "Now isn't this grand. No more waits for the dummy. No walks from the depot, but just a grand ride from home right to the heart of Omaha." The gentleman to whom to whom this lady spoke was a member of the wholesale firm in Council Bluffs. "It is a grand ride," he replied, "and very convenient. I fear altogether too convenient for the Council Bluffs merchants to appreciate it, though it may be good for our landlords."

An old negro, whose face showed the marks of time, held on to a strap in the motor car and watched everything in sight. "I've seen gunboats and steam engines; I thought I'd seen mos' eberyting from a nigger slave driber to a democratic president, but I've lived long enough to see something which I don't know nothing about."

A young girl, evidently from the suburbs, giggled out to an old lady beside her in explanation of her presence, "I jist thought I'd see how the thing rode."

And among them all there were many expressions of surprise and comment. A man, standing on the front platform of the motor car, after watching the operation closely in silence, exclaimed with more earnestness than elegance, "It beats h—l what the brains of some men have accomplished while you and I are kept hustling for bread, and yet we think we are smart." * * Of course there were on board a few of those wise people who never see anything wonderful and endeavor to create the impression that everything new is old to them; but the expressions of wonder, and surprise and delight at the novel affair fill the coaches, and do much to make one of these journeys more than usually interesting.

NEW JERSEY.

Bridgton.—An electric railway is projected here now "in definite shape."

Elizabeth.—The new horse car line here is now in operation—cars running at infrequent intervals. Thirty new horses (green-horns), not used before to pull street cars, were broke in the middle of November.

An "Observer" writes in a local paper Dec. 28, that "either a horse car or an electric railway is needed over a route not yet served by either of our present lines," namely along East Broad street and Morris avenue.

Newark.—The council have granted permission for electric propulsion to the Essex Passenger Railway Co.

Paterson.—The Paterson City Railway Co. have recently put on additional cars, and contemplate further extensions.

NEW YORK.

Albany. The Metallic Street Railway Supply company, of this city, has received another order from President McNamara of the Albany Railway company. The double track laid on Lark street three years ago has given such satisfaction to its patrons for its smoothness of travel, and to the company for its economy in repairs, that during the past summer the Clinton avenue track was relaid with this system, and now comes the renewal of State street.

There is talk, and some probability, of the Albany railway adopting the street car letter box system.

Brooklyn. A red-hot controversy is going on in the papers as to whether the street railway companies should place stoves in their cars and fire up, as some demand, while others protest against the cars being heated at all. "It seems not unlikely," says the *Eagle*, "that the open and close car controversy of last summer will be rivaled in bitterness."

The *Knickerbocker* is authority for the statement that "Deacon Richardson has given notice that hereafter only American citizens will be employed on his street car lines as conductors or drivers."

An electric railway is proposed alongside the boulevard "from park to ocean." The Park Commissioners have given a hearing to both sides of the question, "Shall a franchise be granted the Ocean Parkway Transit company?" This company propose to construct and operate an electric railway on the east side driveway of the Ocean Boulevard, from Prospect Park to the Coney Island Concourse.

Counselor W. N. Dykman opposed the grant of a franchise on behalf of John H. Shults and other property holders. He complained of the "elusive" character of the Ocean Parkway Transit company, of its aims, what it really intended to do and what to pay for the privilege it sought. Unless the electric motor road was paved, the property on that side of the Boulevard would be isolated. He further said: "I have examined the law, and think that no franchise can be given on this route except for a horse railroad.

The intention of the act was that this boulevard should be free from steam cars, though you may let horse cars be operated. I submit that this Board ought to be controlled by what is written in the Charter acts as well as by what is implied. If the company apply under the act of 1884, they must obtain the consent of the Common Council, the Park Commission and a majority of the property owners, before they can build the road. Half a dozen railroads run to Coney Island now, and there is going to be another soon on the Coney Island Plank Road, to be operated by electric motors."

"If a franchise is granted," said Commissioner Kennedy, "it should be put up to public competition and awarded to the highest bidder."

T. R. McCann, S. B. Duryea and Henry S. Williams, expressed their views before the hearing came to a close. No decision was reached by the Commissioners, though it is understood a majority are opposed to the proposed Boulevard railroad.

Alderman Coffey had the report and resolution of the Railroad committee, granting consent to the South Brooklyn Railway company to use electric or cable traction on its road, taken from the table and adopted, December 26.

Mr. Peter Wyckoff, who was recently elected president of the Grand Street and Calvary Cemetary Railroad company, presented each employee of the road with a $2.50 gold piece on Christmas Day.

Buffalo.—The street railroad company is preparing to lay a new switch in the West avenue line, so as to enable it to run cars both ways on West avenue between Hudson and York streets.

The failure to lay the Elmwood avenue line this season, was on account of the inability to get the proper rails, which are cast to order only. Work will be resumed just as soon as the frost is out of the ground in the spring. The company appears not to have settled on any plan for bringing the Elmwood avenue cars down town.

The electric motor cars, for some reason, have not visibly materialized as yet, says a correspondent. "Cars belonging to the company are in Philadelphia to be fitted up, but so far as is known here nothing has been done. The company will soon take steps to find out the reason of the delay. It is understood that a car of the same pattern as those ordered for Buffalo has been sent to California, and is giving entire satisfaction."

New York.—The Julien storage battery motors are working well on the Fourth Avenue line. But the company has not yet adopted the Julien motor, as seems to be generally supposed. They are likely to do so soon however. A contract was made in March by the Fourth avenue company with the Julien Electric company, by which the latter was to furnish ten cars, the street car company to pay for their use, and to equip its line with the cars if the electric traction system proved to have all the advantages over horse cars that the Julien company said it had. The street car company also gave the Julien company the use of one end of their building, at Eighty-sixth street and Madison avenue, for storing the batteries to be used in the cars.

Besides the three cars which are already in use on the line, another is at the Eighty-sixth street station, and three more are expected to arrive in a few days, says the N. Y. *Advertiser*, Dec. 29th. The form in these latter has been changed somewhat, a single truck being substituted for the double one of the cars in use at present. "It has been observed that with the double truck the rear truck has a tendency to open switches, necessitating reduction of speed in order to insure safety. The application of the Julien system is being continually modified to meet the practical requirements and peculiarities of the line."

Superintendent Skitt informs us that he considers the experiment very satisfactory so far, and that if the electric cars now in operation continue to give the same satisfaction as they have hitherto, the company will surely adopt the Julien system; and the other street railways companies of New York City will soon follow suit.

A NEW YEAR'S DEMAND.

The following special was wired from New York, January 1st.:—The thousands of men employed by the various surface railroads of this city are anxiously waiting to see if the companies will sign agreements with their organization for the coming year. The men employed on the lines in this city all belong to Division No. 1 of the National District Assembly, No. 226, Knights of Labor. The Executive Board of the district called on the officers of all the lines Saturday and left the companies a New Year's present in the form of an agreement with the request that it be signed. The chief demand is that no conductor, brakeman, or gripman shall be required to work more than ten hours in twenty-four, and and these are to be worked out within twelve consecutive hours. This scale of wages is also demanded: Conductors, $2.25; drivers, $2.25; night watchman, $2; head changers, $2; hostlers, $2; hitchers, $2; tow boys, $1.50; changers, $2; harness cleaners, $2; switchman, $2; lamp men, $2; pavers, $2.25; rammers and spikers, $2; laborers, $2. The Brooklyn companies have been requested to sign a like agreement.

The *Daily Stockholder* quotes Jay Gould as saying that some time within a year express trains will be run on the elevated road from the Battery to the Harlem River on both the east and west side lines; also, that the fares on the express trains will be ten cents. The third track, which would be necessary to carry out this idea, is about completed from the Harlem River to Fifty-ninth street.

A dispatch of January 3d, says that the officers of the street railroad companies in this city do not view favorably the agreement submitted to them by the executive board of District Assembly 226. Nearly all express a determination not to consent to the clause advancing wages 25 cents a day all around.

VERDICT OF $15,000 AGAINST THE "L" ROAD.—James Lyle, one of the unfortunate persons who were swept into the street from the narrow platform along the track of the Third avenue elevated railroad near Fourteenth street on March 8, 1887, when they attempted to walk from a blockaded train to the station, has obtained a verdict of $15,000 damages against the Manhattan Railway company for the injuries thus received. The case was tried before Justice Beach and a jury in the Supreme court, and it was shown that the plaintiff's arm and leg were hurt and his vision impaired.

Syracuse.—The Third Ward Railway Co. have operated their electric line over a month. It works very satisfactorily.

The People's Railroad is in process of building, and at a prominent point on West Onondaga street it is necessary to cross the Delaware, Lackawanna and Western Railroad tracks. The railroad company is opposed to allowing the street railway to make the crossing, and for several days kept an engine moving back and forth over the road at that point. On Dec. 27, the Delaware and Lackawanna people concluded that the People's Railway had given up the idea of making the crossing and withdrew the locomotive. Superintendent Wagner at once jumped in with a large force of men and in a twinkling had the rails laid across the railroad track. Then a force of fifty men from the Delaware shops moved down with orders to tear the crossing up. Wagner was ready for them with an injunction, copies of which were served on the railroad gang, the engineer and fireman of the locomotive and others, whereby they were restrained from interfering with the work. An equal number of men employed by the People's Railway appeared on the spot ready to resist any action from the other party. The police were also called out to avert a collision. At night the locomotive was standing at the crossing to prevent further operations, and the opposing forces were camped on the spot ready to act on either side if any new movement is made.

White Plains.—The Board of Village Trustees of White Plains have advertised for proposals for the franchise of an electric road from that place to Elmsford on the New York and Northern Railroad. The right of way granted is along Central avenue; but before the Port Chester, White Plains and Tarrytown company can get it they had to bid a percentage of their annual receipts at a public sale held on Jan. 7. The result is not yet reported.

Valatie.—The following table shows the number of passengers carried, and the gross earnings of each of the six* street railways operated in Syracuse during the fiscal year ending on September 30th, 1888:

RAILWAYS.	PASSENGERS.		EARNINGS.
Syracuse & Geddes	663,127	....	$29,253 30
Central City	783 905	....	37,001 15
Fifth Ward	804,621	....	37 063 60
Syracuse & Onondaga	787,410	....	25,589 70
Genesee & Water Street	654,207	....	29,568 08
Seventh Ward	352,310	....	15,300 00
Totals,	1,045,586		173,775 83

Increase in passengers over 1887, 729,843.
Increase in earnings over 1887, $24,752,56.

The Valatie and Kinderhook Street Railroad company was incorporated Dec. 1, in the office of the Secretary of State. The road will be built to carry passengers from one village to the other, and will terminate in front of the Valatie opera house. The capital stock is $20,000. Charles D. Haines, John A Trimper, James D. Yager, John Buckmayer, Curtis F. Hoag, George W. Watkins, of Kinderhook, and Henry Van Dyck, of Valatie, are the directors for the first year.

Yonkers.—The *Statesman*, Dec. 6, says: We have before announced that the Yonkers Railroad company had passed into the hands of a new management. D. N. Stanton resigned the presidency, and Edmund Stephenson, president of the Home bank in New York, was elected in his place; D. Perry Stanton also resigned as treasurer, and D. B. Hatch, of the banking firm of Hatch and Foote, was elected treasurer. John F. Brennan was continued as secretary. The board of directors is now as follows: Edmund Stephenson, D. B. Hatch, John F. Brennan, J. H. Odell, D. N. Stanton, Dr. John H. Hinton, S. V. Tripp, Oliver Stahlnecker and T. F. Mason.

The present management is controlled by strong, practical and honorable business men. They frankly say that it is their intention to supply the necessary capital and to give the enterprise a thorough trial. If there is a fair chance of making the roads pay, they will be continued and everything reasonable will be done to accommodate the public and conform to the letter and spirit of the laws; but if they find, after a fair trial, that there is not sufficient business to meet the expenses, and no sufficient reason to expect a satisfactory increase, they will wind up the company. This is sensible, honest and businesslike.

President Stephenson assures us that at this time the receipts of the company will average $16 a day less than the absolute cost of running expenses, with no return for the capital employed in the plant. This, of course, is not a very encouraging outlook; but the directors hope, by good management, and doing everything practicable and reasonable to accommodate the public, to popularize the cars and increase the traffic.

The Yonkers *Gazette* observes: It is certainly gratifying that the city officials and the railroad company have come to a satisfactory understanding. Now let the railroad company give us regular trips, connecting with all trains, and the people patronize the road all they can, and we may be assured that the many advantages of street railways will be permanently secured.

OHIO.

Cincinnati.—The Employees Day, at the recent Exposition, which was fully reported in the October GAZETTE, has resulted in many pleasant memories. This is how the street railway men of Cleveland have felt in reference thereto:—

From Cleveland to Cincinnati St. R. R. Men:—At a meeting of Street R. R. men, representing all the lines of the city of Cleveland, held in the city on the 9th of October, 1888, the following resolutions were offered and unanimously adopted: *Whereas*, in response to an invitation extended by the street railroad men, of Cincinnati, to attend the general Reunion of Street R. R. Employees, held in that city on the 5th of October last, and whereas, a number of the Cleveland craft availed themselves of the opportunity; *Resolved:* that it is the sense of this meeting that we heartily approve of and recognize the beneficial results of such reunions, particularly the one just held, both from a business as well as from a social standpoint, and that we shall encourage such gatherings of the craft in every way possible; that we fully endorse the ac-

* The Third Ward Electric railroad and the Fourth Ward railroad are not included in the foregoing table, for the reason that they began operations only a short time ago.

tions taken at the Cincinnati meeting, and consider its object wholly accomplished: *Resolved:* that we hereby extend to the committee and men at Cincinnati, our sincere thanks and express our gratitude for the kind and courteous treatment received at their hands during our few days' visit in that city, and to the officers and superintendents of the lines for the many acts of kindness extended in furnishing such gratuitous transportation; *Resolved:* that a copy of the resolutions be forwarded to the General Committee of Street R. R. Employees, at Cincinnati."

The above was signed by a committee of Cleveland men, consisting of J. Moser (Superior line), J. J. Coleman (Brooklyn line), A. E. Duty (Woodland Ave. line), J. S. Sanderson (East Cleveland line), and Enos. S. Peterson (South side line).

Cleveland.—A curious move has been made by the city authorities in reference to the street railways of the city. The *Press* of Dec. 29 says:—The board of aldermen made a move in the right direction, Friday night, by adopting a resolution to investigate the efficiency of the street railroad service. Alderman Lawrence introduced the resolution. It provides that the committee shall consist of the street railroad committees of both the council and aldermen. The committee will have the power to compel the attendance of persons and the production of books and papers. Its duty will be to "investigate and report to the council whether a sufficient number of cars are run on the several lines of street railroads in this city to accommodate the public, and whether any changes should be made in the schedule according to which cars are run on each line, and what, if any, additional cars are required for the public convenience."

Columbus.—A syndicate of eastern capitalists have their eyes on the street railways of this city. A strange epidemic is spreading among horses in this city. The street car company had forty sick horses in their barn Dec. 23, and their service was seriously crippled. The disease is a new one to veterinary surgeons and they are baffled in its treatment. The disease apparently affects the glands of the throat. In a majority of cases it causes a swelling which extends from the point of the jaw to the breast. This makes breathing and eating matters of great difficulty, and as a result the animal rapidly grows weak and loses flesh.

Toledo.—A resolution directing the consolidated street railway company to run their cars on Collingwood avenue was read, when doubt was expressed as to the authority of the council to take such action, until after the completion of the contract for paving that street. The city solicitor was not certain that the council had power to enforce such a resolution pending the paveing of the street, although it was said that the track is at one side of the street, and the running of cars would not interfere with the work of paving the street. The resolution was referred to the city civil engineer and city solicitor.

Mr. C. W. McLean, we hear, has at last succeeded in obtaining an ordinance for an electric railway to Glasboro. Two lines are to be built, and the cost will be about $250,000. Nothing but steel will be used in the construction, which ensures a lasting and substantial improvement. The syndicate (which is composed of eastern financiers), is possessed of ample capital, and stands ready to go on with the work as soon as possible.

Pennsylvania.

Harrisburg.—The East Harrisburg City Passenger Ry Co. has been running Sprague motors (overhead conductors) for about five months very successfully, writes Mr. S. W. Entrekin, proprietor of the Keystone Electric Works. The principal line is three and one-half miles long, "and there is some talk of an extension of a mile or more."

Oil City.—A street railway between Oil City and Rouseville has been talked of for some time. Mr. Ludwig Mayer is at the head of a movement to build one. It is to be "a Citizen's road," such as they have at Bridgeport, Conn. That is a road built by popular subscriptions, or by the citizens, each man taking a small amount of stock. It was not expected that it would pay a dividend, but all the same, it is earning four per cent. If the citizens build this road to Rouseville, it "would be the nucleus to a system of street railroads to cover Oil City, both sides of the river, and run also to Siverleyville." The *Derrick* had a long article in support of the scheme December 7.

Philadelphia.—"The elevated will come," says the *Times*. The Philadelphia Rapid Transit Railway company has a most powerful "backing." Mr. Edward Lauterbach made a declaration recently, which is described as a surprising revelation as to the financial support which is under this latest scheme for mid-air transportation. He said that beside himself he represented and spoke for the New York banking firm of Ladenberg, Thalman & Co., the famous financier, Baron Von Bleichroder, of Berlin, head of the largest banking house in Germany, and the firm of Goldschmidts & Biffoschein, of Paris, second only in all the world to the famous banking house of the Rothschilds. All these concerns are interested in the two elevated roads in Brooklyn, and their experience has made them eager for similar investments in this country. The position of his clients in the Philadelphia matter is, Mr. Lauterbach said, simply this: They wish to engage in the project as a business investment. If Philadelphia capitalists are able to build the proposed road, these foreign financiers will stand back and afterwards subscribe to any portion of the stock they may be permitted to buy. If sufficient money for the construction cannot be raised in Philadelphia they will subscribe at once to any portion of the bonds, or, if permitted, they will purchase all the bonds issued and build the entire road themselves. They don't ask for this control. They do wish, however, to occupy a position where they can guarantee the building of the structure should Philadelphians be faint hearted in the matter. They want all investment in the enterprise they can obtain, and will be satisfied with any portion which they may be able to secure.

When the ordinance giving the Schuylkill River East Side Railroad company the privilege of constructing a branch line on Schuylkill avenue came up for consideration in Select Council, Dec. 13, it was confronted with protests from property owners of that section, and it was adopted with an amendment changing the route to "southward from its line near Thirty-first street and Schuylkill avenue."

The request of the Germantown Passenger Railway company, on the same date, for permission to extend its tracks on East Girard avenue, was referred back to the Railroad committee.

An ordinance was passed (Dec. 13) authorizing the Union Passenger Railway company to lay double tracks on Poplar street, westward from Twenty-ninth street to the Reading Railroad, and to construct a bridge on Poplar street over Pennsylvania avenue whenever the commissioners of Fairmount Park shall consent.

A new road from Germantown to the Park, which will avoid all grade crossings, is to be made soon. The route contemplates the extension of Penn street, so as to tap Ridge road about midway between the Smith Hotel and Tissot's Tavern. This plan, which will give Germantown one safe route to the Park, instead of as now several rough and dangerous ones, has been approved by the Board of Surveys.

"Epizooty" is affecting the car horses of Cincinnati, Louisville and other cities of the west, and fears have arisen that the dread disease may reach this city. Because of this anxiety on the part of their owners it is probable that the car-horses of this city will live in clover during a part of the present winter at least, as they are being treated with every degree of consideration, are being comfortably housed, well fed, and worked no harder than absolutely necessary. Among the big stables in the upper part of the city, of the Traction company, the stable bosses and superintendents are taking every precaution against the possible introduction of an epidemic. The stables are being kept in as good sanitary condition as possible as regards bedding, and careful attention is given to the food supplied.

Pittsburgh.—The coming spring the Observatory Hill Electric Railroad company will complete its line as far as Keating, on the Perrysville road, which is a mile further than the present terminus.

A later communication tells us that the Electric Road company is said to have purchased the stock of the Beaver Road to facilitate the proposed extension.

The Citizens' Traction company began operating its East Liberty branch January 1 by cable. The inauguration of the new line was the subject of gossip among the residents of Penn avenue and East End. Men, women and children have been waiting anxiously for the auspicious event to take place, consequently when the cars commenced their march, they were greeted all along the line with shouts of welcome and satisfaction.

The Pittsburgh, Allegheny & Manchester Street Railway company contemplates making a change in the motive power of its cars, and a committee has been appointed to investigate the different systems. This committee is composed of Major Joseph T. Speer, Mr. A. M. Byers and Prof. R. C. Renshaw. They have not quite completed their report, which will be made and voted on at the January meeting of the stockholders.

Wilkes-Barre—An electric railway is much desired here.

Rhode Island.

Newport.—More than three-quarters of the capital stock ($50,000), of the Newport Horse Railroad company has been subscribed.

Tennessee.

Chattanooga.—The electric railway people are about to ask for right-of-way up Sixth street to Cameron Hill, and finally on to the Roane Iron Works. The grade of Sixth street is too steep for horse cars, and for this reason alone the City Street Railway company has never built its tracks out that street. The electric motor, however, will overcome all difficulty, and can easily mount the grade at a good rate of speed, it is expected.

Alderman Dyer and Lynn have both visited Richmond, Va., and they are absolutely in accord in saying electricity as a street railway motor is a success, and that no trouble will be experienced in climbing the grade up Sixth street. "It is an easy, satisfactory and altogether practicable method of street transit," says Alderman Lynn, "and I say this as a convert. I was skeptical until I saw the operation; now I believe."

The City Street Railroad company has now twenty-one miles in operation, all of which is in most excellent condition. The capital stock of the company is $600,000. The passenger receipts for the past twelve months show that 1,257,920 passengers have been carried, which, at an average of five cents per head would signify a business of $62,896. What the future plan of the company may be is indefinite, but Chattanoogans know that that the enterprising president of the company will have his line represented wherever it is needed.

Knoxville.—A stock company with $300,000 capital has been organized for the purpose of developing North Knoxville. The company will build new lines of street railway and erect a number of business houses and residences.

Memphis.—The *Avalanche*, of December 9th, has some interesting particulars of the purchase of the street railways here by Mr. C. B. Holmes, of Chicago, and his syndicate, as reported in the Street Railway Gazette last month. It says :—

Negotiations for the deal have been in progress nearly six months, through Messrs. F. H. White and John L. Norton, the well-known brokers, who secured some time ago an option on the property. Mr. Holmes and others interested in the purchase have visited this city and inspected the property. A son of Mr. Yerkes, the owner of the North Side Cable Lines in Chicago, came on here a week or two ago for the same purpose, but, as already stated, the Holmes party were ahead of him.

It is understood that the purchase price is about $950,000, which covers all the franchises and appurtenances of the consolidated lines, and also the whole issue of capital stock, amounting to $1,000,000. The outstanding bonds to the company amount to $800,000 of the $1,000,000 issued, $100,000 having been used in the redemption of old bonds and a like amount held in reserve as an improvement fund. The stock-

holders will get very nearly full value for their holdings, which will make the trade welcome to them, as the stock has been slow sale at much less than per value. The change of ownership will be even more welcome to the public. The general sentiment is that the new management could not possibly give us a worse system than that now in operation, and the impression is that they are likely to improve the service, and that a cable line on Main street would follow in the near future.

Nashville.—The McGavock and Mt. Vernon Street Railway company to-day closed a contract by which electric motors are to be placed on all their cars by the first of April next.

TEXAS.

Victoria.—At a meeting of the Victoria Street Railway company, Dec. 4, it was decided to extend the lines at once, making a belt system.

UTAH.

Salt Lake City.— Rumors were "flying about the street," last month—not that the Mormon chief has had another wife—but that the Salt Lake Street Railway company had changed hands or was about to do so. One version was that local parties had bought out the road, while another made the Thomson-Houston Electric company the purchasers. The presence in the city of Mr. W. J. Clark, of that company, was doubtless the occasion for the starting of the latter story. Mr. Clark informs us that he has merely been conferring with President Arnold, of the Salt Lake City Railroad company about the adoption of the Thomson-Houston electric motor system there.

VIRGINIA.

Danville.—Some little changes in the electric car line have removed the difficulties and the line is a big success, says a correspondent. The cars climb the steep grades with apparent ease and with good speed, and the people are charmed with them. It is probable that before next summer the street car line will be extended to the new park, about a mile from the city limits, and the electric cars run to that point.

WASHINGTON TERRITORY.

Tacoma.—The cable road will be built as soon as the weather permits. The new company, with Mr. Nelson Bennett at its head, has been organized January 9th and made final payment for a three fourths' interest in the stock of the old Tacoma Street Railway company. There is now on hand $7,000 of cable road material.

WEST VIRGINIA.

Wheeling.—The Wheeling Street Railway company have obtained an ordinance for extensions, wherein it is provided that "the said Wheeling Railway company shall not be entitled to the benefits, rights and privileges by this ordinance granted by the city, unless it shall, within six months of the date of the acceptance of this ordinance, complete the construction of tracks and operate cars thereon, on and over the route specified."

The recent transfers of stock in the two street railway companies—the Citizens' Railway company and the Wheeling Street Railway company — have caused changes in the boards. The directors of the Citizens' company have filled two vacancies by the selection of Messrs. J. H. Hobbs and W. P. Hubbard. The board of the Wheeling company now consists of Messrs. J. H. Hobbs, W. P. Hubbard, Jacob C. Thomas, John M. Sweeney and W. D. Updegraff, and in the Citizens' company, of Messrs. J. H. Hobbs, W. P. Hubbard, Col. J. A. Miller, Robert Irwin and John M. Sweeney.

The *Register*, Dec. 20, says: Yesterday the Street Railway company placed a heater in one of their cars as an experiment, and it worked like a charm, making the interior of the conveyance warm and comfortable, and demonstrating, to the perfect satisfaction of the passengers, that it was a big improvement over the old straw-littered floor to which the Wheeling public has been accustomed for years back. Heaters will be at once placed in all the cars, and henceforth riding in the cars, in cold weather, will be shorn of some of its terrors. The reorganized companies seem to be determined to improve the service in every possible way, and the public will not be slow to appreciate their efforts.

The Wheeling Electrical Railway company is anxious to extend its line to Martin's Ferry via Wheeling Island, or build a line from Bridgeport to Martin's Ferry. The application asking for right of way has been presented to the city council, and it was referred to the ordinance committee.

WISCONSIN.

Green Bay.—The Green Bay and Fort Howard Electric Street Railway company filed its bonds, which insures beyond doubt the establishment of a street car line here the coming spring.

Milwaukee.—Mac's road has gone off cheaply —"sold for one dollar." The deed executed by the Milwaukee City Railway company and signed by P. McGeoch, president, and George O. Wheatcroft, secretary. The corporate name of the purchaser is the Milwaukee City Railroad company. The property conveyed consists of the various tracks formerly operated by the Milwaukee City railway; the two-story brick-veneered horse barn and the two-story brick-veneered car house on the southeast corner of Chestnut and Twenty-seventh streets; the barn and car house on the northeast corner of Third and Burleigh streets; the barns on Muskego avenue; the barns and shops on Second and Fourth streets, and all the real estate, cars, horses, mules and other property of the old company. The consideration is stated to be "one dollar and other good and valuable considerations." The property conveyed includes 26 miles of single track road, between 600 and 700 horses, and about 100 cars. The general supposition is that the real consideration for the transfer was between $1,000,000 and $1,200,000.

The deed contains the covenant that the property sold is free from all liens and taxes except the taxes for 1888 and a mortgage for $3,500, executed by a former owner, and another mortgage executed March 21, 1888, by the old company, to secure part of the purchase money of a tract of a little over eight acres of land located on National avenue, just outside the city limits. The purchasers, as part of the consideration for the property, assume the taxes for 1888 and the two mortgages, as well as three suits now pending against the company to recover damages for personal injuries, which suits are mentioned in the deed as claims against the property conveyed. This agreement, which is part of the deed, is signed by W. G. Oakman, president, and R. B. Dodson, secretary, of the new organization, the Milwaukee City Railroad company.

The articles of incorporation of the new company are signed by Benjamin K. Miller, Jr., William H. Morris and Edward P. Smith. The law of the state provides that non-residents can not incorporate a stock company here and it is for this reason that the papers are not signed by the purchasers themselves. The capital stock of the company is $1,500,000, divided into 15,000 shares. Four thousand shares are preferred stock and the balance common stock. It is provided that the preferred stock shall entitle the holders to a dividend up to 6 per cent. of the par value of their stock each year from the net profits of the corporation before any dividend for that year can be paid to holders of common stock. The voting power of the two kinds of stock is to be the same. The number of directors is fixed at seven.

Another "big deal" was effected in a few days after the foregoing. Mr. Washington Becker's railroad, otherwise known as the West Side Street Railway passed into the hands of the Eastern capitalists December 19.

The West Side Street Railway was opened to the public on Thanksgiving Day, 1875, at which time the line consisted of a double track between West Water and Twenty-second Street, and a single track between Twenty-second Street and the city limits. The incorporators of the original company were: John H. Tesch, John Plankinton, S. M. Green, S. S. Merrill, and S. A. Harrison. Mr. Becker was the secretary, and before long bought out the interests of the other shareholders. Mr. Becker owned three-fourths of the stock of the road when the recent sale was effected, and practically controlled it. The remaining one-fourth of the stock was owned by eastern men, with the exception of a few shares owned by F. G. Bigelow, cashier of the First National Bank, and one or two other Milwaukeeans, who were associated with Mr. Becker as officers of the company. In financial circles it is believed that the price paid tor the property by the eastern syndicate now in control was $750,000. The road consists of over fifteen miles of single track.

It is understood that the purchasers of both roads are the same syndicate; and negotiations are in progress with the view of securing the Cream City Railway line and the Hinsey franchises.

CANADA.

Toronto.—The Toronto Street Railway company have agreed to extend their present Queen street service up Broadview avenue and to run the Parliament street car over the Don at Gerrard street to Broadview avenue, but this, it is claimed, does not afford the desired accommodation for East Enders.

The new street car company which ex-Ald. Macdonald is pushing so energetically, does not propose to let its claims pass unnoticed by the board of aldermen. They have settled the question of financial standing by depositing with the city treasurer a bond for $20,000 as security that they will carry out the terms of their agreement. Deputations have waited upon the board of works several times in regard to the granting of a franchise, and the matter is now in the hands of a sub-committee.

St. Catharines, Ontario.—Superintendent McMaugh informs us (Dec. 21) that the St. Catharines, Merritton & Thorold Electric Street Railway company have just completed two miles of an extension to the St. Catharines cemetery. And he adds, "Our electric plant is working well, and we have had a good season's business." They have now eight miles of track.

FRANCE.

AN ELECTRIC TRAMCAR IN PARIS.

The *Electricien* gives some interesting details of an electric tramcar built by Messrs. Phillippart Brothers, of Paris, and now being run between La Place de l'Etoile and La Porte Maillot, of that city, by the Compagnie Générale des Omnibus. The car which, fully equipped and with 50 passengers on board, weighs about nine tons, is fitted with 144 cells of the Faure-Sellon-Volckmar type, divided into four groups of 36 cells each, from which the current driving the motor is derived. These cells can in actual practice furnish power at the rate of 40 horse-power effective for six hours. The motor, which is of the Siemens type is placed at the forward end of the vehicle and runs at from 1,000 to 1,200 revolutions per minute. It drives, in the first place, an intermediate shaft by means of an endless band. The driven pulley is keyed to this intermediate shaft, but drives it and a sleeve riding loose on the axle through a differential gear, as in any ordinary trycicle, so that the sleeve and the axle can rotate independently. A chain pinion on the sleeve and another on the axle drive the two hind wheels of the vehicle, which can rotate independently of each other. This arrangement of differential gearing much facilitates the passage of the vehicle round curves and decreases the wear and tear. The speed of the car is regulated by altering, by means of a switch, the grouping of the accumulators, and four different speeds can be obtained. The car is also lighted electrically by means of six incandescent lamps of 10 candle power.

JAPAN.

The Mikado, we are repeatedly informed, has commissioned an engineer to visit the United States to gain information with the intention of introducing electric railways into Japan.

The Philadelphia Traction company paid a dividend of one dollar per share November 30. The par value of the stock is $50, and $30 has been paid on each share. The capital stock consists of 100,000 shares, and the dividend means an outlay of $100,000. The last dividend paid by the company was in April, when one dollar a share was declared, making two dollars for the year. Last year two semi-annual dividends of one dollar and fifty cents each were paid. The reduction in dividends is due to a great extent to the increase in the wages of the employees, and the shortening of the hours of labor and the reduction of fares. President Kemble says the company is in a prosperous condition, and its business is increasing.

A New Tram Car at Bristol, England.

(*From the Bristol "Times and Mirror."*)

The Bristol Tramway Company have turned out from their works at Eastville another elegantly-constructed car, which will commence its career on the Drawbridge and Redland branch. Its number is 20. Besides being provided with the much-appreciated garden seats on the outside, there are several additional improvements which the traffic manager (Mr. C. Challenger) has introduced, which will add to the comfort of the passengers. Improvements are made in the ventilation by the addition of apertures in the facial boards at each end of the car, and as the car moves forward the outer air will pass direct through into the car above the heads of the passengers as they are seated. The quantity of air may be regulated by the manipulation of a slide, which may cover only a part or the whole of the apertures. These ventilators not only give greater comfort by avoiding "stuffiness," but they also add considerably to the artistic appearance of the car. Another improvement is in connection with the lamps. The company always use Hare's best crystalline, non-smelling, water white oil, which costs more than the ordinary lamp oil; but even with this passengers sometimes complain of the disagreeable smell. The lamp chimneys of No. 20 car are, therefore, carried up through the canopy, and the smoke is carried away into the open air above the roof. The construction was superintended by Mr. F. Strong, and the painting and decorating by Mr. G. Carter. Besides the building of new cars the company have a large staff of car builders at work converting all their small cars into outside garden-seat cars, as they intend running this class of car on every section of the system.

Business Notes.

Mr. Edward Samuel, of the Wm. Wharton, Jr. & Co. incorporation, called upon Mr. J. B. Parsons, General Manager West Chicago St. R. R. Co., Jan. 10th.

The Detroit Storage Battery is likely to be exhibited soon on the tracks of the West Chicago St. R.R. Co., and show what it can accomplish. Mr. Parsons has given his company's consent therefor.

The Bell Punch patent was sold by its original inventor for $300, says the Chicago *Herald*, and the company purchasing it made hundreds of thousands of dollars out of it.

The Johnson Steel Street Rail Company is now named Johnson Company. They have added list of their offices in their advertisement this month. May Johnson Company live forever.

The Patton Motor Company, whose new motor is described and illustrated in this number of the Street Railway Gazette, have opened an office at 45 Lakeside Building, Chicago, where Dr. D. W. Collins, business manager, will be glad to meet any inquirers.

The Bentley-Knight Electric Ry. Co., whose head office is at 115 Broadway, New York, have opened a branch office in the Pullman Building, Chicago, under the management of W. J. Gorham, and where they will exhibit a full line of their equipment. Mr. Gorham has been connected with the *Railway Review*, Chicago, for some time, and knows the district well.

The Cincinnati Corrugating Co. have received a good testimonial from the Sisters of Charity, Good Samaritan Hospital, which says:

The building on Sixth and Lock Streets, this city, now owned and used by us as a hospital, has on it a corrugated iron roof, which has been doing effective service for over 28 years. It was constructed by the United States Government for a marine hospital, but after being finished, and before it had been used, the war broke out, and it was taken instead for a general military hospital, and used for that purpose for five years. In 1866 it was put up at auction and bid in by a couple of public spirited gentlemen, who presented it to the Sisters for a hospital. The sheets composing the roof, 7 feet long, are of No. 24 iron, and are in a remarkably good state of preservation. The last coat of paint which was put on, about four years ago, has scaled off slightly in some places, leaving a smooth, uncorroded surface of iron beneath, but over most of the surface the paint has adhered tightly. The only unfavorable condition of the roof was caused by the sagging of the sheets between the cross supports, or purlins, the latter being five feet apart, too great a distance without other strips or form of sheathing.

Messrs. Chadbourne & Hazelton, the Philadelphia agents of the Sprague Electric Railway & Motor Company, received a contract a few weeks ago from the Pennsylvania Railroad Company, for a complete equipment of dynamo and motors to operate their large transfer table at the Altoona car shops; and although this has not yet been started, the Reading Railroad Company has just closed a contract with the same agency for a somewhat similar, though larger equipment, for their transfer table in the Reading car shops. This somewhat novel use of the electric motor has been but recently worked up, and so far the only three transfer tables to be thus operated have given their orders for Sprague motors to do this work.

The Railway Register Company, Chicago, Major Blodgett informs us, have received an order from the Metropolitan St. Ry. Co., Kansas City, Mo., for 300 more of their fare registers. They are to be delivered within thirty days.

EXPIRING PATENTS

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents:

Expire during the present month.

122,564. Car brake—F. A. Canfield.
122,622. Boudoir car—W. D. Mann.
122,661. Car wheel—Rupp & Ott.
122,655. Deflector for cars—J. A. Rockwood.
122,549. Fare box—H. Barringer.
122,660. Hose jumper for street cars—J. Rue.
122,734. Car lamp—W. H. Paige.
122,994. Baggage check—L. O. Cottle.
123,067. Air brake—Geo. Westinghouse, Jr.
123,033. Car brake—J. McCabe.
123,134. Car coupling—J. Temple
123,284. Speed signal for cars—W. L. Needham.
123,126. Car truck—W. B. Rogerson.

Chicago must be the second city in the United States, if Mr. Wm. J. Richardson's repeated statement at Cincinnati be correct, that Brooklyn is the third city in the Union: Chicago is ahead of Brooklyn, and if the latter is the third city, Chicago by all rules of relativeness must be second. But where does the City of Brotherly Love come in? Must Brooklyn take the fourth seat?

Mr. H. Mc L. Harding, general agent of the Sprague Co., was married on December 18, to Miss F. A. Powers, daughter of Charles E. Powers, Esq, of Boston. The ceremony took place at the residence of the bride's parents, 275 Beacon street, at 8 p.m.

Tires of the wheels of road vehicles are curiously made in England, if the *American Analyst* states the matter correctly. It says that the tire, "instead of being of uniform width, is made wider at intervals of a few inches, the object being to avoid breakage of wheels and axles, when coming against the *side of street car rails*. The shoulders between the wide and narrow parts are sufficiently abrupt to make the wheel mount the rail as soon as one of the shoulders comes in contact with it, and the sliding and sidewise pulling, which is the cause of so many wreckages of carriages and wagons in cities, is avoided."

Capt. Hallett, of the Hazelton Tripod Boiler Co., has returned from a trip to Hutchinson and other places in Kansas, Denver, Col., etc. The gallant captain was banquetted and honored at many points along his route.

Is the Planer a Necessity?

Why is the planer a necessity? and why is not the planer a better machine than it is? Why has not this very essential tool been brought to that state of perfection that other great labor-saving machines have attained? Builders of them have not paid that attention to this hard-worked and tireless piece of machinery that they have to other woodworking tools.

The demand for a smoother to do the very smoothest of surfacing has increased so much of late that The Egan Company, of Cincinnati, Ohio, have originated and devised a heavy smoother to work off a surface from any kind of wood that will be "as soft and smooth to the touch as glass—a surface as clean and perfect as finished marble."

Willard's Hotel.

Willard's Hotel was the most appropriate place to hold the Washington Convention, in many respects. A few gentlemen and ladies who had been staying for some time at the Fifth Avenue Hotel and "The Arlington," New York, found the contrast between those modern palaces and Willard's well-seasoned habitations so striking that they wished they were back in the Empire City, or at the Grand Pacific Hotel, Chicago. Had they known how pregnant its "historic atmosphere" is, with the memories of great events, they, and all the street railway people who stayed there, would have more highly appreciated the famous hotel, as well as the courteous kindness of mine host O. G. Staples. The following points in its attractive features may be of enchanting interest to those who attended the Convention: "Where there was a small country inn, in a low two-storied house, with a front of scarcely twenty feet, now towers the Willard's of to-day, covering more than two-thirds of a block of ground, with its vast suites of apartments piled in stories one above the other, and affording accommodations for a thousand guests at once. Willard's was known three quarters of a century ago as the 'City Hotel,' subsequently it was called 'Williamson's,' and later on it took the name of 'Fuller's,' which it kept till some few years before the War of the Rebellion, when, passing into the hands of the Willard Brothers, it was given its present name. Of the vast armies which ebbed and flowed through Washington during the late war, there are thousands of old soldiers who will recall with delight the hours spent within the hospitable doors of Willard's. The old statesmen who served their country in the halls of Congress or the Cabinets of the Presidents will recall at the sound of the name, the grave and patriotic consultations held within the walls of the famous old house—consultations which had for their object the happiness of millions of people: the welfare of the great Republic. And their successors remark upon the coincidence that, as it then was the favorite haunt, the chosen council house of those whose hands held the destinies of the Republic, so it remains and probably always will be. * * * So that to visit Willard's has come to be one of the objects of a trip to Washington, not only to those who have been here before, but to the children and children's children of those who have lived under its home-like roof. To sit at the table where the great men of our country have sat; to live in the apartments where battles have been planned, and political parties have been born or doomed to death; to attend receptions where the proud beauties of a century have held teirh court; to become familiar with surroundings amid which Presidents have drawn their most important state papers, and have chosen their Cabinet ministers; to meet and mingle with the throng of distinguished men and women who still frequent Willard's; to come in contact with and study the travelers and scientists of all nations who gravitate to this central point in the American capital as naturally and invariably as the needle seeks the pole—these are the reasons why every year brings an increasing number of sojourners to Willard's. And they find a never-ending charm and pleasure in breathing the historic atmosphere, so pregnant with the memories of the great events that have marked our national progress."

Patents Described.

The following are brief descriptions of patents relating to street railway interests issued during the past month, especially prepared for the STREET RAILWAY GAZETTE by J. C. Higdon, Solicitor of Patents and Trade Marks, Room 29 St. Cloud building, opposite U. S. Patent Office, Washington, D. C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

393,599. APPARATUS FOR HEATING AND LIGHTING CARS.—Wm. Wilson, Earlville, Ill.

Oil is used as fuel, carried in an elevated tank, and is led to oil-stoves and lamps through suitable pipes.

393,572. APPARATUS FOR PROPELLING CARS.—Macraeon Storage Battery Co., New York. An electric motor is mounted on a small special car and controlled from the coach to which it is coupled. No change whatever is made in the ordinary cars.

393,373. ELECTRIC MOTOR.—Keller & Carnes, Massillon, Ohio. A wiping device for the commutator is mounted upon the machine so that it may be pressed into contact with the face of said commutator at will, and recover its normal position away from such contact when the pressure is removed.

393,601. BRAKE FOR CABLE RAILWAYS.—Ethan Allen, St. Louis, Mo. A brake-lever is pivoted to the car-frame so as to project down into the slot, and shoes which grasp the slot-irons are mounted on the lower end of this lever.

393,622. CONDUIT FOR ELECTRIC RAILWAYS.—Madison Dallas, New Orleans, La. This is a metallic conduit located upon the cross-ties above the surface of the road-bed, and the conductor is imbedded in a wooden strip and located in the conduit.

393,275. CLOSED CONDUIT FOR ELECTRIC RAILWAYS.—C. J. Van Depoele, Chicago. The conduit is entirely closed, located beneath the roadbed, and the current is transferred to the motors by induction.

393,207. STREET CAR MOTOR.—T H. Burridge, St. Louis, Mo. Compressed air is utilized in a special form of motor arranged to operate noiseless and without showing vapor.

392,798. CROSSING SIGNAL.—J. W. Harkom, Richmond, Quebec, Canada. A lantern having two of its sides obscured is mounted on a gate-bar that is raised and lowered.

392,757. OVERHEAD CONDUCTOR FOR ELECTRIC RAILWAYS.—Ries & Henderson, Baltimore, Md. The conductor is in the form of a rail having two opposite contact surfaces; and the contact-wheels of a small truck are forced against said surfaces by springs.

392,876. SEAT FOR STREET CARS.—G. A. Metcalf, Malden, Mass. Double seating capacity is secured by the use of supplemental seats mounted upon the upper ends of standards, said standards being sufficiently long to elevate the supplemental seats a considerable distance above the ordinary seats, where they are out of the way. They can also be turned edgewise.

392,316. AUTOMATIC BRAKE.—E. J. Lawless, Kansas City, Mo. This brake is applied by the momentum of the car or train.

COMPLETE LIST OF PATENTS.

391,999. Railway tie—A. H. Ames, Philadelphia.

391,774. Tram car—Oscar Blessing, Reudnitz, Saxony, Germany.

301,942. Axle lubricator—M. W. Brown, Gainsville, Ga.

391,878. Cable railway gripping apparatus—E. C. Buck, Philadelphia.

391,837. Car brake—Friction Car-brake Company, East St. Louis, Ill.

392,147. Car heater—C. S. Dean, Fort Erie, Ontario, Canada.

391,792. Electric railway — I. W. Heysinger, Philadelphia. Also motor car.

391,797. Electric motor—W. E. Hyer, Newburgh, N. Y.

391,912. Rail fastener—Charles Netter, New York.

391,818. Car brake and starter — Thomas Rhoads, Castle Dalé, Utah Ter.

392,142. Lubricator for car axles—A. W. Wright, Detroit,

392,070. Nut lock—E. C. Rolls, Chatham, Ontario, Canada.

391,974. Nut lock—T. C. Hughes, Kansas City, Kan.

392,345. Car starter and brake—Chas. Kieser, Baltimore, Md.

392,441. Rail joint—B. H. Lightfoot, Allegheny, Pa.

392,279. Horseshoe attachment—S. L. Madden, Louisville, Ky.

392,569. Rail joint—J. M. Price, Philadelphia.

392,464. Car Heater—P. J. Sensabaugh, Knoxville, Pa.

392,470. System of operating alternate-current motors—Westinghouse Electric Company, Pittsburg, Pa.

392,574. Electrode for secondary batteries—Woodward Electrical Company, Dêtroit, Mich.

392,772. Electric railway—Orren Allen, Denver, Col.

392,845. Axle-box—H. G. Bird, Chicago.

392,664. Conduit for electric railways—H. A. Chase, Stoneham, Mass.

392,906. Axle-lubricator — Warren Cole, Jr., Knoxville, Tenn.

382,863. Electric railway—Benj. Heywood, New York.

392,920. Spike puller—B. S. Horton, Vermillion, Ohio.

392,675. Electric railway—R. M. Hunter, Philadelphia.

392,740. Car brake—J. A. Marchbank, Boston, Mass.

392,877. Cover for manhole chambers—M. R. Muckle, Jr., Philadelphia.

392,745. Car brake — James Mutton, Frico, Utah Ter.

392,632. Elevated railway — R. T. Oney, Charleston, W. Va.

392,930. Synchronizing electric motors—F. J. Patten, New York.

392,971. Electric railway—Ira Robbins, Camden, N. J.

392,829. Car brake—J. W. Shotton, Montreal, Canada.

392,890. Regulation of electric motors—Westinghouse Electric Company, Pittsburg, Pa.

392,767. Car stop—Wm. Walker, Jermyn, Pa.

392,940. Guide rail clamp—W. P. Wylly, Patterson, Ga.

393,141. Anti-friction bearing—G. Buchholz, Berlin, Germany..

393,323. Switch for electric motors—Electric Car Company of America, Philadelphia Pa.

393,224. Electric railway—S. D. Field, New York.

393,328. Axle-box—T. F. N. Finch, Worcester, England.

593,228. Cable crossing device—H. C. Grawe, St. Louis, Mo.

393,012. Metallic connector for electric railways—National Electric Company, Camden, N. J.

393,015. Track raiser—Martin Lee, Alma City, Minn.

393,263. Steam motor for street cars—Wm. E. Prall, Jr., Washington, D. C.

393,266. Electric motor and dynamo—A. L. Riker, New York.

393,181. Grip for cable cars—C. L. Snyder, Kansas City, Mo.

393,277. Turnout and crossing for electric conduits—C. J. VanDepoele, Chicago.

393,278. Switch for overhead conductors—C. J. VanDepoele, Chicago.

393,280. Electric railway system—Electro Automatic Transit Company, Baltimore, Md.

393,695. Bridle Attachment — N. Edwards, Washington Court House, Ohio.

393,349. Mold for casting axle-boxes—W. W. Ayres, Fort Plain, N. Y.

393,615. Flask for car wheels—J. J. Carr, Wilkes-Barre, Pa.

393,636. Dynamo machine and electric motor—W. P. Freeman, New York.

393,469. Dynamo-electric machine — Electro Dynamic Company of Philadelphia.

393,561. Car brake—H. S. Hopper, Detroit, Mich.

393,706. Station indicator—J. I. Irving, San Francisco.

393,515. Rail fastening—D. M. McRae, Bruegerhoff, Tex.

393,722. Car brake — Reynolds & Gerdom, Troy, N. Y.

393,666. Automatic switch—H. A. Sage, Aurora, Dak.

393,530. Cable railway—John Wilde, Providence, R. I.

394,015. Motor for street cars—W. S. Salisbury, Chicago.

394,018. Heating and lighting cars—Saunders & Patton, Pueblo, Col.

394,139. Sectional double line electric railway—S. H. Short, Columbus, O.

394,036. Duplex electro-motor—C. J. VanDepoele, Chicago.

394,037. Constant upward pressure contact for overhead conductors—C. J. VanDepoele.

394,040. Cable railway—R. P. Walch, St. Louis

The Street Railway Gazette.

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An Extensive "Tie-up" Expiring.

New York and Brooklyn have been inflicted with a "general tie-up" of their street railways.

Despatches from the Empire City of January 29 run generally as follows: "Nearly three years have elapsed since New-Yorkers have been forced to walk to business through a tie-up of the surface roads. The last tie-up, in June, 1886, was a disastrous one for the men. For some time past the men have been quietly preparing to renew the struggle, and in accordance with a decision reached last evening nearly all the roads were tied up this morning. The men two weeks ago made a demand on the companies for $2 per day for ten hours' work in twelve consecutive hours. No reply was received, hence the tie-up. The men, in a long address to the public, set forth their grievances and ask its support.

"The strikers comprise the employees of the First, Second, Fourth, Sixth, Eighth, and Ninth avenues, Broadway and University Place, Belt, Dry Dock, avenues B and D, Cortlandt and Grand streets, 42d, Central, Crosstown, Chambers street, avenue C, Boulevard, St. Nicholas avenue, and 110th street, Harlem, Morrisania and Fordham and 138th street, and Port Morris lines. The Third avenue, the 23d, 14th, Bleecker, and Christopher street lines have not been tied up."

A Brooklyn despatch of the same date said: "No disturbance occurred to-day in connection with the street railroad strike. No attempt was made to run cars on the Richardson lines. Obstructions placed on the tracks by boys were voluntarily removed by the strikers. The police were on duty guarding the company's property, but were idle. The Brooklyn strikers are now claiming that if the tie-up of the New York lines does not bring the Deacon to his senses, that by to-morrow not a single car will be running in New York or Brooklyn. They go further, and declare that if this is not enough, to accomplish their end, the surface cars of every city in the United States will be tied up.

"Preparations have been made in Brooklyn to call out the 13th, 19th, and 3d regiments in case of a riot."

It may not be uninteresting to state what various newspapers have said about this strike, when the tide of violent impulses was at its highest.

The Buffalo *Express* (January 30) stated the case tersely, as follows: "No street cars ran in Brooklyn yesterday. In New York travel on all but five of the surface lines was stopped, although with the aid of large forces of police two or three cars made perilous trips. Already men have been severely beaten by the strikers and force has been used to prevent the running of cars.

"Some weeks ago the men on the tied-up roads in Brooklyn demanded two dollars a day for ten hours' work in twelve consecutive hours. No reply to this demand was received, and so they struck. It is said that the men on the New York Dry Dock Road, in which President Richardson is interested, have no fault to find with their hours or their pay. Only a few days ago the superintendent posted a notice that the company would take off one trip a day without reducing the wages.

"The strike in New York is wholly one of sympathy with the Brooklyn men. No demand has been made or refused, but the New-Yorkers are simply attempting to coerce street car companies in another city in the management of their affairs. This kind of strike is outrageous, and will be sure to recoil upon the strikers. It will hurt rather than help the Brooklyn men. It justly destroys public sympathy, and it is strange that the men have not learned enough wisdom from the history of strikes to avoid such a blunder.

"The situation last night in both cities remained serious. The Brooklyn roads have offered to confer with their striking employees, but refuse to meet the committee of District Assembly No. 75."

The first climax of the rioting element was reached January 28, and is described next day in Geo. W. Child's paper as follows: "No cars were run over the Atlantic avenue street car lines in Brooklyn, New York, yesterday. The new men are afraid to man the cars without personal police protection. This it is said cannot be afforded them. About 100 of the newly hired men left in fear after hearing of the killing of conductor Adams. While some new employees of the Atlantic avenue road were being transferred last evening under strong police escort from the office to the stables, a mob of several thousand men blocked the way at Twenty-third street, and a fight followed, the police charging the crowd and using their clubs freely, while the rioters threw stones and other missiles. Several on both sides were hurt, but none dangerously. The crowd was finally dispersed. There are fears of serious rioting to-day. The thirteenth regiment of militia was called out last night as a precaution."

THOMAS W. ACKLEY.

BORN 1826—DIED 1889.

President of the American Street Railway Association 1886-7.
President of the Board of Presidents of the Philadelphia Passenger Railway Companies since 1878 (ten years).
President of the Thirteenth and Fifteenth streets Passenger Railway Co., Philadelphia, since 1870.

The *Public Ledger* (Philadelphia) January 31, summarized the situation editorially and gave some wholesome advices which are well worth reproducing.

"NO COMPROMISE WITH MOB LAW STRIKES.

"Whatever the merits of the demand of the striking horse car employees in New York and Brooklyn may be, the violent methods they have adopted for enforcing their demands have been utterly wrong and indefensible, and for that reason the strike has been doomed to failure from the start. Attempts to persuade people by resort to the knock-down argument, by clubs, stones or revolvers, by obstruction of travel or traffic, by destruction of property or by any form of violence whatever, are sure to fail in this country, for the reasons: first, that they are wrong and lawless in themselves, and, therefore, totally unwarranted in a country whose whole polity is founded upon law; next, because American manhood is aroused in defense and vindication of those whose rights are outraged and of their own rights at the same time; and third, because all the community, outside the lawbreakers and the mob, join with the public authorities in seeing to it that the violence shall be suppressed—that the mob shall be put down—and that so many of the mob-ites and destructives as shall be captured shall be punished according to law.

"Just that course has been run by all the mobs and all the riots that have ever afflicted this country. They gather, gain some headway, do more or less damage to property, cause more or less loss of life or injury in the way of wounds—flourish for a few hours or days—and then the masses of the people, the body of the good and orderly citizenship of the country stand up in support of the authorities, and the mobs and riots are themselves destroyed, the supremacy of the law is restored, the real or pretended object of the strike or riot or lawlessness disastrously fails.

"Violent strikes and strikers always lose. That has been the case with the most formidable of the so-called labor strikes for many years, and must, of course, be the case with those of minor consequence. The railroad strikes and riots of 1877 caused the destruction of a vast amount of

property and the sacrifice of a number of lives; but, strong and apparently universal as that strike seemed to be for awhile, it was suppressed, leaving only the destruction and the slaughter as its trophies—with a large number of victims who flung their employment away and their means of living. That, too, was the history of the great Southwest railroad strike, which three years ago blocked the traffic of five States for awhile. There was destruction of property and some loss of life there, too—all leading to the same result: the failure of the strike and its objects, the restored supremacy of the law, the manning of the railroad by new men, the discharge of the old hands, and a deplorable loss of the means of living of those who in this instance again flung their employment and livings away by resorting to mob law. It was the same with the stock yard strikes and riots at East St. Louis and Chicago, and even in the city of New York, where the horse car men are again stopping all local travel on the surface roads—they have had within three years a sore experience of the same kind. They attempted then precisely what they are trying now, with the result of finding public opinion against all strikers who seek to accomplish their ends by mob violence, and that the public and the law authorities put them down.

"It must be so always. Men who 'strike' for what they regard as their 'rights,' and who attempt to carry their point by total disregard of the rights of all other people,—who disturb the public peace, who threaten the public safety, and who, in so far as they are able to accomplish their ends, throw the whole ordinary intercourse of society into confusion, interruption and loss—have to be put down at any and every hazard, no matter what their plea or pretence may be. When they are mobbing, beating and killing other men for the sole reason that the victims claim the right to work upon terms that are satisfactory to themselves—when they are obstructing by riot and violence all usual means of travel and traffic to the loss and danger of unoffending passengers—when they are destroying the property and paralyzing the trade and business and affairs of people who have neither part nor lot in the 'strikers'' quarrel—they are sure to excite the manhood, the resistance and the anger of all the rest of the community; and when such resistance is aroused, whatever merit there may have been at the outset in favor of the strikers' claim or demand is wholly submerged and lost sight of in the necessity of putting down lawlessness and in restoring the rule of the law.

"There can be no success for mob-law strikes in this country, and no compromise with violence or attempt at mob rule in any form for any purpose."

"The World" to blame.

A full page of the *World* (New York) has been devoted daily to vivid descriptions of the movements of the strikers and their struggles, until the "tie-up" waned and died out. It is remarkable how evasively "the largest circulation" has commented on "Labor's great fight," when other leading newspapers condemned it in unmeasured terms. The *World* spoke of the "rights" of the parties at loggerheads in such a manner as not to offend the strikers, and yet so guardedly that the law and order element could not accuse it of encouraging lawlessness. On the 31st of January the *World* said editorially:

"The rights of the parties to the present unfortunate controversy over the operation of the street railways should be kept clearly in mind.

"(1.) A man's right to work is fundamental. Nothing lies deeper than that. Upon it depend all the other rights proclaimed by the great Declaration to be 'inalienable'—the right to 'life, liberty and the pursuit of happiness.' Whoever, therefore, interferes forcibly with another's right to work trespasses upon the natural and necessary prerogative of a human being. There can be no justification for such usurpation.

"(2.) A man's right not to work is equally clear, subject to certain limitations. No man who is able to work has a right to be idle if thereby his support be liable to become a public charge or his family be subject to hunger and cold.

"(3.) The right of Labor to unite is at least as plain as the right of Capital to combine. And the right to unite carries with it the right to act through representatives of the Union. When the agent of a corporation insolently refuses to treat with the chosen representatives of his employees he practically denies to them the right of efficient organization. Such action is an attempt arbitrarily to annul the first law of nature—that of self-defense. For nothing is better demonstrated than that workingmen must stand together to avoid being oppressed separately.

"(4.) The people have a right to be protected against the danger of mob violence, and to require that the corporations to which they have surrendered their streets shall perform the service required by their charters. Rioting is no remedy even for injustice in a Republic. Nor can the greed or the unreason of a corporation be pleaded as an excuse for the non-fulfilment of its obligations to the public.

"If the right were done the strike of the street railway employees in this city would end in an hour."

New York's great daily paper did not explain what it considered "the right" in the case, but the last paragraph of the above quotation could not be understood except in one way by the strikers, and that is that the street railway companies should do what the strikers considered was right. That is the furthest the *World* dared go in misleading public sentiment against the street railway people. It had been "pitching into" them for some weeks, or months previously to the tune of "bobtail cars must go" and other editorial airs. There is no doubt whatever but that the *World's* attacks on the companies did much to bring on the strike; it was just the same in case of the last Chicago street railway strike (last October). The *Daily News* in particular, in its eagerness to obtain "the largest circulation," ridiculed the North Side cable in particular, and the West Side lines in general, so that the employees were misled to suppose that they might as well let Luke Coyne and Walking Delegate Goodwin take the management of the North and West Chicago street railroads out of the hands of President Yerkes and General Manager Parsons.

It is not expected that the great daily papers will take much notice of what the Street Railway Gazettr may say; but we venture to commend our daily contemporaries to "read, mark, learn and inwardly digest" what Mr. Child's *Public Ledger* says (as quoted above). The papers which love to indulge in "popular" attacks on public corporations, may learn in time that it does not pay "in the long run." When the numerous street car drivers and conductors find out that they have been misled they will become disgusted with their misleaders.

This latest strike in New York and Brooklyn would never have been undertaken if the strikers had not imagined the cars could not be run without them. We are glad to notice that new men are being recruited rapidly, and most of the stupid simpletons who threw up their berths are likely ere long to be begging their bread or getting steeped in crime.

The spirit of these strikes is nearly allied to the rankest anarchy, and no effort should be spared to weed it out. Mr. Wm. J. Richardson, the popular secretary of the American Street Railway Association, and his father, had to stand the brunt of the labor battle which is now about ended, and they stood in the breach firmly. The result of their firmness, and the admirable attitude of all the numerous lines that were so recklessly "tied up," is likely to have a salutary effect on street railway mischief-makers throughout the land.

The trouble not yet over.

While it seemed, at the writing of the above, that the strike had collapsed and that the strikers had killed only one "scab," it was demonstrated Feb. 3d that the demon of destruction is yet loose. A riot occurred on First avenue near 39th street that afternoon, during which many persons were injured by bricks and stones, and Officer Brennan narrowly escaped a bullet that was fired from the roof of a tenement.

The avenue had been crowded all the morning with people who were in an angry mood over the strike. Some boys playing in the street about one o'clock rolled a truck from the curb across the car track. The solitary officer in the vicinity drove the boys away and caught one of them, whom he took to the station-house. When the officer returned the crowd had increased in number and viciousness. The blue coat was received with a shower of stones. At the same time the mob seized some trucks and upset them on the track, blockading a 34th street car. This car formed a target for stones and bricks, and its windows were quickly demolished. The passengers, among whom were some women, fled in terror.

Meanwhile the officer had rapped for assistance, and the 16th precinct reserve was on its way to the scene. The mob was busy dragging trucks, stones, logs and all sorts of obstructions from neighboring stone-yards, wood-yards, etc., and piling them on the tracks. Thousands of men, women and children shouted approval from the windows and roofs of the tenements which lined the street.

When the reserve came up they were pelted with missiles from the rioters and from the people on the roofs. The police force was too small to make any impression on the mob, and more help was summoned.

Some of the passengers in the car had been hit and bruised. One old lady fainted and was cared for in a neighboring drug store. The shot which so narrowly missed Policeman Brennan crashed through the window of the car on which the officer was riding. It went clear through the car, but fortunately no one was seated in its path. The shot seemed to come from a house, and some officers broke into the building and could find no one on whom to fix the guilt.

A big stone from a roof smashed a hole in the top of a 42d street car that was in the blockade. The stones were growing more plentiful and the crowd more demonstrative when a carriage containing Inspectors Byrnes and Steers dashed around a corner into the mob. The officers jumped out and began to ply their clubs. At the same time two patrol wagons hurried around another corner. The men jumped out, formed in line, and swept down upon the crowd. In ten minutes the avenue was clear of people, all the rioters having been driven down the side streets. The policemen remained stretched along the avenue to keep it clear. Men on the roof of No 607 threw some bricks, one of which crushed the helmet of an officer. A detachment of officers raided the house, but, after climbing four flights of stairs, found the roof deserted. The offenders had found refuge in other tenements. This ended the trouble and, except for the occasional throwing of a brick from some yard or other place of concealment at an officer, there was no further disturbance.

Cars were kept running on the avenue until 7.30 P. M.

There was no trouble of note on any other East-side line during the day.

Nothing of much interest occurred among the tied-up lines of roads on the West Side, on the day under consideration. The Broadway, Eighth-avenue, Seventh-avenue, and Belt-line companies made no attempt to run cars. The Sixth-avenue Line was kept running until 3.30 P. M., when crowds began to gather at points along the road, and the outlook was so threatening that the cars were hauled off for the night. Already an ugly affray had occurred in Carmine Street, one of the cars having its windows smashed, and the police scattering the crowd with some difficulty.

No attempt was made to run cars on the tied-up Richardson roads, Brooklyn, on the day referred to, and no disturbance occured.

At night renewed signs of a collapse became evident. The meetings of the strikers were not so well attended as usual, and there was a general whisper among the men that they better secure their old job before it became too late.

Licenses are suggested as a remedy for strikes, and all other ills that street railway corporations are heirs to. "Yes," said an old time car conductor, "a movement is on foot to have conductors and drivers licensed." There are several reasons why they should be licensed. (1.) It would bring better workmen into our calling. (2.) Less accidents would occur to the car-riding public, and (3.) Strangers using the cars would be better accommodated in the hands of a carman who was thoroughly posted.

Thomson-Houston Electric Railways.

The Omaha and Council Bluffs Railway and Bridge company started their cars the last of November, and since that time they have been in daily operation in a way which has been to the utmost satisfaction to the owners and to the general public, which is more than pleased with this new means of rapid transit which the road has opened between Omaha and Council Bluffs. The cars on this road are run faster than on any other road in the country, a speed of fifteen, and oftentimes twenty, miles an hour being attained. The power plant consists of two 80 and one 40 h. p. generators. This is the finest electric railway in the west to-day, and shows in every detail of construction and operation the superiority of the system.

The Des Moines Broad Gauge Railway company, which has been equipped with the Thomson-Houston railway system, has been in operation since December 20th, and most satisfactorily, too. The first trial trip made on this road was such a one as to convince the most unbelieving of the practicability of the electric railway. The car had a load of eighty-seven passengers, and the rails were thickly covered with mud in many places, but these had no effect upon the operation of the car which mounted the grades and rounded the curves with an ease and precision which clearly showed that the apparatus was capable of doing the heaviest work which would be required. The total mileage is 7.5 miles, and eight cars will be operated. During the severe snow storm in Des Moines, when about one foot of snow fell, the motor cars made their regular trips every fifteen minutes. The horse cars put on four horses, but could not run on time then; and the steam motor, which runs out into the north end of the town, got ditched, so that the electric cars were the only ones operating during the storm, which is certainly flattering to the system. The receipts from four motor cars on this road are four times more than from five cars operated by horses.

The Third Ward Street Railway company, Syracuse, N. Y., which is operating the Thomson-Houston system, has been somewhat delayed by difficulties connected with the track construction, but is now in operation and has eight cars and four miles of track.

The Riverside and Suburban Railway company, Wichita, Kan., has operated successfully since starting, and has stood all the tests of bad weather and muddy and frozen streets, never having lost a single trip. The people of Wichita are enthusiastic over it, and are learning by experience the comfort and satisfaction which this service affords. The track is built of Johnston rails in the city limits, and the ordinary "T" rail is used outside. There are three cars in operation, each equipped with Thomson-Houston motors and lighted with electric lamps

The Eckington & Soldiers' Home Railway, at Washington, D. C., has been in operation since the latter part of October, and thus far without a hitch of any kind which can be laid to the electrical apparatus. The patronage of the road has increased to such an extent that it has been necessary to double the car capacity. Each motor car now tows an additional car, both of which are filled to their utmost capacity at every trip. The road, it will be remembered, is the finest which has been built in the United States, and one which reflects the utmost credit upon the Thomson-Houston company.

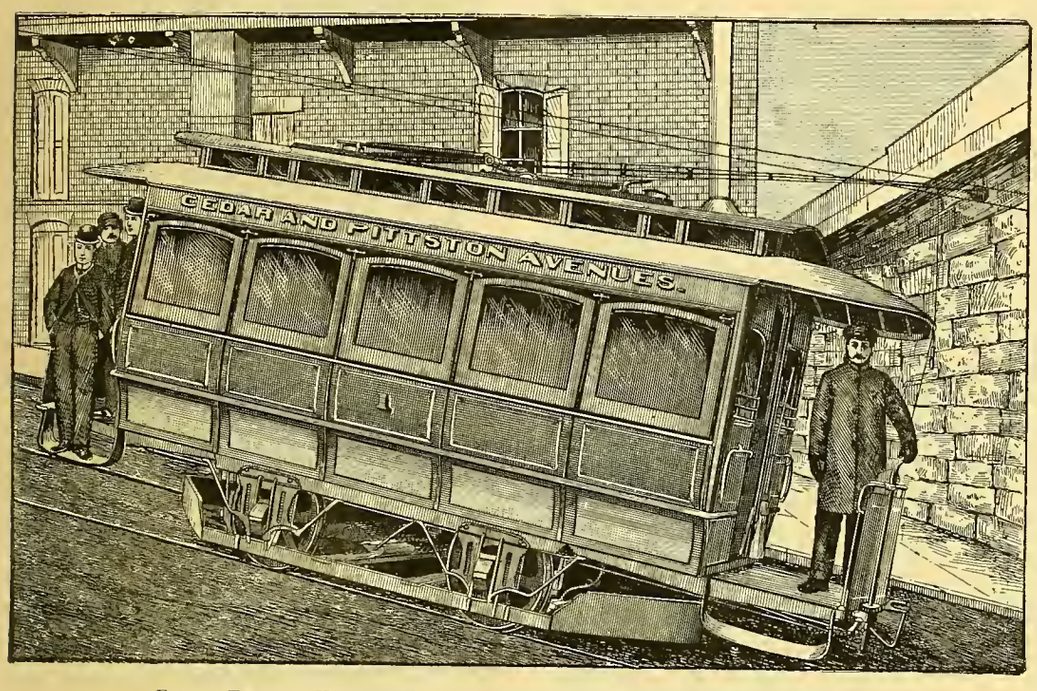


FIG. 1—THOMSON-HOUSTON CAR ON GRADE. SCRANTON (PA.) SUBURBAN RAILWAY.

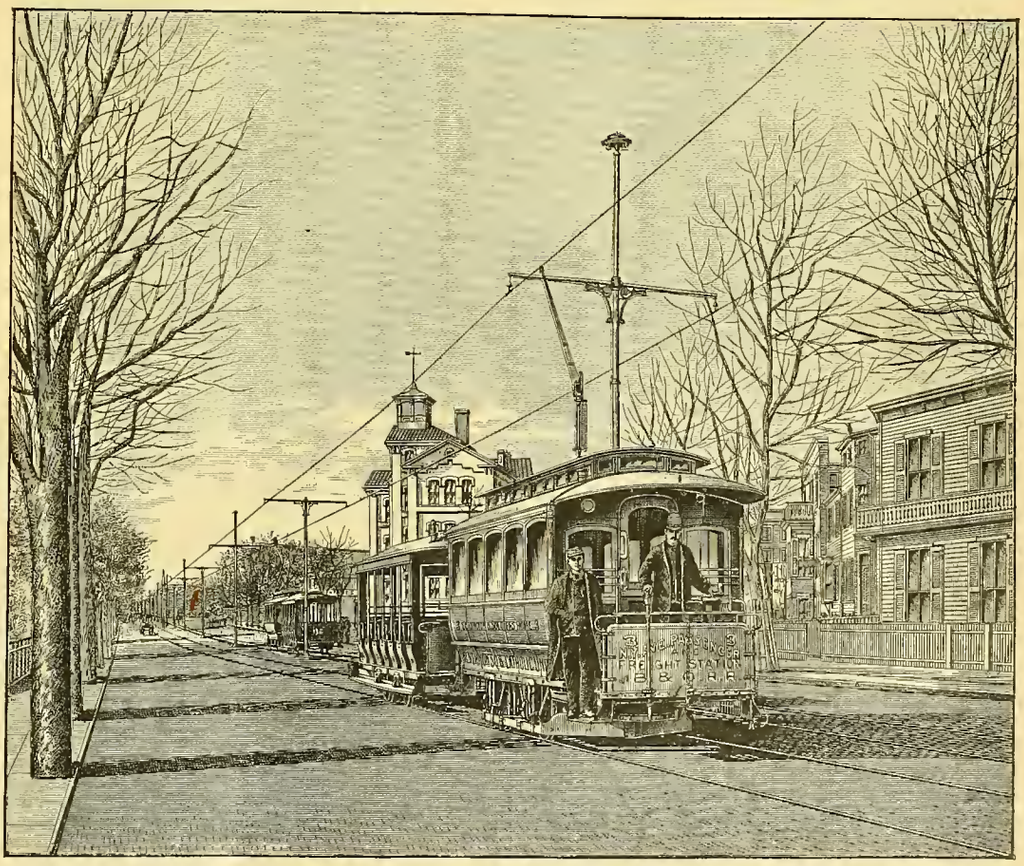


FIG. 2—THOMSON-HOUSTON ELECTRIC RAILWAY.

Three of the improved Thomson-Houston trucks have been in use for some time past on the Scranton Suburban Railway, and the manner in which they operate has been the occasion of much favorable comment. Each truck has two 15 h. p. Thomson-Houston motors. The first one was shipped early in August, and was used under a large open car, and frequently carried up the heaviest grades a load of seventy-five people, and on several occasions, more than 100 people. The truck was afterward put under a heavy Pullman car which weighs almost as much empty as an ordinary street car does when loaded, and its operation under this car was equally as satisfactory. This road is one which has many curves and heavy grades, and the motors are called upon to do some very heavy work, but they proved themselves to be perfectly reliable and abundantly able in every way to supply the demands made upon it.

Thomson-Houston System at Nashville.

The Thomson-Houston Electric Co. has just closed a contract with the McGavock & Mt. Vernon Street Railway of Nashville, Tenn., for the equipment of a part of its road. The length of the line is 3.07 miles, of which 2.30 is double track, and .77 single, making a total of single track 5.37 miles. There are seven curves on the line and numerous grades, the maximum being 5½ per cent. There will be six cars, each sixteen feet in length, and capable of carrying seventy-five passengers, and equipped with two 10 h. p. Thomson-Houston motors. The overhead system will be used. This contract was not entered into until all the various systems now in operation in the United States had been carefully investigated. Electricity will not be used on the entire line at present, but a loop from Cherry street around the public square back to the stables. The time consumed by a car making this trip is seventy minutes. The new car will make this trip in thirty minutes. The consideration of saving one-half of the time is a material one, viewed from both the stand point of the company and the patrons of the road. Eight cars are now used on this division, and as the motor cars will be twice as fast, only four of them would be needed, but for the fact that the company expect an increased patronage, so that the six cars will be put on as soon as ready. The city council, some weeks ago, granted the right to exchange animal for electric power to all the street railway companies, and if the present road proves as successful as other roads operating this system, the remaining branches of the McGavock & Mt. Vernon road will be equipped, and it will, in all probability, be adopted by the East Nashville and South Nashville companies. The company has also closed a contract for the equipment of two miles of single track at South-

ington, Conn. The overhead line is all completed except the curves, which are now being put in. The bracket method of suspension is used except on curves, where the cross suspension is employed. The cars will be operated, each being equipped with two 10 h. p. Thomson-Houston motors.

The Thomson-Houston Electric Road at Boston.

On November 20th the Thomson-Houston Electric company started to equip the Cambridge Division of the West End Street Railway of Boston, running from Bowdoin square, Boston, via Cambridge St., West Boston Bridge, Main St., to Harvard Square, Cambridge (three miles), and thence via North Avenue to Arlington, a distance of four miles, about six of which is double track and paved.

As the season was so far advanced it was first thought advisable to equip the line as far as Harvard Square, and accordingly the rail connections were made from Harvard Square to Bowdoin Square and back. This work was completed Dec. 3d. In view of the fact that the cars on this division of the West End Street Railway run on a headway of about one or two minutes, it will be seen that remarkably good time was made by the Thomson-Houston company in removing the paving and drilling and connecting the rails without interrupting the traffic. The work of connecting the rails on North Avenue is now about done. The poles used in equipping this line are made of lengths of strong iron pipe firmly shrunk together and are very neat and unobtrusive. There are three styles of these poles, it being deemed advisable to use a stronger one on the curves than was used on the straight stretches—300 have been used from Harvard to Bowdoin Square. They are set in crushed rock and cement. The work of setting the poles from Harvard Square to Arlington is progressing rapidly, and already about one-third of the distance has been covered.

The cross suspension method will be used the entire length of the line. The cross wires from which the trolley wires hang have been stretched, are in position from Harvard to Bowdoin Square.

The overhead trolley wires will be placed in position at once, and the work of fastening them to the cross arms will be commenced. In order not to interfere with the operation of the car during this work a large platform staging will be used, which will permit passage of the cars underneath it. In connection with the work of equipping the line it may be said that the Thomson-Houston company has had to cope with several difficulties which could not enter into the construction of other lines in this city, and in the overcoming of which no little engineering skill has had to be employed. One of these points has been the draw-bridge over which the two railway tracks run. Owing to its peculiar construction and situation it has been found necessary, in order to effectually connect the wires, to design a special switch which will be put in position in a few days.

At the grade crossing of the Boston & Albany Railroad in order to avoid raising the trolley wires above the gate, an automatic device will be employed in connection with the gates to prevent interfering with the trolley wires. Twenty cars are to be equipped out of those now running on the road, three being fitted up at a time. The work on these has been already commenced. All the latest devices for the complete equipment of the cars will be employed, and the Thomson-Houston company expected to have them running to accommodate the public Feb. 1.

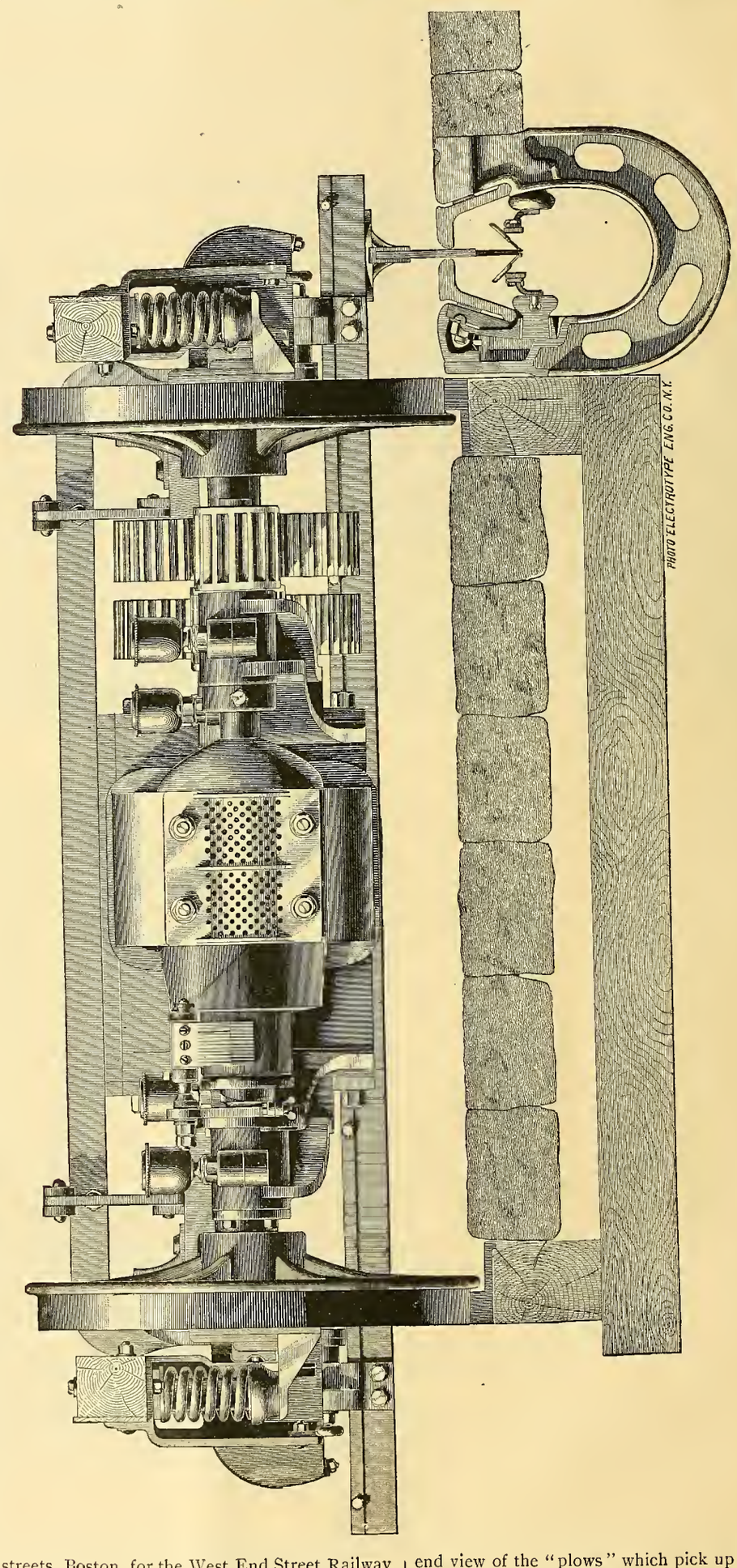
In regard to the power station it is proposed at present to utilize the station of the Cambridge Electric Light company, and place therein five 30 h. p. generators and complete switch board for operating the same. The steam plant is already being placed in the station, and work of setting up the generators begun.

When the road is equipped with the present order which has been received from the West End Street Railway, 20 cars will be running from Bowdoin Square to Arlington, each of which cars will have sufficient power to run a tow car. All cars will be lighted with electric lights and equipped with head lights.

Bentley-Knight Electric Conduit System.

We illustrate in this issue the electric conduit system of the Bentley-Knight company, showing the new form of conduit which has been laid by that company through Boylston and Beacon streets, Boston, for the West End Street Railway company and which is now being laid through Fulton Street, New York, by the North & East River Railway company, under license from the Bentley-Knight Electric Railway company.

In Fig. 1 is shown an end view of the motors and mechanism employed by the Bentley-Knight company in the construction of their new standard trucks, and a section of the conduit taken at a yoke, showing the extreme limit of space occupied by the conduit. Fig. 1 also shows the end view of the "plows" which pick up the current from the conductors in the conduit and carry the same to the motors. Fig. 2 shows a rear view of the motor and mechanism taken from the centre of the truck. It also shows a plow in section and a section also of the plow-



Section of Conduit at Yoke and End View of Plows.

FIG. 1—BENTLEY-KNIGHT ELECTRIC RAILWAY—END VIEW OF MOTOR TRUCK.

guides which carry the plows, and form a part of the path traversed by the current on its way from the conduit conductors to the commutator of the motor. In Fig. 2 the conduit is taken at a point between yokes and exhibits the method of setting the same in concrete. As will be seen from the cuts, the construction differs from any heretofore employed, in that the conduits furnishing the current to a double track street railway, are both placed in the space between up and down track, instead of each conduit being laid between the rails of an individual track, as has heretofore been the practice.

The peculiar advantage possessed by this type of construction is that no change need be made in an existing roadbed and that the footing of the horses and the operation of street cars along the line is not interfered with during the period of change from animal to mechanical motive power.

Over a considerable portion of the line in Boston now equipped by the conduit, cars were constantly running on half minute headway while the conduit was being laid. The space between the tracks of a street railway, possess also the advantage that it is the highest part of the street, the best drained and less used, while slot rails laid there are not open to the objection of causing slipping of horses. The wear and tear on the pavement there is also much less than at any other portion of the street. Placing the two conduits together makes but one excavation necessary for both, allowing a single man-hole and catch-pit and sewer connection to drain both conduits, instead of one set of sewer connections being needed for each separate conduit.

It will be seen that an entirely novel construction of yoke is used in the conduit shown. The slot rails—which are the heaviest ever used in a conduit structure—rest in a seat prepared for them at either side of each yoke and are bolted firmly to the yokes. The bolts which hold the slot rails to the yokes, as well as the upper extremity of the holder in which is held the insulator supporting each conductor, are carried into a box at either upper extremity of each yoke. These boxes are furnished with cast-iron caps, which, while fitting too closely to be thrown out of position by passing wheels, are easily removable by a special tool. The cap being removed, easy access is given to the contents of the box and the width of the slot rail can be regulated at will from the surface of the street, without any interference with the pavement. It is also the case that the slot rails can be wholly removed at any point without interrupting the operation of the conductors or the constancy of the current along the line. The conductors are furnished in lengths of 24 feet and at each end of each conductor is an expansion and contraction joint which allows for any variation in temperature.

As will also be seen from the cuts, the electrical connection between the conductors in the conduit and the motor on the car, is maintained by means of contact plows, at the lower extremity of which contact shoes are pivoted which have a spring rest upon the upper surface of the conductors and slide along them as the car moves, preserving constant and unbroken contact. Double plows are used to insure constant contact and to prevent any sparking or flashing. From the contact shoes the current is carried up through the body of the plow to the plow-head, at the upper extremity of which a flexible connection is made with the longitudinal conductors held in the plow-guides which are supported by the motor frame extending across the entire width of the car. By means of these guides the plows can assume any position across the entire width of the car, without breaking the electrical circuit. It will be readily seen that when a car switches from down to up track on a line where double conduit between tracks is used, the plows will occupy a position when the car reaches the up track, exactly opposite to that which they occupied when the car was on the down track; in going across the switch, perfect connection must be maintained, which makes it necessary that the plows slide freely sidewise.

The motor construction shown is the latest type produced by the Bentley-Knight company, in which every effort has been made to increase the solidity, durability and strength of parts, while the motor has been so condensed in its vertical dimensions as to leave much more unoccupied room under the car than has yet been gained by motors of the same strength.

Any type of car-body can be used with the Bentley-Knight trucks, no part of the electrical equipment having any dependance upon the car-body itself. It will be observed that the opening of each conduit slot and the plows and plow-guides, are all under the protection of the car-body, and within the space occupied by the ordinary car step, so that there is no danger of their proving any obstruction to passing traffic or occupying any space heretofore kept free. The plows and plow-guides are held in vertical position by a spring catch, which, while sufficiently strong to so hold them under all ordinary circumstances, gives way whenever an irremovable obstruction is met and allows the plows to come up out of the conduit, thereby preventing any breakage of plows themselves and at the same time preventing any obstruction being left in the

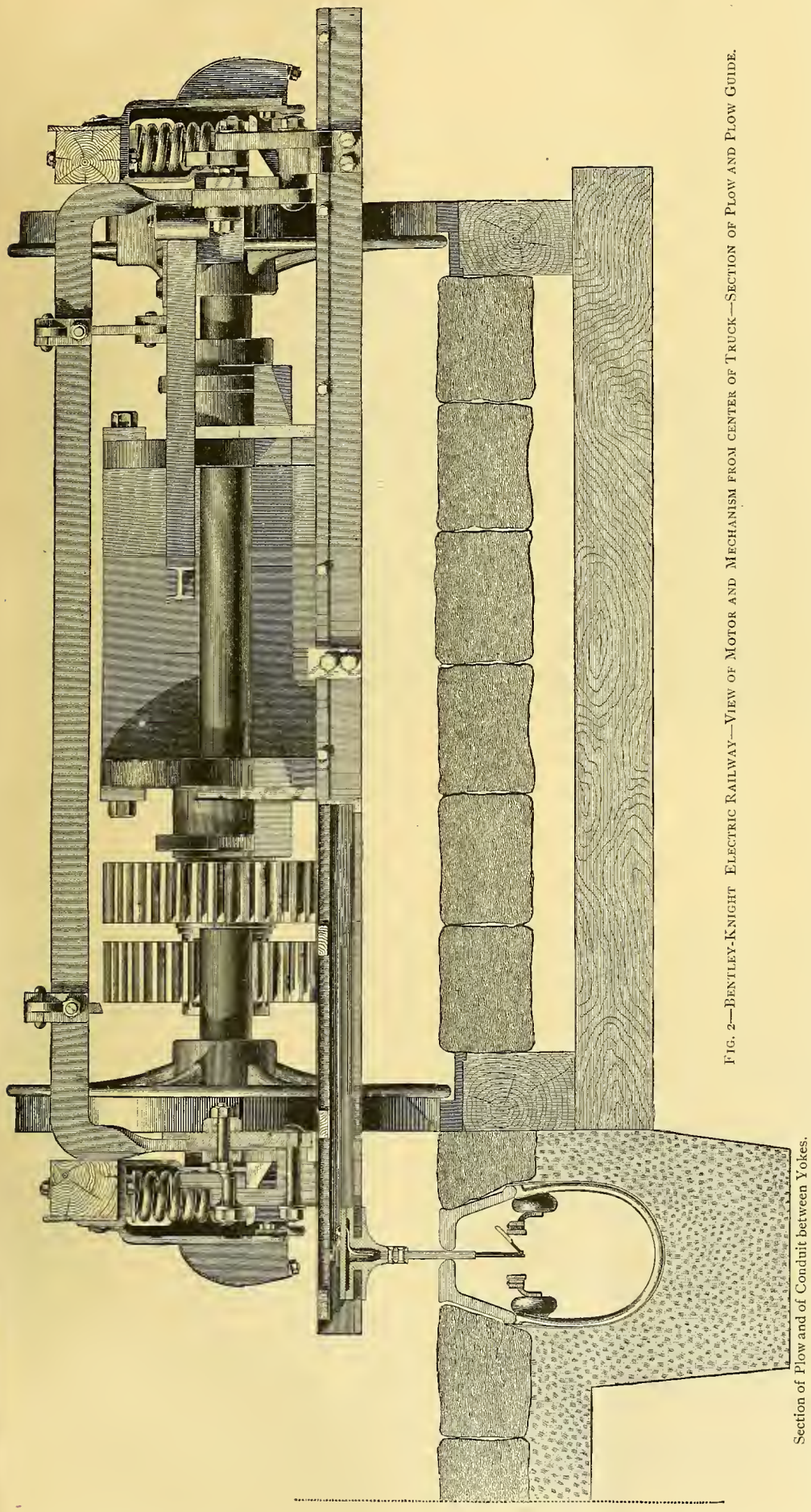


FIG. 2—BENTLEY-KNIGHT ELECTRIC RAILWAY—VIEW OF MOTOR AND MECHANISM FROM CENTER OF TRUCK—SECTION OF PLOW AND PLOW GUIDE.

conduit; when so thrown up they are immediately replaceable by a lever at the side of the car. This lever also permits the plows to be thrown out of the conduit and held in a horizontal position, whenever it may be desirable to use elevated conductors along any part of a line. The Sprague and Thomson-Houston motor trucks furnished the West End Street Railway company, are being fitted by the Bentley-Knight company, as received, with the necessary plows and guides to permit of their being used on a conduit line. The construction adopted, however, in some of the motor trucks so far built by these companies, has prevented the added security gained by the duplicate plows, room having been left for only one plow-guide and connection. Considerable flashing has resulted from this omission.

The first double motor trucks for the West End company, built wholly by the Bentley-Knight company at its new works, Nos. 25 and 27 Tenth Avenue, New York City, are just received in Boston and the competition of the three companies—Bentley-Knight, Thomson-Houston and Sprague—will undoubtedly go far to decide the most advisable type of motor construction for street railway practice, each company having virtually accepted the challenge to a trial of their machines on their merits.

Sprague Electric Railways.

Since the successful inauguration of the Sprague Electric road, at Boston, owned by the West End St. Railway company, and its durability, reliability and advantages over the horse railroads have been made apparent even in such large cities as Boston, the greatest interest has been manifested all over the country in this easy convenient economical method of street car propulsion.

Large cities are now debating the question why, since electric railways have proven such a success in large cities like Cleveland and Boston they cannot be introduced to solve the question of rapid transit which is now such a very serious problem in so many cities.

We note with interest that the Philadelphia "Public Ledger," among other large and influential papers, has devoted considerable attention in both its news and editorial columns to this subject incident to the starting up the West End road of Boston, and questions why a system which has proven so successful in this latter city could not be introduced to supplant the slow horse car in Philadelphia.

On account of its capacity for speeding an electric car, for the same hours of service, should make twice as many miles per day as an ordinary horse car, and owing to the remarkable control which the operator has over the motion of the car, it can be stopped much more quickly, even when running at twice the speed, is much more safe and less liable to collision with any obstruction on the track than an ordinary horse car.

There is no reason why electric cars should not be introduced into all the large cities like New York, Philadelphia, Chicago, St. Louis, and other cities where the question of rapid transit is now a very serious one, and is growing more serious every day.

Wilmington City Electric Railway, with Sprague Car in Operation.

The Sprague Electric Railway at Cleveland, O.

The East Cleveland Electric Railway, which runs out Euclid Avenue and some of the other fine residential streets of Cleveland, connecting Cleveland with its suburb East Cleveland, which was installed by the Sprague Electric Railway & Motor company of New York, has been in operation now for about a month, and the citizens are already clamoring that the electric system for street railway propulsion be extended all over the city of Cleveland.

Since the 9th of January, when the East Cleveland road operated successfully through the heavy blizzard of snow and wind, successfully demonstrating the durability and reliability of the electric system and the power of the electric motors, all the Cleveland papers have been loud in their praises of the new road.

The Cleveland "Plain Dealer," in speaking of the road, recently said:—"How provokingly slow the East Cleveland cars go, or seem to go, west of Willson Avenue, after a person leaves a motor car for one drawn by horses. The motor cars run along at an easy and rapid gait and it seems like leaving a passenger train and boarding a freight train to get on a horse car from a motor car. It makes a person long for the time when motor cars will be run on all the lines and over their entire length."

It is rumored that the management of the East Cleveland road intend increasing the line before long, and extending it in several directions in Cleveland.

Fig. 1.—Sprague Electric Cars on Reading, Pa., Railway Passing Each Other.

Sprague Electric Road at Boston, Mass.

The West End Electric Railway is running very successfully, and carrying a large number of passengers each day between Park Square, one terminus of the road, and Brighton, the other terminus of the road. The cars run speedily, and are under very quick and perfect control. The residents of Brookline who use the cars regularly in coming into Boston and returning are very enthusiastic over the celerity of the cars, and the time made over the ordinary horse car. The change from the overhead to the underground system is made very quickly and without stop, so that no delay is experienced at this point. The car drivers, or "motorers" as some Bostonians insist in calling them, are not expert electricians, but simply street car drivers, who have been detailed to operate the electric cars, and who have learned their necessary duties very quickly.

All of these old drivers are very enthusiastic over the ease with which an electric car can be controlled, and are very well pleased with their new position.

On the 20th of January a very heavy snowstorm visited the city, and on the night of that day covered the tracks of the railway to the depth of from two inches to a foot.

The electric snow ploughs which are being equipped by the Sprague company for the use of the West End Railroad, had not yet been finished, and the cars were obliged to run without the aid of these for clearing the tracks. In spite of this the cars ran very successfully over the entire distance of the road, clearing their own way, and carrying large numbers of passengers. The President and Directors of the road express

themselves very well pleased with the demonstrated efficiency and strength of the electric road as exhibited during the snow-storm, even without the aid of the regular electric snow-ploughs.

Recent Sprague Electric Roads.

We take pleasure in presenting our readers in this issue of our paper with several views taken from recent photographs of electric railways which have been installed by the Sprague Electric Railway & Motor company of New York.

The first two engravings are of views on the East Side Electric Railway of Brocton, Mass., of which Albert F. Small is president. This road extends over a circuit of about four miles in length, operating four cars. The first engraving represents a test which was recently made upon the railroad, and was taken from a photograph made upon the spot. The test consisted of bunching all the cars of the company at a point on the road farthest distant from the power house, and in starting them all up at once.

The test was perfectly successful. Although the power for all the cars was transmitted between two and three miles, the cars started up promptly, moving rapidly and showing that the entire power can be easily transmitted and applied even at the farthest end of the line, and that the load upon the dynamos can be varied from zero to a maximum without any resulting detriment to the electrical apparatus.

The second view, gives a very good idea of the bracket method of suspension, used upon this line, and also of the Sprague overhead system of reinforcing the working conductor. By this system of working, the conductor, a silicon bronze wire of small diameter, is carried over the center of the track, while the greater portion of the current is carried upon a main conductor running parallel to the working conductor, and connected to it every one or two hundred feet. This main-conductor, which can be either carried underground in a subway, or at the side of the street, as in the view, can also be reinforced by feeders running from the main power station. The size of the working conductor is independent of the number of cars and the length of the line, and therefore does not have to be changed with the alteration of any of these points.

This electric road at Brockton has been in operation now for about four months, and it is giving very good satisfaction to both the directors of the road and citizens of Brockton. The company do not own their own power station, but hire electricity from the local lighting company.

The second road illustrated in these views is the East Reading Railway, of Reading, Pa. This view gives a very good idea of the method of overhead wiring for a turn-out. The road is a single track road, extending over about two miles, and is said to be giving very good satisfaction to the president and directors of the road. The road has been in operation about two months.

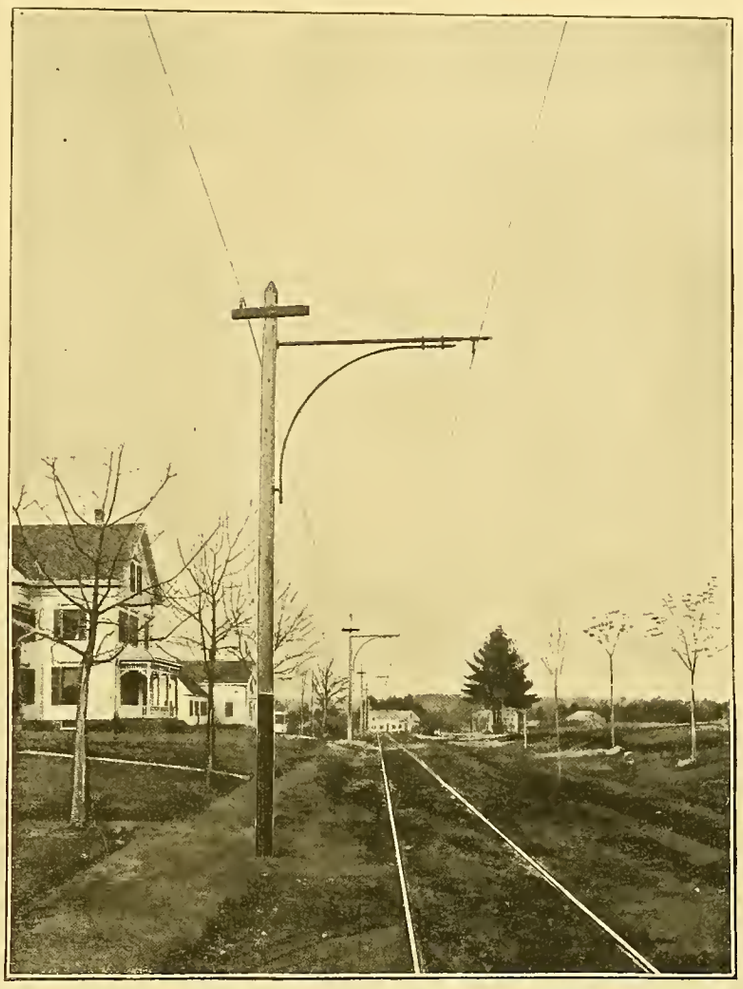


FIG. 3—BRACKET SUPPORT ON EAST SIDE SPRAGUE ELECTRIC RAILWAY, BROCKTON, MASS.

The fourth engraving, is the view of an electric car on the Wilmington City Railway, which has been in operation upon the Sprague system for about eight months. This road has given such great satisfaction that the directors of the road have ordered an additional number of cars.

In the letter to the Sprague company the president of the road, Mr. William Canby, says: "From the practical experience we pronounce your system a complete success. We consider it by all odds the most economical mode of running street cars in suburban districts, or in any place where permission to erect poles can be obtained. In comparison with horse power we find it decidedly cheaper and more efficient in every way. It is popular with our patrons on account of its cleanliness, its smooth and rapid motion, and especially for the absence of the usually overtasked and laboring horse."

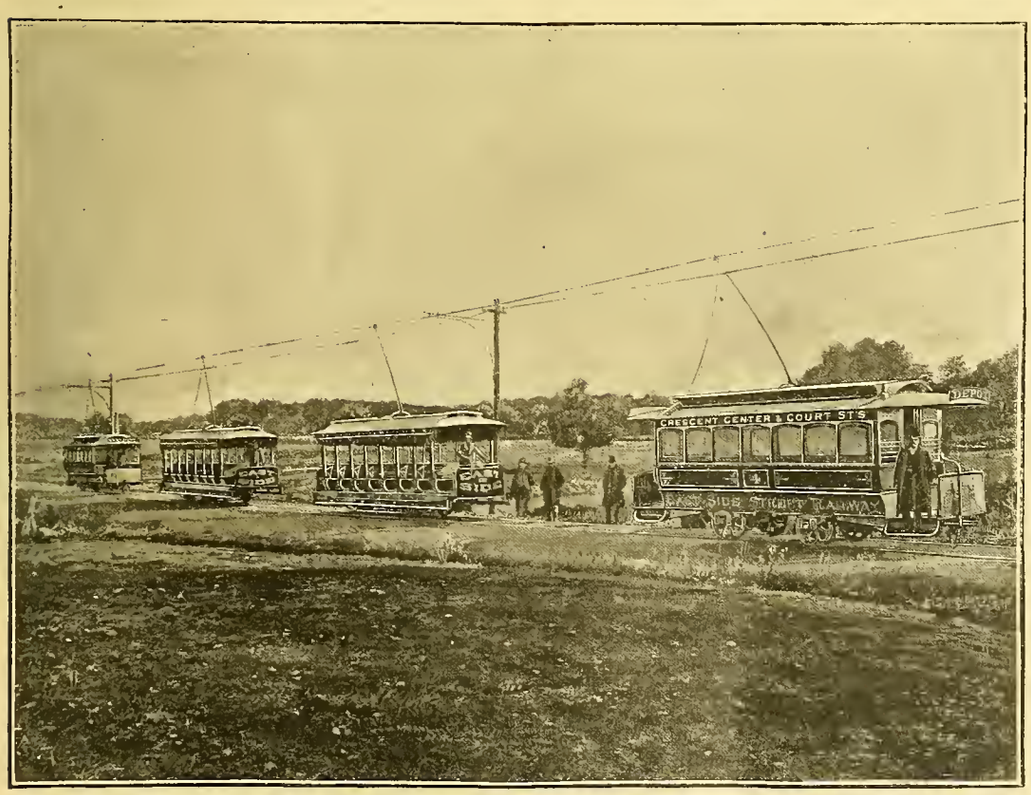


FIG. 4.—FOUR SPRAGUE CARS BUNCHED ON EAST SIDE ELECTRIC RAILWAY, BROCKTON, MASS.

These are only a few of the many roads which are now in operation upon the Sprague Electric system in all parts of this country. The number of Sprague Electric roads is rapidly increasing, new contracts being closed every day, one of the latest of which being that for Atlantic City, New Jersey, made by the Pennsylvania Railroad Co., who own the system of railways in that city. The details of this contract are given elsewhere in our paper.

Another Sprague Road in Operation in the South.

The first trial trip of the electric cars on the Asheville, N. C., electric street railway was made on January 21st in the presence of president, Mr. W. P. Penniman Jr., Supt., Mr. J. H. Barnard and a number of prominent citizens including Captain T. W. Patton, General Johnstone Jones, Dr. S. D. Pelham, and about sixty others, some being stockholders in the road, and all the rest interested directly or indirectly in the success of the enterprise.

This electric railway has recently been installed by the Sprague Electric Railway & Motor company of New York, and uses their regular system of overhead wiring, with small $\frac{3}{16}$ of an inch silicon bronze wire for a working conductor which, as in all the Sprague roads, is the only wire suspended over the street.

The test proved a great success. The run was made over the entire distance of the line, about two miles, in less than eight minutes, carrying a large number of passengers. Upon reaching the

farthest terminus of the line, which is at the new Western North Carolina Depot, the party were welcomed by cheers of the citizens who had gathered there to greet the arrival of the electric car, and by the blowing of whistles of all the locomotives that were present at the depot.

The citizens of Asheville are very enthusiastic over the success of the road, and the ease with which the cars mount the grades, round the curves and obey every movement of the driver's controlling switch. The directors of the road also express themselves as very well pleased with the entire performance of the electric cars.

The *Asheville Citizen*, in speaking of the road, says :

"Hurrah for the Asheville electric railway! There is no happier man in town to-day than Mr. J. H. Barnard, superintendent of the road. The enterprise is a great one for Asheville, and all honor and credit to its projectors and owners. The Asheville electric street railway is a great success, and we would like to say that there are no *muscæ domesticæ* on the Asheville Electric Street Railway, or upon those who control it."

The Sprague System Come to Stay.

The Cleveland *Leader* recently published interesting correspondence relative to the Sprague electric motors at Richmond, Va. The East Cleveland R.R. Co., having adopted the Sprague system, were anxious to know if certain statements they had heard, to the effect that the Sprague motors were to be abandoned at Richmond, were true. Mr. Henry A. Everett, secretary of the East Cleveland company, telegraphed L. L. Borss, president of the Board of Aldermen at Richmond, on New Year's night. The next day at noon the following answer was received:—

Electric cars running as usual; thirty in service to-day. L. L. Borss.

The following letter to Mr. Everett from Andrew Pizzini, Jr., secretary and treasurer of the Richmond Union Passenger Railway Company, dated December 29, will explain itself:—

Answering your esteemed favor of the 25th inst., would say that the statement made that this company had ordered or intended to order the motors of the Sprague Company off their cars, has no foundation whatever. The motors have given and are now giving perfect satisfaction, so far as their work is concerned. The Sprague system is as near perfect as an electric system can be, and as soon as the mechanical parts of the machines are made strong enough to do the extraordinary hard work they are called on to bear here, nothing will be left to accomplish in a motive power for street railway service. This is my opinion, and I give it for what it is worth.

Important Sprague Road at Atlantic City, N. J.

News has just reached us of a very important indorsement of the electric railway system above all others for street railway propulsion, in which the name of the Sprague Electric Railway & Motor company of New York, is quite prominent. This indorsement comes from the Pennsylvania Railroad company, who have during the last month, through their general manager, closed a contract with the Sprague company for the complete equipment of their system of roads at Atlantic City, New Jersey. It has long been the desire of the Pennsylvania Railroad company to substitute some more efficient method of street railway propulsion than horses upon their railways at the important summer resort of Atlantic City. Before awarding the contract for the equipment of this road, the Pennsylvania Railroad appointed a committee of engineers to make a most minute and careful investigation of all the different systems of street railway propulsion, both cable and electric, now in use. The committee in charge of the investigation were composed of mechanical and electrical experts of the highest order and of wide reputation.

The period of investigation occupied extended over five months, during this time the committee visited all the principal electric and cable roads which are in operation in this country and carefully examined the merit and working of each. The result of their investigation was announced last week when they pronounced the Sprague system of electric railways superior to all others in durability, efficiency and reliability, and recommended that the contract of the Pennsylvania Railroad be awarded to this company. The Sprague company has certainly to be very greatly congratulated upon securing this contract, and taking into consideration the high attainments and reputation of the judges who conducted the investigation it is one of the most important and convincing indorsements which could be given to any company.

Details of the Sprague Atlantic City Road.

We are able to give a number of details of the important contract secured by the Sprague Electric Railway & Motor company for installing an electric road at Atlantic City, N. J.

The Pennsylvania Railroad company, who have contracted for this electric railroad, have desired to have the railway and its equipment first-class in every particular and similar in every particular to the now famous Sprague Electric Railway of the West End Street Railway of Boston.

In the equipment of this road iron poles of a very neat and tasteful design will be used throughout the entire extent of the line for supporting the trolley wire over the center of the track. These poles, which will be ornamental and of a graceful appearance, will be erected in the center of the street, and firmly set in concrete to prevent all bending or losing of position. From either side of these poles there will be an ornamental bracket extending over the tracks for supporting the trolley wire.

This trolley wire will be of the small size, no larger than an ordinary telephone or telegraph wire, which is used on all the Sprague roads, and which is characteristic of that system. The material of the trolley wire will be of silicon bronze, and its high tensile strength, over 80,000 pounds per square inch, will enable the overhead systems of supports to be of the lightest and most unobtrusive character possible. This trolley wire will be reinforced by the regular system of a main conductor running parallel, according to the Sprague method, and tapped at necessary intervals along the line to insure a uniform pressure of electricity at all points of the road. This main conductor is also reinforced by feeders running directly from the generating station, so that the size and weight of all the overhead work is reduced to a minimum.

Each car will be equipped with two 15-horse power Sprague improved motors, flexibly suspended to insure against accidents from sudden strain in starting and stopping. The cars will be brilliantly lighted by electricity, protected by improved lightning arresters, and will be of the finest construction and workmanship. These cars, having a capacity of 30 horse power upon each, will be able if necessary to run at the rate of fifteen miles per hour, drawing two loaded cars, and can handle any load which it is possible to put on them.

It is estimated that these electric cars will prove a great attraction to the many visitors at Atlantic City during the summer, and the most complete and expensive car equipments have been adopted in order to handle the large traffic which it is expected will exist.

The first order for car equipments calls for fifteen cars with overhead system and power station, but it is expected that this equipment will be increased before long.

The work on the overhead system for this railroad will be commenced as soon as possible, and it will not be long before it is expected that the road will be in operation.

We congratulate the Sprague company upon the large number of contracts which they have secured during the past season, and upon the large number of roads which are in operation upon their system.

Street Railways Discussed in the Senate.

Some months have elapsed since we gave a report of what our senators thought of electric railways Some had never heard of such things; others declared they were very dangerous. The question of rails and the electric wires were discussed again January 23, when the District appropriation bill was before the Senate; and we are glad to see that a little more knowledge has been manifested at the Capitol, yet there is much room for improvement. Mr. Vest moved as an amendment, that all street railway companies operating or having tracks or road beds on the streets of the city of Washington shall cause said rails and road beds to be made level with the surface of the streets upon each side of said track or road beds, so that no obstruction shall be presented to vehicles passing over said tracks. The cost of making the changes herein required shall be paid by the corporations owning or operating said street railroads, and if after being notified by the Commissioners of the District of Columbia in writing to comply with the terms of this act the said corporations shall not within thirty days thereafter begin the work required to complete the same within a reasonable time, it shall be the duty of the Commissioners to cause the necessary changes in said rails and road beds to be made, and the cost thereof shall be collected from the corporations respectively owning said street railroads by suit in the name of the United States, to be instituted by the United States attorney for the District of Columbia, against said corporations or persons in the Supreme Court of said District.

Mr. Edmunds at once became interested. He was indignant because the street railroad companies had treated the government and the public with scorn. They had been required to lay the flat or groove rails in place of the T rails, but in defiance of law they had continued to put down the T rails, which were an utter nuisance everywhere.

To this Mr. Vest said, "Amen."

Mr. Cullom called attention to the condition of the tracks at 14th street and New York avenue. He thought it should be attended to at once.

Mr. Edmunds thought that the latter portion of Mr. Vest's amendment could be improved a little. If the corporation or corporations referred to do what the law required them to do, the government should do the work, and instead of bringing an action against the company it had better issue a warrant for the amount expended, to be collected out of the property of the delinquent then and there. If the collection was illegal the delinquent can sue and rectify himself.

Mr. Sherman thought that as they were on the subject of railroads there was no better time than the present in which to discuss

THE QUESTION OF MOTORS.

He said that the amendment offered by Mr. Vest practically compelled the companies to rebuild their roads, and they might just as well complete the business by compelling a change in the motive power. He was in favor of requiring the railroad companies here, with one or two exceptions, to put on a different motive power. He favored electricity, and said that notwithstanding the criticisms made in regard to the electric road he believed it was going to be the final railroad of the future. It might be necessary for the companies to devise some way of putting the wires below ground, but even above ground, as the road now built here shows, the electric road was far superior to any other railroad in the city. He would be glad to see that system adopted, though it would be better to put the wires below. The corporations, or at least two or three of the principal ones, were strong enough to be able to make the change. He had been hoping that the District committee would report some such bill as was called for.

Mr. Vest agreed with Mr. Sherman as to the necessity for a change in motive power, but there was one difficulty which had not been spoken of. The charters of the companies gave them certain rights which would have to be nullified.

Mr. Sherman thought that need cause no concern; Congress would simply exercise its power to repeal, alter or amend.

Mr. Hale said that the interference of Congress would come none too early if it came at once. The people of no city in the country, said he, are imposed upon and ill-treated as are the people of Washington and the people who visit Washington by the street-railway companies in their manner of conducting business. The trouble is that every year it comes around and the grievance is felt by every body here, and we grumble and fulminate and declare what shall be done, and Congress goes by and nothing is done. The committee do not report any

schemes that will relieve us of the evil, the inconvenience, the trouble; and whoever are imposing upon us after a time get to feel that they can do it with impunity, and from year to year they continue. I have no doubt that when they get together and sit down and consider the subject, draw their dividends and go on for the next year, a part of the performance is to laugh in derision at the talk that is made in Congress about it. So we suffer ourselves, we suffer our constituents who come here and everybody else, to be imposed upon. He wanted to know if it was not clearly in the power of the Commissioners of the district to regulate such matters in a proper way.

Mr. Edmunds said he thought the governing executive power in the district had the right to require this very thing. "Whether," said he, "the existing law would give even such a weak and ineffectual remedy as is provided in this amendment I do not remember; but the fact is, as the Senator from Maine has stated, that, granted the Commissioners have the power to compel the doing of this rightful and necessary thing, they have not done it, and I am very much afraid it will be a good while before they will do it if left to themselves. I can relate very briefly an instance in my own experience showing the relations or the contrast between the governing power in the District of Columbia and these corporations and their grace to private individuals. I take it it was just about a year ago that I wrote a formal letter, as one person resident in this district, to the Commissioners of the district, calling their attention to the absolute nuisance of the two railway crossings. I think, at 3d street and Massachusetts avenue, where you had to stop your horse to a walk and go as you would across a mountain brook full of stones to get across the railway tracks. I asked them to call upon the railways and compel them to make those crossings there in a condition suitable for traffic. They replied with great politeness and courtesy that they would attend to it at once. But that was all.

"Having had that experience and there being at Dupont circle a similar condition, though not nearly so bad, in getting over the railway tracks there, I gave up the Commissioners entirely and addressed a humble and piteous and respectful petition to the masters, the railway company, without going to the Commissioners at all, and appealed to them as an act of grace to everybody who traveled along there to have that thing put in order. I got an immediate gracious response that they would do it right away, and within two weeks it was done. So the way for any citizen of the district or resident here to get anything done in ameliorating these crossings is to apply to the masters of the situation, the corporations themselves."

Mr. Frye: I should like to ask the Senators who are familiar with the horse-railroads in the city of Washington one question. I have never been able to understand why the United States and the cities in the United States allow their streets to be absolutely destroyed by these horse-railroads. One day in Liverpool I hired a horse and carriage to take a ride, and I was riding through several streets where there were horse railroads, or tramways, as they call them. I avoided them the same as I would here, but accidently I got on the track and afterward I had no occasion at all to avoid the railroad tracks. No one riding would have noticed that there was such a thing as a railroad track there. There was not the slightest disturbance to the carriage, and you could ride over it in any direction. You could ride over it lengthwise, and it would not disturb the carriage in the slightest degree. I got out of the carriage and examined the rail, and I found that it was a very simple contrivance. Instead of a T rail, such as we have here almost everywhere, it was a simple U-rail, the flanges of the rail coming just level, with the pavement, and the slot of the U not being large enough to admit of an ordinary carriage wheel.

Mr. Sherman: There are some of those rails here in this city, right in front of the President's house.

Mr. Frye: Why do we not make every railroad in the city have a U-rail?

Mr. Sherman: I should be glad to go farther when we do that, and go to the extent of having new motive power. The railroad upon New York avenue has a most beautiful rail. You can go over it without disturbing your carriage in the slightest degree, riding right over it, and it is concreted between. Your carriage can go anywhere, astride the rail or across the rail, diagonally or in any other way.

Mr. Frye: Since my return I have never been able to understand why so many cities in the United States allow their streets to be sacrificed in that way.

Mr. Sherman: Nobody else understands it; but we do not require them to adopt this new rail. A new rail is not provided for by this amendment. What we ought to require is a new motive power; that is, either the cable or the electric motive power. In my judgment the electric motive power is now far in advance of any other.

Mr. Teller: I should like to ask the senator from Ohio if he thinks that the New York avenue street-car line is a model with their columns in the middle of the street and their death-dealing wires hanging over the street on both sides?

Mr. Sherman: I am glad the senator asks me if I think that is a model railroad. It has wires above, but there is no unsightly aspect about them; a straight, open way with the columns 200 feet apart. At night lit with brilliant electric light, it is rather beautiful than otherwise. The "death-dealing wires" would not kill a cat, I imagine. The evidence is conclusive that the wires carrying electricity sufficient to light are very dangerous, but that the power, according to the testimony of experts, required for moving these cars is not sufficient to cause death.

Mr. Harris: If the senator will allow me, I will state that if the whole power a dynamo machine can generate for propelling the cars to which the senator refers was put upon the wire he would experience only a slight shock if he should come in contact with it.

After further debate Mr. Dawes said: I wish to state that new discoveries are all the time being made, not only as to the method of applying electricity, but as to the effect of it, and that recently it has been discovered that what is a perfectly harmless shock to one individual is fatal to another, and that which is perfectly harmless to one individual at one time is fatal to that individual at another time. No one as yet has been able to say when any particular individual is safe who comes in contact with these electric wires. Human life is at the mercy of conditions if these wires are within contact. Within a few days the dress of a lady in a parlor lighted by electricity, upon which she had some metal buttons or ornaments, coming in contact with the wire, was set on fire.

Mr. Hoar: That was electricity for lighting.

Mr. Dawes: I know it was electricity for lighting. Whether these electric wires be for lighting, or for power, or for any other purpose, we have not yet been able to understand when we are safe and when we are in peril, except when we know they are beyond our reach. We are not safe, whether they are used for one purpose or another.

Mr. Chandler: I am glad to learn from the senator from Tennessee (Mr. Harris) and from the senator from Ohio (Mr. Sherman) and the senator from Massachusetts (Mr. Hoar) that electricity passing through these wires is safe. I am glad to learn that we are getting over the dangers. I do not understand how it can be, because certainly there have been many fatal accidents reported. Every day we see that some workman has been instantly killed by contact with these wires. But now it seems that there is no danger. I am glad of it.

Mr. Harris: If the senator will allow me, speaking from the standpoint of such information as I have been able to obtain by having a lot of experts before a committee to which I chance to belong, charged with the duty by the Senate of investigating and getting such information as we could obtain upon this question, it depends upon the energy and amount of the current, no matter what wire the electricity is conducted by.

Mr. Edmunds: It depends somewhat on the nature of the current, because there are two different natures.

Mr. Harris: Yes.

Mr. Chandler: The senator from Massachusetts (Mr. Dawes) says it also depends somewhat on the person.

Mr. Harris: I think the senator from Massachusetts is somewhat, if not entirely, mistaken in that declaration. Different nervous organism will be affected differently by electricity; I do not know to what extent. But the information the committee derived from that investigation amounts to something like this: No accident or injury to human life has been known to occur where a volume of, say, 500 volts has been employed. In the moving of the cars, to which reference has been made, about 400 volts is the maximum of power used. The batteries employed here on this railroad cannot generate exceeding 500 volts. But the arc light requires from 1,500 to 2,000 volts, and that is far beyond the danger line. Whenever a man comes in contact with that power there is very great danger, if not absolute certainty of destruction of animal life. That is the state of the information that we derived from the investigation.

Electric Railways in Blizzards.

Will electric railways operate in snow storms and blizzards? A delightful answer to this question was brought in by Mr. Barclay, agent of the Sprague Electric Railway and Motor Co. at the Rookery, Chicago, just as the January GAZETTE was going to press. The following is the remainder of the telegraphic news from Davenport, Iowa, which we published last month:—

Extract from Davenport Democratic Gazette (Evening paper), *January 9th* 1889.

"Snow has fallen on an average by day and night, 8 to 10 inches. It was heavy and damp. The wind drifted it considerably. Long before daylight street railroad men were at work with their snow plows. It was hard work, too, because of the wind, while the air was full of falling snow. It was packed hard on the rails. When time for business came, the electric cars had the advantage over the horse cars, for when the former started they moved with almost their usual speed. Steel brushes pending from the platforms of the electric cars cleared the rails of the snow left by the plows and scrapers."

(Copy of Letter.)

DAVENPORT, IA., Jan. 9th, 1889.

DAVENPORT CENTRAL RAILWAY COMPANY.

Sprague Electric Railway and Motor Co.,

Gentlemen: We have had as bad a snow storm, as far as street railroading is concerned, as is usually encountered in this section of the country, which, you know, is subject to very heavy snow and ice storms. Our cars made the usual time, while the horse cars ran slowly on their lines on a practically level road, and could not attain any speed over a walk all day. We naturally feel jubilant over our grand success.

Mr. J. F. Peavey, President Sioux City Street Railway Co., Sioux City, Iowa, was here to-day inspecting the system. He declared that it was not possible to do with horses what we did with electricity to day. As we telegraphed you, our citizens are also jubilant over the success. The wind was very strong and blew the snow back on the tracks almost as fast as it was cleaned off. The only difference that we could notice in the propulsion of the cars was that our power plant took about 50 per cent. more all day long to propel the cars. We would not have minded it had it taken 100 per cent. increase, we were so pleased at being able to satisfy ourselves and the public even in a blizzard.

When any railroad men are in doubt when you assert to them, as you did to us, that you can operate better in a snow or sleet storm than cars propelled by horses, refer them to us, and we will only be too pleased to verify your assertion. Yours truly,

DAVENPORT CENTRAL RAILWAY COMPANY,
W. L. Allen, Pres.

The Davenport Central Railway Co. have a grade of 7½ to 8 per cent. 1,000 feet long.

This we believe to be the last straw which a number of railroad men make as an excuse for not giving their patrons better transportation, and at an admitted less cost than by horse or mule power. Yours truly,

SPRAGUE ELECTRIC RAILWAY & MOTOR CO.

The Street Railway Gazette.

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S. L. K. MONROE, - - - - - - MANAGER.
E. V. CAVELL, - - - - - - - EDITOR.
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Articles and papers on subjects relating to intermural transit always appreciated; the GAZETTE'S columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways—on the surface, elevated or underground. A special column is devoted to the publication of trade notes and items from manufacturers and dealers.

Special Announcement.

The friends and patrons of THE STREET RAILWAY GAZETTE are hereby notified that Mr. Wm. Hughes, formerly upon the staff of this paper, has been discharged for unbusiness-like methods and conduct. While in our employ and under obligations to devote his whole time and services to our interests, he has used his position, the insight he had into our business, and his acquaintance with our patrons, to the detriment of THE STREET RAILWAY GAZETTE. We therefore regret the necessity, but, in order to protect both our customers and ourselves, to take this method of advising the trade in general that the said Hughes has no connection with our house in any way. And we will not be responsible for any obligations or business arrangements made by him from this date.

THE STREET RAILWAY GAZETTE,
P. G. MONROE, President.

FRANCHISES are made valuable by good management. And in many places citizens pay thousands of dollars as premiums to induce street railway companies to extend their lines; and cities readily grant favorable franchises to encourage people to build street railways, because they know that nothing contributes so much to the prosperity of a municipality or village as street railways, when properly operated. When they become splendid successes, however, "envy, hatred, malice and all uncharitableness" grossly misrepresent them, and stir up evil feelings against "the soulless corporations" to the detriment of general peace and prosperity. The following is an illustration of such mischievous misrepresentation, from a "popular" paper: "What is the actual value of a street railway franchise? The question has been often raised and seriously discussed, but so fragmentary has been the information accessible on the point that reliable conclusions have been difficult if not impossible to reach. Conjecture has been freely indulged in in the absence of trustworthy data; but the wildest estimates have probably not overtopped the actual figures, if a recent transaction in Cleveland may be accepted as a criterion. It appears from the transaction in question that the annual value of the street railway franchise in the Forest City, is no less than $6 per running foot of track, or $31,680 per mile, the west side line having exacted from the south side line $1,200 per annum rental for the one-fourth use of 800 feet of track on Ontario street. This at five per cent. represents a capitalization of $633,600 per mile—figures that look incredible, although based on an actual deal. These facts have set the Cleveland papers agog. The *Penny Press* wants to know what taxes are paid 'upon such a royal plant.' The *Leader* declares that the figures show the 'street railway companies are enjoying enormously profitable franchises at a compensation to the city ridiculously misproportioned and inadequate to their value.' It adds that 'the time is opportune for the adoption of a system of taxation, applicable to corporations using public franchises that will return to the people in taxes some fair proportion of the worth of those privileges which have been surrendered without compensation and are yearly becoming more valuable.'"

NATURAL GAS, as may be seen under our Kansas City (Mo.) news, has been (or rather is about to be) utilized for street railway purposes.

TIE-UPS and the disorderly conduct of strikers are attributed to the fault of the companies, according to the *Sanitary Plumber*. In its number of February 1st, that paper, with grim humor, remarks that "Probably at the present writing the surface railroad companies of New York and Brooklyn are finding it pretty difficult to prove that they have any rights whatever, or the privilege of managing their own affairs according to common business privileges, and yet we cannot but think the fault is their own. The Knights of Labor are allowed to tear up their tracks, and stand the cars on end and obstruct the streets throughout the entire length of the lines, and yet there is but a feeble show of invoking the arm of the law. But only let some poor plumber who has paid $10 for the privilege of making a sewer connection interfere with their traffic, what a display of the majesty of the law is made, and how quickly the culprit is arrested and fined."

STRIKES may be considered as a disease—an infectious disease—which spreads rapidly, if not checked at the bud. But can it be effectually checked? some may ask. We venture to answer, Yes, if the parties concerned only know how. Down in Cincinnati they have made strikes "a thing of the past." The Los Angeles *Tribune*, of January 25, gives another illustration of how a strike may be effectually checked. As our readers are aware, Mr. C. B. Holmes, with some Chicago friends, recently purchased the Los Angeles Cable Railway Co's lines, and placed Mr. J. C. Robinson in charge. Reforms were rapidly effected, which gave general satisfaction. In carrying out his plans Mr. Robinson discharged some old hands, and put on several new men. A few mischief makers put their heads together and hatched a strike. As soon as it was discovered that the strike agitators were enticing some of the conductors and drivers to follow them "sharp and decisive methods were adopted," says the *Tribune*. "No tampering with treachery or disloyalty of this character was tolerated. The movements of the malcontents were watched closely, and in the early hours of Sunday morning last Mr. Robinson completed his arrangements and to the disgust of the half dozen or so who volunteered to lead the way they found themselves discharged and their places filled by new men. Thus, without hesitancy and with infinite resource and tact, was the movement to harass the management and inconvenience the public frustrated and stamped out at its very inception. Now, a canvass of the men demonstrates the fact that the utmost satisfaction is expressed that these turbulent factors in the concern have been eliminated." This was all done quietly. But the management lost no time in taking the public into its confidence, by making the following declaration: "It is notorious that there are many restless spirits usually found in the street railway service, men who have filled nearly every station in life and have proved failures in all. The position of a street car conductor is sought after and accepted by these men as a last resort. Whether it is because of the peculiar nature of the calling, surrounded as it too often is with exasperating and rebellious influences, or from some other not readily defined cause, the elements thus brought together invariably combine, and upon the slightest possible provocation enter into an unreasonable conflict with those in authority. Then it is that the early training and real character of the men asserts itself. Some one among them invariably develops upon these occasions all the attributes of a born agitator. Regardless of the lessons inculcated by their unfortunate past, of family ties (where they exist), or of the claims of the company upon their fidelity, they prefer to rise in their might, and with the usual clap trap against the common enemy, their employers. Such in the past has been the experience in this city. It was not so very long ago when, upon the occasion of the late general manager of the cable company's assumption of office, his endeavors to remedy existing evils were met with, first defiance followed quickly by insubordination and a strike. For nearly a week the citizens were deprived of accommodation by this reprehensible cessation of the street car service. Having practically dictated their own terms the men were again allowed to resume work." The old state of things has now passed away in Los Angeles. The same plan may not work so effectualy in such large cities as New York, Brooklyn and Chicago. But that strikes may be prevented, and turbulent spirits checkmated on the first move, we believe possible even in the great cities. And the latest strikes will probably enable the leading street railway men to rout the enemy before a road is tied up any more.

Specials.

LINCOLN, Neb., Feb. 8.—In the House to-day the Omaha Street Railway Consolidation bill passed the house by a majority equal to that received in the Senate two weeks ago. This is one of the most important measures that has thus far passed both Houses, and it will cause the formation of a syndicate that will be backed by millions and will control and operate the street railways and cable lines in Omaha. The bill gives the consolidated companies exclusive franchise for fifty years. Senator Paddock is one of the largest stockholders in the new syndicate, as he was in the old street railway company, and it is stated that with the bill passed the consolidated roads will be bonded and ten miles of cable line will be laid in Omaha the coming year.

SPRINGFIELD, Ill., Feb. 8.—The Secretary of State has issued a license of incorporation to The Street Car Conductors' and Drivers' Benevolent Union of West Chicago; without capital stock; for benevolent purposes; incorporators, Gregory White, Thomas H. Heffernan, R. McGarigle, and others.

Motors.

Electric motors to the number of nearly 17,000 are now in use in the United States alone, and they represent fully 100,000 H. P., varying from one twenty-fifth H. P. to twenty-five H. P., and in some cases more than that.

There is no telling, with any degree of certainty, where the field for the electric motors will end, as it is being introduced into nearly every industry now, and new fields for it are being continually opened up.

For alternating currents several motors constructed on as many different principles have lately been brought out, which promise to work as successfully and as economically as continuous current motors.

The Mekarski Compressed Air Motor.

As may be seen from an advertisement in this number, on page X, a company is being organized, with substantial backing, to equip American street railways with the Mekarski Compressed Air Motor, which has been in successful operation in France for some time.

The advantages presented by the system are:

1. No disturbance of the road bed.
2. Application to any line, without any practical increase of capital.

3. An economy over horse traction of from 25% to 30%.

4. A great economy in the car-house and stables.

5. The motive machinery very simple and requiring no skilled labor to run the cars.

The motors do not vary in appearance from ordinary street cars.

The system has been in practical and economical use in the city of Nantes, France,—for seven or eight years at Vincennes, near Paris, and this present year will be adopted by two lines in the city of Paris. At Lyons, Bordeaux, Limoges, Berne, in Switzerland and other European cities.

"Passenger Railway Bills" Negatived in the Pennsylvania Legislature.

The House Committee on Passenger Railways devoted about an hour and a half to the consideration of the Marland Cable Motor bill January 31st. Mr. Marland said the first four sections simply provided for the protection of the company's property and the punishment of persons wilfully obstructing the cars. Mr. Brooks thought the company ought to go to the Councils for such privileges. Mr. Marland understood that the Philadelphia Traction company would not apply in Pittsburg. Besides, the Pittsburg company might want to cross the river, but the bridges are owned by private corporations over which the Councils have no control. Mr. Brooks said that as the Pittsburg ordinances were not at hand, the committee would be legislating in the dark.

As to the section requiring notice to be given to the companies of intention to go under or over their tracks and works to make gas, water or sewer connections, and to give the companies the option of doing the work themselves, Mr. Marland said that was necessitated by the bad work by the persons calling themselves natural gas fitters. He disclaimed any connection whatever, directly or indirectly, with any cable motor company. Mr. Stewart, of Philadelphia, said this section would give motor companies in any city of the State a monopoly of the work of opening streets and making connections. Mr. Brooks added that a contractor for a sewer upon bringing his work up to the tracks could be compelled to stop for a considerable time and suffer loss.

Mr. Patterson said the company could compel a city or contractor to give security for what the company would expend.

Mr. Donahue saw nothing wrong in the section provided the company should not overcharge. Mr. Stewart did not believe such companies, under their charters, would have a right to engage in gasfitting and plumbing.

Mr. Richmond said the bill would compel the city of Philadelphia to "knuckle down" to such companies. Mr. Marland said the law had to be general, but there was no danger of overcharging, because an appeal could be made to court.

Mr. Hoskins had no doubt that the prohibition against tunneling under or passing over was intended to prevent the building of elevated roads in Pittsburg. "And just as effectually in Philadelphia," added Mr. Brooks, Mr. Marland having said that the river bridge companies claimed the right to prevent the erection of another bridge within 2000 feet of its bridge. The cable motor company, if it wanted to build a bridge of its own, would have to do so beyond the built up portion of the city. In a brief executive session the committee unanimously decided to report the bill negatively. The same decision was reached upon the Lafferty General Passenger railway bill without reading or discussion. It had been read at a previous meeting.

The Annual Statistician and Economist (L. P. McCarty, editor) has been removed from 807 to 814 California street, San Francisco, Cal.

The annual meeting of the stockholders of The Trans-Continental Car Lock and Seal company, of Chicago, was held at the offices of the company, 430 to 434 "The Rookery," on Wednesday, January 16. The following gentlemen were elected as directors for the ensuing year: Warren G. Purdy, John Johnston, Jr., Hobart Chatfield Taylor, Wm. F. Donovan, Chas. E. Davis, Jno. W. Norris (president) and J. Edwards Fay (secretary).

The Cincinnati Corrugating Co. make a specialty of car roofing.

Snow and Electric Railways.

There are many people who although believers in the practicability of the Electric Railway are yet inclined to be a little skeptical as to their operation in localities where snow and ice are prevalent. The performance, however, of some of the railways operating the Thomson-Houston system during the recent snow storms has clearly proved that the snow and ice offer little if any opposition to their working. On Saturday, January 20th, there was a heavy fall of snow in Scranton, Pa., which at nine P. M. had accumulated to a depth of about six inches. On Sunday the cars made regular trips which on that day are made hourly. On Monday morning it was found that there were many heavy drifts, but these seemed to offer no impediment to the first car to go over the line, which plowed its way through them in a way which leaves no doubt as to the ability of these cars to operate in stormy weather. On grades of 4½ and 5 per cent. the snow was even deeper than on the level; but in spite of this the cars made their trips on schedule time. The operation of the cars was the subject of universal favorable comment. At Des Moines, in the middle of December about a foot of snow fell, but it had no effect on the Electric Cars, which made their regular trips every fifteen minutes, in fact, it was the only tramway in Des Moines which was able to operate on schedule time during the storm.

How a Cable Road Works.

"Now, the old thing works like this," he said· "You notice that big wheel over there?"

"Yes."

"Well, there's a dewfunny on the side that's connected with a magiger that's out of sight, and when steam is on and you want to work the trap, you just pull the hopper and the dingus ketches hold of the cable and presses it against the wheel; then a catch iron flip flap does something that I don't understand, and the cable reels off them thingumbobs. Understand?"

"Quite," said his friend, gravely; "but what is the use of that gilderfluke at the far end?"

"That is a sort of a twistycutis that keeps the cable from kicking against the cut-off valve, which has an automatic thingumbob that grabs the cable."

Another Acrostic.

"Beauty is in the eye of the gazer;"
and this is what we see in "Thirteen."

Go to! old wizard, quote us no more numbers;
Eke out false signs no longer from thy mind.
Onward, Westward moves the course of empire—
Renounce the superstitions of thy kind.
Go hence, with "Fate doth lurk in 'thirteen.'"
Evolve this new philosophy from thy pate

Before preached they who knew not "joy" from "fate."
Kerper, for instance named in thirteen letters—
Eternal progress is the synouym.
Revolving this in mind, to the Queen City,
Pursue thy way and learn 'twas him,
Even the Colonel, who put in the cable
Renewing the youth of Cincinnati; 'tis no fable.

A Poor Rhymer.

Mr. Rufus Martin, 15 Broad street, New York, has recently established shops at Chester, Pa., where he intends to repair, paint, etc., second hand cars. It is his intention to keep on hand a variety of such cars, ready for quick delivery. He has now on hand some desirable 10 and 12-foot closed cars.

Grumbling is a popular pastime. Newspapers who seek to catch the many by piling grumblings against street railway companies have one good excuse on their side—they try to work for their own good. This much can hardly be said of the senators who grumbled officially against the street railway companies of the District of Columbia, as reported in another column. One senator sent a written complaint to one of the companies, and the company at once remedied the inconvenience complained of. What more should he want?

Tramway Traction Resistance, etc.

The indefatigable Secretary (M. Nonnenberg) of the Permanent International Tramway Union has induced very interesting information by questioning the various tramway companies. We here give further questions and the answers thereto:

FOURTH QUESTION.

A. What resistance do tramway cars present to the traction?

B. What means do you employ to ascertain this resistance?

C. What measuring instruments do you use?

Tramways d'Aix-la-Chapelle and Borcette.

We have no data on this subject.

Tramways of South Antwerp.

We have never examined into the matter.

Tramways de Breslau.

We find that resistance on an even track is the greatest.

Tramways de Bruxelles.

A. The resistance which the tramway cars present to the traction varies considerably when the condition of the track and the mounting of the running gear is taken into consideration.

Unfortunately, in the experiments we have often made to ascertain the above we used imperfect instruments, and hence the ascertained results are not so sufficiently precise as to warrant us in presenting same to the public as reliable and correct.

We have used, in this connection, a needle dynamomètre manufactured by Schaeffer & Budenberg, which we suspend between the whiffletree and the vehicle. We have ascertained that at each step of the horse the needle would rise to a point on the scale, only to immediately descend to another part and often to O.

We have undertaken to counteract the effect of the jars which the vehicle received from the horses, by attaching two cars, one after the other, and placing the dynamomètre between them. In this case as well the unstability of the needle is evident.

We are led to believe that the average traction effect on a level, track not especially cleaned up, is about 50 kos. for a car weighing 4000 kilos., but we must confess that we do not place any confidence in this figure.

We propose to make some new experiments, using our electric cars for that purpose.

Tramways de Cologne.

We have not given the matter any attention.

Société allemande de chemins de fer d'intérst local.

Our enterprises at Dortmund, Chemnitz and M. Gladbach have not given the question any attention as yet.

Our manager at Duisbourg is of opinion that 50 kilos. is the resistance of a two-horse car and 38 kilos. for a one-horse car; this resistance having been ascertained by means of a needle dynamomètre.

It should be borne in mind that too much reliance cannot be placed on the results of experiments in regard to resistance to traction, as it varies more or less, according to the state of the cushions and tires, as well as the kind of lubricating oils, greases, etc., used.

Mm. Fischer-Dick, chief engineer, and Peiser, engineer of the Berlin Grand Horse Railway company.

The question of resistance to traction of tramway cars, that element so necessary to arrive at the work of horses and motors, has not received any deep study. The rapid wear and tear, which oftentimes affect the horses so unequally, prove clearly that the cars have to oppose a great resistance, especially in curves, uneven roads, etc., but up to the present day the importance of this resistance has not been expressed in figures.

We take the liberty of noting in detail the experiments we have made to determine the resistance to traction on an even road and advise you of the results we have obtained, calling your attention to the fact that these figures only apply to the below mentioned roads, experience having proven that with the same car the resistance to traction will vary considerably according to circumstances. The condition of the

road, the form of the head of the rail, as well as tire, in fact all the elements which are factors in the motive power of a vehicle, influence, more or less, in each case the resistance to traction.

These experiments have been made at our workshops at Gesundbrunnen on a new road, perfectly even, in fact, exclusively constructed for this purpose. The Haarmann rail used is specially adapted for this purpose.

These trials were made with three styles of cars, each car making ten trips. The following results give the average of the above trips:

First Experiment. IMPERIAL CAR—weight (total) 3120 kilos. 44 seats and 7 standing places. (*a*) full car, 136 kilos. (*b*) empty, 40 kilos. *Second Experiment.* TWO-HORSE CAR (Metropolitan)—Weight (total) 2590 kilos., 20 seats and 11 standing places. (*a*) full car, 72 kilos.; (*b*) empty, 40 kilos. *Third experiment.* ONE HORSE CAR.—Weight (total), 1780 kilos.; 12 seats and 18 standing places. (*a*) full car, 53 kilos.; empty, 22 kilos.

A recapitulation will hence show that the resistance per 100 kilos. is as follows: For an "Imperial" car, 1.95 kilos.;for a Metropolitan car, 1.46 kilos. and for a one-horse car, 1.61 kilos. The above cars being full, whereas empty the results would be, "Imperial," 1.28 kilos.; Metropolitan, 1.23 kilos. and one-horse, 1.23 kilos.

The three cars above mentioned were fitted out with new cushions, newly tired with tires which had been re-turned for this special occasion.

To decide the question as to the difference in resistance to traction in cases where the wheels which had been re-turned and when bran new wheels had been utilized we have, at the conclusion of the above trial, placed under a two-horse (Metropolitan) car a set of new wheels—their first use—and as a result was shown, that the resistance was 56.5 kilos. against 32 kilos. in the first place with the tires re-turned.

Tramways de Francfort.

We have not given the matter any attention.

Tramways de Halle.

We have not arrived at the subject of resistance to traction yet.

Tramways de Hamburg.

We are unable to give any reliable data on this subject.

B. The experiments we have made with dynamomètres have been unsatisfactory, because the Schaffer & Budenberg spring dynamomètre does not possess any device which will show the average result.

Tramways de Heidelberg.

Not having the necessary instruments at hand we are unable to answer the questions.

Tramways de Leipzig.

To place in motion a two horse car will necessitate a force of 51 kilos; 26 kilos will prove sufficient for a one horse car.

Tramways de Magdebourg.

We have had no experience on the subject.

Tramways de Munich.

As we have made no trials in the matter we are unable to reply intelligently.

Tramways de Reims.

Having had no experience we cannot give an opinion.

Tramways de Stuttgart.

We have given the subject no attention.

Tramways de Temesevàr.

We have never considered the subject.

Tramways de Vienna.

Unable to answer the questions as we have had no experience in the matter.

Nouvelle Société des Tramways de Vienna.

The results of our experiments are hardly worth recording. We have always entertained the idea of making dynamometrical and dynamographical tests to ascertain the resistance to traction.

Tramways de Zurich.

We have never investigated the subject.

FIFTH QUESTION.

A. What system of rails do you use? Give style of rail and the complete explanation of connections, crossings, cross ties, etc. What is the weight of the rail itself, per running metre, and the total weight of the system (all component parts included) per metre?

B. What are the advantages and disadvantages of the system you employ? 1st. In regard to the manner in which the rail adapts itself to the surface of the road, *i. e.* the ordinary road bed, the wooden, the asphaltum, the macadam, etc. 2nd. In regard to joints and connections generally. 3rd. With reference to the cleaning of the track.

C. Has experience shown you the advisability of giving the counter rail a larger width than that of the other rail?

D. Do you employ for the exterior line of curves rails which are flat, and in what cases? In case you use other rails, do you modify the spreading of the rails? in which way and to what extent?

E. What are the special conditions of guarantee that you exact from those furnishing your materials?

F. How long have you used the system which you would recommend the employment of?

Tramways d'Aix la-Chapelle et Borcette.

A. We use the Larsen rail, which weighs 16 kilos. per running metre.

B. The connections are good and the road bed is easily cleaned.

E. Since we have taken charge of the line we have not ordered any rails.

F. This system we have used since 1881.

Tramways of South Antwerp.

A. We use the Dufrane-Macart rail, with a weight of 26 kilos., made of steel. The whole system weighs about 30 kilos. per running metre. The rail gives satisfaction. The road is easily kept clean. We do not employ a flat rail for the outer line of curves. We make an allowance of one centimetre in such cases. We have used this system since 1876.

Tramways de Breslau.

A. We have employed the following system of rails: For the old lines, constructed since 1887, steel rails with wooden cross ties. For the new lines, built since 1883, steel rails of the Demerbe system. The former weighs 18.25 kilos. per running metre; with attachments, etc., weight 39.98 kilos. The Demerbe rail weighs 30.20 kilos. per running metre. The weight of the complete system is 70.86 kilos. per running metre.

B. The first mentioned rails present the fol lowing advantages: Easy running of the cars, perfect adaptability to the road, and stability, owing to the wooden cross ties, etc.

In the Demerbe system we have found that this rail adapts itself admirably to the road bed without needing any intermediate pieces or joints for strengthening purposes. The few rivet holes used by this system is a great advantage, as it insures stability. The road bed can easily be kept clean by the use of both of these rails.

C. Our answer is, No. Our counter rails have only a width of 12 mm. on wooden cross ties and 15 mm. Demerbe system.

As a matter of fact the rails on the regular straight track, traveled by all kinds of vehicles, are of the same height, but in the case of curves, the exterior rail is higher elevated than the interior.

D. When we have laid rails on wooden sleepers, we have made use of flat rails in cases where the exterior line of the curve was from 15 to 50 metres. Where we have used the Demerbe rail we have utilized flat rails at a curve of 40 metres.

E. We have no prescribed special conditions of guarantee in regard to the resistance of rails, etc. We have always done our business with first-class firms, who have always served our nterest satisfactorily.

Our system, which is laid on wood, has been used since 1877; the Demerbe rail since 1883. We have adopted the latter style for the reason that it adapts itself admirably and solidly to the track and gives general satisfaction. The Demerbe rail, which we use on our single track branch where a car passes every minute, has never needed any repair whatever. When carefully laid they last well and give every satisfaction.

The Tramways of Brussels.

A. Like all old tramway roads, this company originally employed rails laid on wooden cross ties. All these rails were replaced in 1876 by a metal rail of the Demerbe style, which we tried at that period. The first rails of this style were of iron; later they were made of steel. In this rail we are of opinion that we have one that answers all possible requirements for a horse tramway. This rail weighs 30 kilos. per running metre. The weight of the complete system is 65 kilos. per current metre.

Since 1883 we have used, for purposes of renewing old rails and construction of new roads, the Michelet rail. This consists of a rail and a counter rail both of steel. The former is of the "Vignole" type, and the latter fitting it admirably; both are riveted together at equal distances.

The rail itself weighs 18 kilos. per running metre; the counter rail 14 kilos.; the curve counter rail 19 kilos., and the system complete 70 kilos. for straight line, and 75 kilos. for curves.

B. The Demerbe rail gives satisfaction in the track as well as in Macadam roadbed.

The Michelet rail, like all those which approach the Vignole type do not give as good results when not strengthened, as heavy teams are liable to cause damage when passing over the parts where the rail is riveted together. In regard to keeping the track clear both are satisfactory.

C. We do not think that in cities where the ordinary running of cars is the same as Brussels it is necessary to make the curves of the same width, the track being an ordinary one. We are unable to discover that the Demerbe steel rail, laid ten years ago, has suffered the least deterioration. To this there are exceptions, notably in cases where the traffic is something very great, and the road is lightly paved, in that case a wide counter-rail is easily worn out. In these and similar cases it is necessary, to avoid the strain on the paving along the rail, to have the counter-rail of the same widths as the opposite one.

D. Formerly we used flat rails for the outside line in curves, when the turn was 30 metres and over. We have condemned their use and use ordinary rails instead.

E. We do not exact any special guarantees or conditions from our supply men.

F. We have employed the Michelet system since 1883.

Tramways de Cassel.

A. We use the Haarmann rail on our road. Its weight is 14.2 kilos., and the system complete is 65.2 kilos. per running metre.

B It gives satisfaction when laid both in ordinary and macadam road beds. The joints leave nothing to be desired after 4 years of constant use. The track is easily kept clean.

Tramways de Cologne.

A. This line refers to five systems of rails which are used in its construction. 1st, the Ferral or Dufrane system—weight 50 kilos. 2d, the Demerbe system—weight 65 kilos.; the Haarmann system, weight 78 kilos. 4th, The Haarman system (for macadam) weight 47 kilos.; Phoenix system No. 14, weight 87 kilos. These weights are per running metre.

B. With the exception of a small branch which is paved with wood, all our lines are built with ordinary and macadam road beds. The Demerbe, Haarmann and Phœnix systems give satisfaction alike in the above roads. We consider the Phœnix rail the best for a macadam road in streets rarely used by teams. On roads of this description where there is but occasional car service, the Haarmann system is satisfactory, while not so expensive.

C. Experience has proven that the employment of counter-rails as wide as the companion rail presents agreat advantage, inasmuch as the cars which run on the tramway rails retain themselves better than if the counter-rail was broader. It is of benefit to the road bed as well.

D. We have abandoned flat rails for the exterior line of our curves, as they are difficult to place, manage and keep in repair, and more expensive than the ordinary one.

To be Continued.

Street Railway News.

Alabama.

Birmingham.—A movement is on foot to commence at once the building of a dummy line road from Birmingham to Averett's addition and Ensley City. It is understood that the proposed line will run from Averett's to Pratt Mines, thence past Glover's store to this city.

It is also stated that the Clifton Dummy Line company will commence very soon the extension of its line to Oxmoor. The right of way has been secured and the property owners along the proposed extension have agreed to deed the company every alternate lot. It is probable that the work will soon be commenced.

The extension of the Twentieth street mule car line to Highland avenue is almost complete, and will prove a great convenience to those living adjacent to Five Points.

The Birmingham Union Street Railway company made a proposition January 30, to the citizens of Jonesville, asking that they hold a meeting and decide what kind of inducements the town would hold out to the company in order to secure the extension of the Ware's Grove line to that place. The meeting, it is stated, will be held at once and steps will be taken to secure the extension.

A dummy railway from the Louisville and Nashville Railroad at Allenton to Camden, 15 miles, is being considered. It is stated that it could be built at $3,000 per mile.

The East Birmingham Land Co. will hold a meeting on Feb. 11 to consider borrowing money for the extension of their dummy railroad, previously mentioned, and for the more thorough equipment of the road.

A communication of January 20th says: The Shelta Caverns Land & Improvement Co. are making surveys, and will probably commence work in the spring to build a dummy railroad to Shelta Caverns.

California.

Los Angeles.—The board of supervisors have granted a franchise to a street railway company to run over Orange and Compton avenues.

Mr. C. B. Holmes was in the city the latter part of January.

National City.—The street cars are regarded with much pride by the residents. They are similar to those run on Fifth Street in San Diego and are drawn by one horse. Half hourly trips are being made so as to connect with both the National City and Otay and the Coronado trains.

Oakland.—Ward Davidson, of this city, has been granted a patent on a turn-table for cable or electric railways.

The Piedmont Cable Railroad company made a contract with the Judson Iron Works a short time ago, for the manufacture of a large quantity of rails to be laid on the new road. This contract has now been vacated, and the reason for it is that it was discovered that the rails ordered infringed upon a patent. It will be necessary to send east for rails.

Oroville.—The supervisors granted a franchise to J. W. Hartcell, January 8, to construct a street railroad from Oroville to Thermalito and Palermo, one and a half miles, to be in operation within one year, and all completed within three years.

Pasadena.—This city is well provided with horse railroads, which run in all directions. It has been suggested to combine these and provide electric motors, extending the line to Los Angeles. "This will in all probability be done," says a correspondent, "giving to Pasadena fifty miles or more of road for the transportation of passengers through the streets and groves of the city at a minimum cost."

San Diego.—This city now has some ninety-five miles of "motor road" in the city and its immediate suburbs, and thirty miles of other roads, exclusive of standard gauge lines. This has all been built inside of two years and a half, and represents an outlay of several million dollars.

The San Diego Street Car company put in the double track crossing at F street yesterday, January 12, and also "a 90 deg. curve or cut-off" at the same place, which makes the connecting link to the entire system.

Colorado.

Denver.—Articles of incorporation of the South Denver Cable Railway company were filed January 13 with the Secretary of State for the erection and building of a cable line from the present end of the Broadway line to a point near Rosedale. The incorporators are Messrs. Rodney Curtis, John Evans, John J. Reithmann, H. C. Brown and W. F. McClelland. The right of way has been tendered the company, and the ultimate success of the line is an assured fact. The capital stock is placed at $250,000.

Arrangements have been completed for the building of the cable road from Welton out Twenty-ninth street to Berger's addition.

Mr. Lewis C. Rockwell applied to Judge Allen in the district court, January 16, for a temporary injunction (which was granted,) restraining the Denver City Railway company and the Denver City Cable Railway company and George E. Randolph from proceeding with the work of excavation, for cable road purposes, on a triangular portion of ground situated near the junction of Grand avenue, Twenty-first street, Waverly and College lane. It was claimed by the plaintiff that the ground in question was dedicated by himself and others to the city on the agreement that no right should be granted to any corporation or company to build a street railway over the property.

Arguments were completed before Judge Decker in proceedings instituted by the Denver Tramway company against the Denver City Railway company to condemn crossings over the horse railway tracks on Lawrence street. The city cable company shortly after the suit was commenced filed a cross petition alleging that it had entered into a contract with the horse railway company to change the horse railroad tracks on Sixteenth street into a cable track and that after the change the horse railroad and the cable company were each to have the joint use of the track. The cable company also insisted that the tramway company should be required to place their cable underneath the cable of the city cable company, assigning as a reason that the line of the tramway company on Lawrence street was almost level so that the grip could be disengaged from the cable and the cars pass over the other track by reason of the momentum acquired. On the other hand it was claimed that the cable line on Sixteenth street is on considerable grade and that the cars could not pass without acquiring a too rapid or dangerous rate of speed, whilst if the city railway company had the upper cable they would not have to disengage the grip whilst crossing the Lawrence street line. It was decided that the cable company should have the privilege of the upper cable.

Pueblo.—Certificate of incorporation was filed January 14 by the Pueblo Street Motor company, organized for the purpose of introducing the Valentine & Griggs motor system in the streets of Pueblo and Bessemer. Capital stock, $100,000, in $10 shares. The incorporators are A. T. Griggs, A. V. Francis, Frank Nicholson, J. S. Stewart and W. L. Hartman.

On the same date (Jan. 14) there was a contest before the city council between the present street railway company and a new organization which proposes to construct motor lines in almost every part of the city, using the Valentine & Grigg petroleum engine motor. This machine is described by a correspondent as having small drive wheels like those of a locomotive, but they are lifted from and let down to the track to stop or start. Seven different motor lines are projected, several of which are on the same streets in which the old company has or seeks right of way, but in none of which it has exclusive franchise. The new company is backed by ample capital for building and equipping at least one line and the practicability of the invention has been tested. After quite a contest in the council both petitions were referred to the street committee for report at a future meeting. The Richards engine, built at Binghamton, N. Y., is the one used on the working model. It being a heavy shop engine not adapted to the purpose of a motor, an engine of special construction, using practically the same principle and burning crude petroleum, is being now constructed.

Connecticut.

Bridgeport.—A large force of men have been working on Stratford avenue at the east end of the Fairfield avenue bridge, laying the horse car track in the centre of the roadbed. Cars are now running to the New York, New Haven and Hartford railroad track.

Hartford.—New street railway lines are projected, and the old ones are to be improved.

The annual meeting of the stockholders of the Hartford and Wethersfield St. Ry. Co. was held January 25. The officers of last year were all re-elected. Two directors were added to the board, Messrs. E. Bound Chaffer and James Donovan. It was voted to bond the road for $15,000, to provide funds to double-track Main street.

In the House, Jan. 22, Representative Wolfe introduced a bill on behalf of the Townshend family, for the construction of a street railroad beginning at Tomlinson's bridge and running to South End. The company proposes to start with $20,000 capital, but wants the privilege of increasing its capital stock to $100,000.

Mr. Wolfe also introduced a petition of the State Street horse railroad company to extend its tracks through several streets.

New Britain.—The new stoves on the street cars are much appreciated.

Dakota.

Deadwood.—As an incident of the opening of the street car line in Deadwood the *Pioneer* says: "For the purpose of placing the fact on record, Ald. McDonald will have the pleasure in years to come of referring to the fact that he dropped the first nickel for a ride on what promises to be a great convenience to the city."

Rapid City.—A meeting of the stockholders of the Rapid City Street Railway company was held January 16, at which directors for the next year were elected. The board chosen is: James W. Fowler, R. C. Lake, Thomas Sweeney, E. B. Chapman, James Halley and D. R. Knull. The board organized and elected E. B. Chapman, president; James Halley, vice president; D. R. Knull, secretary, treasurer and general manager; James W. Fowler, attorney.

Sioux Falls.—The motor line to be built in this city will be of the standard gauge, and the necessary steel has already been ordered. The line is to be in operation by next July.

Yankton.—Two firms are "figuring" on building a street railway here.

Florida.

St. Augustine.—The work of constructing the electric railway here will be commenced at once. The Daft system has been contracted for.

Georgia.

Albany.—A street railway is to be built here. We understand that Mr. W. W. Rawlins is one of the promotors.

Athens.—The street cars stopped running January 27, and will not run again for some time. The company controlling them found that they were not paying and decided to stop them. The disease which broke out among their mules some time since gave the company a set back from which they were almost unable to recover. The cars will be run again as soon as a company can be gotten up to take hold of them.

Illinois.

Chicago.—The North Chicago Street Railroad Co. have made an arrangement by which their cable cars are electrically lighted as they pass through the tunnel. The scheme is greatly admired, and adds much to the popularity of the North Side service. One of the tracks and a heavy copper wire strung overhead carry the electric current. Each grip-car has two lamps. One end of the wire to which they are attached is connected by metal brushes with one of the axles; the other end is carried to the roof of the car, where connection is made with a little metal wheel. This metal wheel is attached to a rod made fast to the roof of the car. By an ingenious yet simple device, as soon as the car enters the tunnel the metal wheel at the end of the rod is guided to the copper wire and made to run along it. The connection between the wire overhead and the track below being thus completed, the lamps in the cars are "in circuit" and become incandescent. Upon emerging from the tunnel the little wheel above moves off the copper wire, the connection is broken, and the lamp goes out.

Decatur.—The Decatur city council has granted a franchise to the Sprague Electric Railway and Motor company.

Geneva.—This city is to have an electric street railway, and it is intended to connect Batavia, Geneva, St. Charles, and ultimately Elgin and Aurora by the electric road.

Joliet.—Parties owning large amounts of real estate on the west side opposite the mill and penitentiary are getting a horse railroad to bring their property into market. The proposed line is from the court house, down Jefferson street, up through the Cut, and thence north via Center street to a point opposite the penitentiary. Owners of property out toward Raynor's addition and south towards the Shooting Park and Bush's Park, ought to be taking some steps toward getting a branch out their direction.

The directors of the Joliet Electric Street Railway Co. have elected Lewis E. Ingalls president, C. B. Garnsey, secretary and treasurer.

Moline.—The details of the running of cars on Mr. Holmes' lines in the three cities have been arranged by Superintendent Schnitger. There are to be 33 cars in all, 14 on the two lines between Rock Island and Moline, two on the Elm street stub, six on the Davenport and Rock Island bridge line, eight on the Third street line in Davenport, and three on the Second street in the same city. The whole system through the the three cities is under control of the Davenport City Railway company, of which Mr. Holmes has been elected president. The other companies have a nominal existence.

Quincy.—The people of the Third ward intend to circulate a petition asking the street railway company to extend its line from the corner of Fifth and Maine to Third and Maine, and then extend it south on Third street. They promise to build a viaduct over Delaware street. It is claimed that the grade would not be more than 20 feet to the block, and that this extension would be a great convenience to the public generally, as by it the manufacturing district could be reached.

Springfield.—The street railway company's annual meeting was held Jan. 9 at the First National bank.

Indiana.

Elkhart.—A company was organized here Jan. 7 to furnish electric power for the street railway, stationary power, heat and incandescent lighting. A factory for electrical machinery and appliances will also be started. Electric street cars will be running by the 21st of February.

Indianapolis.—At the council meeting Jan. 14 the question of the removal of the unused street railway tracks extending east on Seventh from Illinois and Pennsylvania streets was taken up, and the board voted for their removal. It was also decided that the company should take up the turntable near Tenth and remove it to Twelfth street.

When the two new buildings which the Citizens' Street Railroad company are erecting in the northern part of the city are completed, the company will have room for the stabling of 1,200 head of mules and horses, the housing of 200 cars, and also room to do general repair work.

Irvington.—The East Washington street merchants, residents of the National Road, east, citizens of Irvington and officers of Butler University are interesting themselves in a project to secure an electric railway to Irvington. Hope of inducing the Pan Handle or C. H. & I. to run frequent trains, and of bringing about an improvement in the English avenue line has about been abandoned. Meantime the merchants have raised $2,000 with which it is hoped the corporation owning the turnpike may be induced to relinquish it, and thus lead to the abolition of toll-gates. This would restore the traffic which has largely been driven to the numerous free roads and would enable an electric company to procure right of way. It is understood that the Mackay-Collett Electric company, of Terre Haute, is investigating the proposed route.

Jeffersonville.—Subscriptions are entered for stock of the Ohio Falls Street Railway Co.

The opposition company is endeavoring to head off the foregoing.

Lafayette.—William Jaques, of Logansport, and Messrs. Knight, of Michigan City, and Thornton, of Elkhart, representatives of the street railways of their respective cities, were here January 9 to inspect the operation of the electric railway. A score of other street railway magnates were invited, but were kept at home by the blizzard which seemed to pervade the entire state. It raged with fury here, but did not prevent the electric motor from working successfully. The visitors were much pleased with the success of this electric railway. It is the Sprague system.

Iowa.

Council Bluffs.—The *Nonpareil* (January 15) says: The initial trip of street cars operated by McLaughlin's chemical motor was made at Omaha. The motor, with three cars attached, started from the Park Avenue barn on a tour of the street car lines of the city. The engine was started by Governor John M. Thayer. Invitations were limited to fifty.

Negotiations are in progress between the Omaha-Council Bluffs Bridge company and John A. Horbach for the purchase of the latter's interest in the Omaha motor line. It is presumed that the bridge company will operate the motor line when first started from its paved station on the Iowa side, but this is not settled. A right of way for the poles beyond the present terminus at Thirteenth street is wanted, and the motor company is having an argument over this matter with the city. It is possible that the negotiations with the Thomson-Houston Electric company to build a power house in this city will be renewed. Mr. Charles L. Pullman, agent of the Pullman Palace Car company, was in the city to bid on an equipment of cars and motors January 25, but the company was not quite ready for business.

Davenport.—The *Democrat-Gazette* of January 10 says: In the city yesterday was James F. Peavey, who is the president of a company in Sioux City which operates twelve miles of street railway. He came to examine the electric railway and he couldn't have struck a better time for the work if he had selected a day that would suit him best. Snow had buried the Central railway and the snowplow and scrapers left hard ice on the rails. But the steel brushes pending from the platforms of the electric cars cleared the rails of that, but left on them a dampness that froze as quickly as it was formed. On the Brady street hill sand was used to increase the traction. So the electric cars moved along with nearly their usual speed and with less difficulty than the motive power on the horse lines encountered. There were but two mules or horses to move the cars on the latter, while there were fifteen-horse power in the motors that moved each electric car. The electric line had less trouble than the Chicago, Rock Island and Pacific line, for a freight train started across Brady street at Fifth street and didn't move in less than half an hour and so disarranged the trips of the electric cars a great deal. Many persons walked down town who would have had transportation but for that delay.

Mr. Peavey spent some time in the dynamo-house, rode over the line two or three times, and was driver himself once. He went one trip with a pretty heavy load, and hardly believed the car would ascend the hill on the icy track, but it went up in five or six minutes and astonished him. Two teams of horses could not have hauled that big car full of people up that grade, under the circumstances, in less than fifteen to twenty minutes.

Mr. Peavey expressed his surprise and satisfaction with the system, and says he shall adopt it for his lines in Sioux City. He is one of the wealthiest as well as one of the most enterprising of citizens who are pushing their city onward in growth and commercial importance very rapidly.

Our former townsman, W. P. Bissell, accompanies Mr. Peavey and is a welcome visitor, indeed. With them is John T. McChesney, of Aberdeen, D. T., a gentleman of means which he desires to invest in paying street railways. The electric line captured him complete.

DesMoines.—The following charming paragraph appeared in the *Hawkeye*, (Burlington,) January 15: "DesMoines is elated over the success of its electric street railroad. Electric roads are now in successful operation in that city, in Davenport and in Council Bluffs. Other Iowa towns are considering their introduction. Burlington people who are anxious for progress, may find consolation in this. Don't you weary, don't you cry, you will get them by and by."

Articles of incorporation of the McNeill Cable company, of Oskaloosa, have been filed with Secretary Jackson, the capital stock being $500,000.

The DesMoines Electric Railway company has leased the lot opposite the City Hall, on the southern corner of West Locust and Second streets, 132 by 110 feet, and will commence, as soon as spring opens, the erection of a brick building, of sufficient size to accommodate all of their offices, car shops and the storage of their cars. The building will be two stories high, with the offices on the second floor. The company have several more cars ordered and will extend their lines very materially as soon as the work can be commenced and carried to an early completion. The new cars are being built in the East, says the *State Register*, and especially adapted for motor work, being considerably longer than the cars now in use.

The Electric Street Railway took possession of Centre street and commenced laying track, January 18. During the day they put down track from Sixth west past Seventh, and at different places along west to Fifteenth street and north on that street. This will make a fine route for the electric cars toward University Place, and through the residence portion of the city now reached only circuitously.

Dubuque.—Mr. C. B. Holmes is said to be negotiating for the purchase of the street railway here.

Fort Dodge.—Fort Dodge is bound to have a street railway, says the *Republican*. Work will begin in the spring, according to the *Chronicle*.

Norfolk.—The Norfolk Street Railway company began operating the extension on the west side, or that portion of the city lying west of the Union Pacific tracks, January 11. This adds three-quarters of a mile of track to the street railway system. Nearly all the best residences of the city are situated along this extension.

Ottumwa.—The *Courier* says that what Ottumwa now needs is a reorganization of its street car system, a consolidation of the lines, and electric motors. Then make two trips where one is now made, and the patronage would be doubled.

Sioux City.—The Elevated Railroad company has established an office in the Chamber of Commerce portion of the Peavey Grand block, where future meetings and the transaction of the business of the company will occur. Mr. E. C. Peters, president, has been placed in full charge of the business of the company, and he will make his headquarters at this office. Mr. Morison, the bridge engineer, who is engineer in chief of the line, is expected in a few days, and work on the plans and on other preliminaries will shortly begin. The City Council have given the Cable Railway company until July 1st to operate cars.

Kansas.

Atchison.—The Atchison Street Railway is offered for sale by Messrs. Straub & Morris, real estate dealers, cor. Third Ave. and Wood St., Pittsburgh. The franchise comprises right of way over all the principal streets. About seven miles of completed tracks. City pays for paving between the tracks. Of the cars, only five are in operation at this writing, on account of 5th street being in process of repaving, grading, etc, and in which they are laying new track as fast as paving progresses. The five cars are on Com'l, Main and 10th street lines.

The earnings of the five cars for eight months past has averaged $6.25 per car per day. The 5th street line, when pavement is finished, will require from five to six cars, and will earn more per car than the other lines. There are 11 curves in all on the whole line. Weight of rails 30 and 36 pounds. The worst grade is on South 5th street, where for about half a block it is 7.35 per cent. On North 5th street, there is a short one of 6 per cent.; on the 10th street line, one grade of about 5 per cent. All other grades easy, in fact mostly level. A fair estimate for present population is 25,000, and considerable may be added to this for the following reasons. The building of the new Missouri Pacific R. R. shops, which very recently have been granted concessions by the city in order to get them to come. The large increase of the paving brick plants

and other industries, and the opening of Minland college south of the city.

Kansas City.—The Argentine, Armourdale and Kansas City street railway company has filed articles of corporation with the secretary of state. The company is composed of gentlemen of Kansas City, Kan., and Kansas City, Mo., with a capital stock of $250,000. An ordinance will be introduced at the next session of the city council asking for a franchise to construct and operate a street railway on the south side. The line will extend from the foot of Osage avenue at the Kaw river, to the southwestern city limits. A franchise will also be asked for in Kansas City, Mo., to operate a street railway connecting with the Armourdale line by a bridge and viaduct at the foot of Osage avenue.

Topeka.—The City Railway Co. have placed stoves in most of their cars.

There are three motors on the East Side Circle Railway, operating seven miles of roadway between Kansas avenue and Highland Park. Two of these motors were manufactured at Richmond, Ind. The third motor was made in Chicago. These motors are quite different in appearance from those operated on the other rapid transit lines of the city, resembling more closely an ordinary passenger coach. They are very handsome, with pony trucks beneath the floor, causing them to move smoothly and with comfort to the passenger. The passenger cars are from the Pullman Palace Car company.

The motor of the North Topeka, Silver & Rossville Rapid Transit line, which was to have been sold at sheriff's sale at the engine house was not sold, owing to a successful effort by the company to raise the amount of the mortgage. The amount was about $2,500, and the motor has been "in quod" for several weeks necessitating the closing of the line. The company has encountered very rough obstacles in its brief existence, and it was generally feared that this last difficulty of meeting the note of $2,500 would cause them to give up the ship, says a local scribe. The fact that the difficulty has been met and conquered should gain for the energetic management more of the public confidence. The road has been built and the freight alone on the line when completed to Rossville would unquestionably more than make a good profit on the investment. But without financial aid in completing this last portion of the line the company will labor in vain. It is plainly evident by this time that they mean business. What they want is some substantial evidence of confidence and good will. The company is buffeting the winds and high seas of adversity, but at present it is still on top.

Louisiana.

New Orleans.—On being granted their new charter the Canal & Claiborne Street RR. company decided to improve their road and entered into correspondence with the Johnson Company of Pennsylvania with this object in view. This company proposed to lay street car rails on the girder system and to put down a test track to demonstrate its superiority over the present system. The Canal & Claiborne company accepted the proposition and selected the track on the south side of Canal, between Magazine and Tchoupitoulas streets, as the place for the test track. Three lines of street cars—Canal and Claiborne, Canal and Common and the Coliseum street lines—use this track and the street traffic over this square is very heavy, hence the test was bound to be a fair one. The Johnson company sent down Mr. E. Nobles Jr., an engineer, to superintend the laying of the track, and January 31 he completed the work.

Maine.

Portland.—The Portland Horse Railroad will ask the Legislature for authority to run their cars by electricity.

Maryland.

Baltimore.—A new electric motor is being constructed in Richmond, Va., by Robbins, of that city, and will be given a trial about the middle of February, on the tracks of the York Road Line here. Mr. Robbins has not yet divulged the general plan upon which his motor is constructed. The York Road company is empowered, by an act passed at the last session of the legislature, to use a noiseless and steamless motor, and President Samuel H. Tagart entertains hopes that such a motor will be eventually built to furnish greater speed than that furnished by horse power.

The testing of the car operated by storage electricity on the tracks of the North Baltimore Passenger Railway company, last summer, was brought to a sudden stop by litigation, which has not yet ended. Just as it was being demonstrated as a success, Mr. J. N. Pendleton, of New York, entered suit against the Electric Storage company, of this city, which was operating the cars, for infringement of patent. Several legal steps have been taken in settling the suit, but it is still on the court dockets. As soon as the litigation is at an end the car will be put on the tracks again. The Electric Storage company bought the patent from the Accumulator company in New York for Maryland, District of Columbia and West Virginia.

The Baltimore City Passenger Railway company contemplates extending their line out to Northeast Baltimore by the way of Orleans and other streets, and Mr. Betz, councilman from the sixth ward, will submit an ordinance granting the desired franchise.

Massachusetts.

Abington.—At the annual meeting of the Abington Commercial Club, January 16, the question of electric street railways was considered; and it was resolved to apply for franchises in several towns.

Boston.—William H. Powell, for many years foreman of the Mt. Auburn horse car stables, was officially notified, January 31, of his appointment as superintendent of the South Boston division of the West End street railway, the duties of which he immediately assumed.

Brockton.—The committee on street railways concluded the hearing, January 31, on the petition of the Brockton East Side Street Railway company for a definite location on Main street. The company submitted a bill giving it a location west of the track of the old company. City Solicitor Reed for the city, and Judge C. W. Sumner for the Brockton Street Railway company, argued that there should be no legislation by which the latter company should be required to move its track at its own expense.

Dalton.—A new road is being planned at Dalton which will make a short and direct route from the new depot to Cranesville, which is sure to be the center of the town in the near future. At present the route to the depot from that part of the town is circuitous, and the public-spirited men interested in the welfare of the town, are projecting the new road. Careful estimates fix the cost at between $6,000 and $7,000, which is considerably less than was first estimated.

Hyde Park.—The Hyde Park selectmen received a petition, January 18, from the directors of the Hyde Park & Dedham Street Railway company, for a location of the tracks of the railway of said company through the principal streets of Hyde Park. The petitioners further ask the right to operate said railway by both animal and electric power, the latter to be supplied by means of an overhead wire. The petitioners also request permission to exhibit a plan showing where, in their judgment, the poles should be erected for the stringing of said wires.

Lowell.—Petitions were received January 16 from the Lowell and Dracut Street Railroad company for permission to extend its tracks, and also from this company and the Lowell Horse Railroad company for permission to use electricity as a motive power in River street, Chelmsford street and Middlesex street. An order for a hearing Feb. 15 was adopted.

An order was adopted January 31 that the horse railroad companies be notified to cease using salt on the tracks, and a petition was received that the company be compelled to restore their tracks in Gorham street and resume running cars, or take up the tracks.

The Lowell, Lawrence, and Haverhill Railway company is being organized, to build and operate electric railways. In Lowell they would endeavor to secure permission to run on the rails of the Lowell Horse Railway company in Bridge street to Merrimack street. It is said the New York capitalists are interested.

Northampton.—The committee on street railroads considered the petition of the Northampton Street Railway company, January 18, for an amendment to its charter providing for leave to issue bonds and mortgage its property to secure payment. John C. Hammond and J. A. Sullivan, directors, and John B. Bottum, representative of Northampton, appeared for the petitioners. Mr. Hammond said the amount desired does not exceed $25,000, and for a term not exceeding 20 years. The original charter authorized the raising of $300,000. It was afterwards reduced to $50,000; and has never paid a dividend.

Revere.—The street railroad committee heard Mr. W. C. Benedict, president, and J. M. Gore, counsel, of the Revere Street Railroad, January 16, for changing location from northerly terminus of Walley street at Orient Heights to Ocean avenue, near Crescent Beach. There was no opposition.

Next day the committee reported a bill to authorize the Revere Street Railway company to construct, maintain and operate part of its railway upon private property. The bill authorizes the company to operate its railway on public streets and private ways by electricity or other motive power, except steam. If the company succeed in establishing their projected line, the people of Boston will have a new, quick and cheap route to the North Shore beaches.

The Revere Street Railway proposes to run its line from the junction through Bennington street and Walley and Washburn avenues. But as Washburn avenue is not yet made, the new electric line will run across the marshes on piles about 100 feet west of the tracks of the Narrow Gauge railroad. The Thomson Houston electric system will be used, and the road will be in running order by June 10.

Springfield.—The stockholders of the Springfield Street Railway company held their annual meeting at the First national bank, January 9, and re-elected the old board of directors, as follows: John Olmsted, George M. Atwater, A. E. Smith, James Kirkham and Gideon Wells. The directors organized by choosing John Olmsted, president; A. E. Smith, treasurer; and Gideon Wells, clerk. F. E. King was re-elected superintendent.

Waltham.—The sale is announced of the controlling interest in the three-mile track of the Waltham and West Newton Street Railway to W. A. Boland, of Lynn, who is said to have purchased it for the Thomson-Houston Electric Co. The West End Co. will also, it is rumored, have a hand in the management of the property.

The buyer agrees to assume the debt with interest, $28,500 (the road never having been prosperous), and to pay a certain unstated sum on the stock. There are 300 shares of stock, a capital of $30,000. The 151 shares purchased belonged to the American Waltham Watch Co., and it is desired to secure the balance.

The new owners propose to make a electric road, and build new lines between Watertown and Waltham and Newton and West Newton, making a loop for the Newton end of the West End Street Railway. The road was built 25 years ago for the special convenience of employees of the watch factory.

A meeting of the stockholders of the Waltham & West Newton Street Railway was held January 17. Mr. W. A. Boland, who has purchased the majority of the stock, was present, and made the same offer of $20 per share to balance of stockholders, as he had paid the American Walthan Watch company for its 151 shares. Some of the stockholders accepted the terms, so that Mr. Boland holds now 200 shares out of the total of 300. One Waltham estate, which paid $1000 for 10 shares originally, accepted $200.

Michigan.

Adrian.—The Adrian Electric Light-Railway company has made a contract with Jackson & Snow, of Detroit, for the completion and equipment of their line. The Fisher motor will be used.

Bay City.—The Bay City Street Railway company will hold their annual meeting Feb. 12, when they will decide whether to make a three-mile extension to South Bay City or not. Another five-mile extension is also contemplated.

Detroit.—A "mass meeting" was held in the City Hall January 13, to "considerd street railway franchises." The meeting was convened by the K. of L., who understand that "the people

have been awakened to the importance of such franchises." After a long string of windy speeches a young man who gave his name as William Milligan, who is said to be employed in the Michigan car works, said he was a laboring man, and interested in cheaper fares. The City Railway company now offered three-cent fares on all its lines. It was before the people to accept now, and not "to be knocked out by the speeches of the pedagogues who had spoken." [Laughter and applause.] He did not mean the Knights of Labor. He thought that some other men here had itching palms as well as the aldermen. [Applause.] The meeting passed the following resolutions:

Resolved, As the sense of this meeting, that his honor, the mayor, be and is hereby requested to veto the several street railway ordinances now in his hands for his consideration.

Resolved, That no further street railway privileges be granted to the present companies or any new ones until such time as an arrangement can be effected with the present companies whereby the cars of rival companies may be allowed the use of the present tracks on Woodward, Michigan, Monroe, Gratiot, Grand River and Jefferson avenues, under a reasonable and fair rate of apportionment of fares.

Resolved further, That a committee of representative citizens should be appointed to map out a general street railway system commensurate with the present population and prospective growth of the city, and when that system is properly outlined, it should be offered to the bidder offering the best terms.

Mr. Taylor brought up the point that by adopting the resolutions, competition could be shut out for twenty-one years, the duration of the life of the franchises of the existing lines.

Mr. Farwell replied that he knew that the concession of allowing other companies to run over their lines was now being considered by the stockholders and officers of the old companies, and they were about in the condition of mind to adopt it.

The resolutions were then adopted and the meeting adjourned. By an oversight, the committee which they called for was not appointed. There was plenty of applause and enthusiasm all through the discussion.

Mr. Strathearn Hendrie, treasurer of the Detroit City Railway, in reply to inquiry, says: "We have just sent a man to Boston to examine the workings of a new electric road just put in operation in that city, and will also send to Cleveland, where another has just been started. They are both the Sprague system. As soon as such a change can be made, and with confidence that there will be no break or accidents causing delay, we will put in the electric railway, but until then it would not be advisable."

The Street Railway company are sprinkling their tracks in some parts of the city with sand to prevent the horses from slipping, and the city marshal is kicking. It is his duty to keep the streets clean from dirt, and he does it as far as he can. Putting the sand on the streets is a violation of the ordinance, but in view of the purpose for which it is put on the tracks, Humane Agent Kennedy is applauding Supt. Bevier for his humanity, and asks the city marshal to allow it for the present, while the streets are so slippery that they are dangerous for the horses.

Grand Rapids.—Mr. C. T. Yerkes, of Chicago, "is supposed to be negotiating for the purchase of the Grand Rapids, Mich. Cable company" says the Sioux Falls (Dakota) *Press* January 27.

Kalamazoo.—Mr. J. W. Boynton was re-elected president of the Street Railway company January 14; F. H. Chase vice president; A. Ellithorpe, secretary and treasurer. The total receipts for the past year are $16,340.45.

Negaunee.—An electric street railway, running between Negaunee and Ishpeming, Mich., is to be built at once. The distance is 3 miles. The power will be supplied from the falls, ten miles north of Negaunee, and transmitted by electric cable.

Presque Isle.—An electric railway to connect Marquette and Presque Isle, is to be built the coming spring. This is a part of a $1,000,000 scheme to make Presque Isle a famous northern summer resort.

Saginaw City.—The right of way has been granted to the Union Street Railway company on Court street, from Washington street to the Michigan Central depot, by the Common Council. The track will be laid as soon as the frost is out of the ground.

MINNESOTA.

Duluth.—The Metropolitan Street Railway company, of Duluth was incorporated January 15, capital stock, $500,000; limit of indebtedness, $300,000. Incorporators, A. R. McFarlane, R. S. Munger, J. D. Ray, J. C. Hunter, F. E. Kennedy, Herbert W. Coffin, S. L. Selden, R. M. Hunter, W. E. Richardson, Frank A. Day, of Duluth; I, A. Willard, Mankato; C. E. Dickerman, St. Paul; S. W. Matteson, Decorah, Ia.; F. S. Easton, Lowville, N. Y.

Minneapolis.—A correspondent, writing January 25, says: "The quiet little community clustered around Oswald's mill at Shingle creek has awoke from its slumber of a decade and is putting on metropolitan airs. Ezra B. Ames has built a hotel on his premises that is a credit to the community,, and now the citizens, in joint council assembled, ask for street car accommodation. A committe will wait upon Secretary Goodrich to-day or to-morrow, and in case their wish for an extensioinof the Washington avenue line to Shingle creek is not granted, they propose to run an hourly bus line. They would prefer the street car, however, and will guarantee the street railway company against all loss. They also propose to do all the grading necessary for the track.

Rochester.—Hon. O. S. Porter is making arrangements to put in a street railway in this city the coming season.

St. Paul.—The annual election of the city railway company was held, all the old officers being re-elected, and the old board of directors, excepting that Mr. Sims succeeds Mr. Shepherd (resigned).

Stillwater.—The Stillwater Street Railway Co. will build their road as soon as possible. Messrs. Allen, Sweeney and Hewitt are the principal stockholders. They recently acquired controlling interest. Mr. W. M. Hewitt, for several years operated the Third street line in Davenport, Ia., and afterward built railways in Muscatine and some smaller towns. He is the general manager. Dr. W. L Allen is president. Mr. Thos. Sweeney being secretary and treasurer.

MISSOURI.

Kansas City.—An ordinance authorizing the construction of street railway on a part of Indiana avenue and Twenty-seventh street, introduced by Alderman Phelps, was read first time January 15. On motion of Alderman Finlay the petition and ordinance was referred back to the alderman who introduced the ordinance to have the certificate of the city engineer in regard to the majority on petition.

The Grand Avenue Street Railway company will be the first corporation in this city to use natural gas in its business. Mr. Walton H. Holmes, the president, recently contracted with Mr. J. F. Marks to furnish natural gas as a fuel for the railway company. It will be piped from a well at the corner of Twenty-fourth street and Tracy avenue. The work of laying pipe has already commenced. The power house is at the corner of Fifteenth street and Grand avenue, more than two miles from the gas well and it will be some time before the pipes are all laid. Fuel for the railway company now costs $1,200 a month. The gas will cost about one-half that sum. With gas no smoke consumer will be required.

Articles of incorporation of the Kansas City & Independence Rapid Transit company, with a capital stock of $1,000,000, have been filed (January 28) with the secretary of state. The line will be a continuation of the Fifteenth street cable railway and will be operated with steam motors, connecting this city with Independence.

The Union Cable Railway company have in contemplation a plan for building an extension of their present line into Quindaro. Much depends, however, on the ability of the company to secure suitable franchises and the right of way for the projected road.

The Rosedale dummy road was formally turned over to the Grand Avenue Railway company January 31, and cars were started over the line. The equipment is first class in every respect, and Mr. Likins of the Bellevue Locomotive Works, who delivered the dummy engines, states that it is one of the best built dummy lines in the United States.

President Smith and Chief Engineer Gilham of the Kansas City Cable company, and Wm. B. Knight, chief engineer of the Belt Line railroad, held a conference recently regarding the building of the Summit street railways. These two corporations discussed the matter of entering into an agreement with the city to build the viaduct. The proposition was to build a viaduct sufficiently large to accommodate travel on the street in addition to the space required by the cable road tracks. To do this it was necessary to acquire some private ground adjoining. The property owners are holding up the companies for a high figure, which they naturally are adverse to paying.

As a result of this conference it was decided either to build a viaduct merely to accommodate the cable tracks, in which event it would not be necessary to buy the property in question, or President Smith concluded he would build the road as far south as the boulevard and wait until the property owners come down in their figures before completing to Twenty seventh street.

St. Joseph.—The Frederick Avenue and Citizens Street Railway Co. will adopt electricity.

St. Louis.—The Council committee on railroads held a session recently to hear arguments on the Broadway and Seventh Street Elevated Electric Railway bill. This is the measure urged by Messrs. Branham, O'Meara and others. An army of objectors were on hand, all of whom had reasons to give to show why the committee should not recommend the bill for passage. Owing to the brief session only a few could be heard on the subject. Messrs. W. S. Sabath, Rudolph Schultz and Herman Stamm, property owners on the proposed line, addressed the committee in lengthy speeches in opposition to the bill. They claimed that its passage would ruin their property. The committee decided before adjournment to hold two more meetings on the bill before reporting it to the Council.

The railroad committee of the Council had a very lively session at the City Hall January 15, listening to arguments against the opinions of Council bill No. 105, which grants a franchise to the Electric, Elevated and Power Co. and authorizes the construction and operation of an elevated road.

NEBRASKA.

Omaha.—Investigation of the features of the bill to authorize street railways to consolidate, which has been introduced in the state senate by Mr. Funcke, of Gage county, fails to disclose anything objectionable, says the *Herald*, barring possibly one omission which can be rectified by amendment. Omaha will reap the most immediate benefits from the measure as it will enable its street car, cable and motor lines to consolidate and operate with greater convenience and less expense to patrons. "There is no possibility of an injustice to the public from the monopoly which such a consolidation would create," says the paper named, "as street transit patrons have no interest in methods except convenience, speed and fares. The former of these will certainly be enhanced and as for fares the maximum is already established at five cents per fare." The one proviso which the *Herald* thinks should be inserted in the bill is that when a consolidation of street railways ensues, the total capital stock of the consolidated company shall not exceed the total appraised valuation by more than twenty-five per cent. This proviso should be inserted to guard against watering the stock and to prevent overbonding of the road.

The Cable Tramway company strung 28,800 feet of new cable on its Dodge and Twentieth street line, January 14, without interrupting travel.

The electric motor company, on account of the rapidly accumulating sleet on the wires, as a matter of precaution, ran two trains all night Monday, says the *Republican* (Jan. 16). "The doubting Thomases still remain disappointed on account of the weather's seeming to interfere so little with the electric wagons."

A very voluminous petition was filed in the district court, instituting proceedings under the

title of John A. Horback vs. William M. Marsh Frank Murphy, Guy C. Barton, Silas H. H. Clark, W.A. Smith and the Omaha Horse Railway company. On the first page of his petition plaintiff states that he, Horback, owns twenty shares of the original first issue of 1,000 shares at $100 each, of the company's stock, having bought it September 17, 1869, of Moses F. Shinn. Proceeding he states that on May 19, 1877, the company owed P. E. and J. D. Iler $700, and that said indebtedness was part of $20,000 secured by a mortgage to Joseph H. Millard as trustee, covering all the company's property, which on May 19, 1877, was of the value of $100,000 and more; that though all of said $20,000 was due, yet the said Millard, though requested, refused to bring suit to foreclose the mortgage, and as plaintiff upon information and belief says, for the reason that though the indebtedness secured was due, yet the property of the company was more than five times sufficient to pay it and the directors of the company could easily have provided for the payment of all of it as it was their duty to do. Mr. Marsh was then president of the company and, as Horbach alleges, "contrived to wrong, cheat and defraud" the other stockholders out of their interests and secure control of the company. In pursuance of his scheme Horbach says Marsh bought up, under false and fraudulent representations as to the true condition and valhe of the property and for small sums of money, many shares of stock and continued so to do until he gained control of the business, and in order that he might have the aid and assistance of Murphy and Smith, Marsh assigned to them each five shares. The next step taken by Marsh, it is alleged, was to allow the mortgage to be foreclosed and the property put up at auction and buy it in at $24,500.

New Hampshire.

Concord.—At the annual meeting of the Concord Horse Railway, January 16, the following were elected directors: Moses Humphrey, Howard A. Dodge, A. F. Holt, P. R. Holden, J. C. Pearson, J. H. Albin. Mr. Humphrey was chosen president, N. E. Martin clerk, and E. C. Hoague treasurer. The following is the directors' report:

To the stockholders of the Concord Horse Railroad: The operation of your railroad for the past year has been attended with results very little different from those of the preceding year, as will be seen by the treasurer's report, and the trial balance herewith submitted. The heavy snows of last winter, for some three months, and the continued rains and cold weather, throughout the fall, seriously reduced the amount of our travel, thereby materially diminishing the gross earnings of the road. The operating expenses were largely increased by the additional expenditures necessarily incurred in order to kep the road free from snow during the winter, but notwithstanding these unfortunate conditions our net earnings have been nearly as large as they were during the preceding year. Had it not been for the increased operating expenses and the reduced gross earning, as before stated, our net earnings must have been largely in excess of the preceding year. In the face of these drawbacks your road carried, in round figures, 260,000 passengers during the year 1888, an increase of about 8,500 over the number carried in 1887. We have added to the rolling-stock of the road a new open car for street travel, and all other rolling-stock has been put in good condition and repair. We have laid fifteen tons of new steel rails, at a cost of nearly $700, and have put into the track 1,500 new ties. The road is now in better condition than ever before. Judging from the past there is every reason to anticipate a good year's business in 1889. We have thought it proper to pay the usual dividend of 6 per cent. upon the capital stock for the past year. The total receipts were $26,126.10. Payments were: Conductors and drivers, $6,471.46; maintenance of track, $2,826.53; new cars, $780.79; coal, hay and grain, $5,436.88; salaries, $700.00; interest, $227 91; insurance, $215.71; general expenses, $2,218.07; dividend No. 6, $3,000.00; bills payable, $500.00; total, $22,562.85, which, with cash on hand, Dec. 31, 1888, $3,663.25, makes $26,126.10.

Dover.—An electric railroad is to be built from Dover, N. H., to Berwick, Me.

The Dover horse railroad has just declared a 5 per cent. dividend. They carried 117,797 passengers during 1888.

New Jersey.

Atlantic City.—The Sprague Electric Railway company of New York has received a contract from the Pennsylvania Railroad company to equip Atlantic avenue in Atlantic City, N. J., with an overhead electric railroad system.

Elizabeth.—Mayor Job Male, in his message to the council, advocated the granting of a franchise at an early date to "some sort of a street railway company," and also called attention to the growing need of a city hall.

Newark.—The *News* (January 22), says: It is expected that the work of adjusting the bronze buttons to the cable rope, which has been going on since it was discovered that the old buttons would not do, will be completed in about a month, when, unless some further changes are found to be necessary, trips will again be attempted. The experimenting that has been carried on has not only caused long delays, but has also cost the company considerable money. A large force of men is employed, the cost of making changes and alterations is large, and there are other expenses to be taken into account. It is estimated that the company is expending nearly $1,000 a week. This is given by those connected with the road as evidence to show that the company is working in good faith and expects to have the road in operation before long.

President Battin, of the Essex Passenger Railway company, says that he knows no more about the road, as far as its ultimate success or failure is concerned, than does any one else "I have seen the Chicago road work, however," he said, "and don't see why this should not. We won't purchase it until it has been in operation successfully for two months. If it works that length of time there is every reason to believe that it will continue to work successfully." Mr. Battin was informed by Mr. McNeil, the engineer of the company, that the construction of another road had been undertaken in the West. Officers of the Essex Passenger Railway company show a disposition to give the cable company all necessary opportunity for putting the road in proper shape. Long delays that were experienced with cable roads in other cities which are now operating successfully, are cited to show that the road here may yet be made to work smoothly.

Plainfield.—This city is to have a street railway, and the probabilities are that an electric road will be built and operated before the year ends.

New York.

Albany.—The report of the Grand Street and Newtown Railroad company for the quarter ending December 31 shows: Gross earnings, $35,087.15; expenses, $33,927.37; net earnings, $1,159 78; other income, $899.47; gross income, $2,059.25; charges, $3,945; loss, $1,885.75; cash on hand, $502.07; profit and loss, surplus, $48,948.67.

Brooklyn.—The annual report of the Brooklyn elevated railroad carried 2,885,312 more passengers during the year ending Sept. 30 last than the previous year, and increased its gross earnings by $146,227.17.

The Kings County Elevated Railway Co., of Brooklyn, have issued their first mortgage of 5 per cent. bonds, due 1925. The total issue is $3,300,000. The advertisement describing the security says: The bonds are a first mortgage on the six miles of road, now completed and operating, and on the rights, franchises, rolling stock and real and personal property of the company, of every nature and description, now owned and hereafter to be acquired.

The road runs from Fulton Ferry, which is the busiest ferry between the two cities, and from the Bridge, all the way through Fulton street, the principal business street of Brooklyn, to East New York. It has just been completed and is already doing a business more than sufficient to pay its expenses and the interest on these bonds. From the nature of its location the business is bound to increase very rapidly. The structure has been built and equipped in the best manner. The mortgage is at the rate of $550,000 per mile, as against $800,000 to $900,000 per mile of bonds on the New York roads. The validity of the charter and franchise and the form of the bond and mortgage have been approved by our counsel.

The Steinway and Hunter's Point Railroad company are again making experiments with an electric motor on their branch road to Bowery Bay Beach.

Buffalo.—The trial of the officers of the Buffalo Eastside Street Railway was resumed January 29, in the Criminal Term of the Superior Court. The prosecution had failed to show that the witness Mason had been compelled to work more than ten hours, and he had sworn that he had done the work voluntarily, that he had worked for the extra wages to be received by remaining on duty for 17 hours, and for no other reason. Mr. Quinby asked to re-open the case for the people. The court was willing and Henry M. Watson was called to the stand.

Mr. Watson testified that when the State-bill went into effect the clause providing that drivers and conductors should not be required to work more than ten hours a day was embodied in the contract. There are two classes of workmen employed by the company; one class received $1.50 per day and the other was paid by the hour.

Judge Hatch said that it appeared to him to be the duty of the court to direct a verdict of acquittal. The burden of proof was upon the people; every presumption was in favor of the accused. The prosecution was required to prove that a misdemeanor had been committed. There was nothing of a direct nature tending to show that the defendants compelled men to work over time. The statute did not prohibit a man from working as many hours as he saw fit, providing no coercion was used. In view of all the facts in the case, he would be compelled to direct a verdict of acquittal.

East Randolph.—A street railway is proposed here.

Fort Edward.—The conductors on the street railway struck yesterday, says the Albany *Argus*, of January 29, against a reduction of wages, and their places were filled with "hayseeds" waiting for the chance.

New Hartford.—The New Hartford & Washington Mills Street Railroad company has been formed for the purpose of laying a street car track up South street to the proposed site of the Masonic Asylum. It will be operated in connection with the Belt line, and may be extended to Washington Mills.

Rochester.—The directors of the Rochester & Charlotte Electric Railway company recently held a meeting at the office of J. Breck Perkins, the company's attorney. The following committee was appointed to eastern cities and inspect the motive power of various electric railways: E. A. Fisher, W. C. Barry, C. C. Woodworth, Wilson T. Soule. Mr. Perkins states that unless the injunctions delay the company, cars will be running in May next.

Troy.—Trojan capitalists, says the Albany *Express* (Jan. 29), have organized a company, with a capital of $10,000, for the purpose of constructing a sireet railroad from the stone bridge at Troy, on the Brunswick turnpike toward Eagle Mills, a distance of one and three-fifth miles.

The Troy and Lansingburg Horse Railway company, lessees of the Cohoes and Waterford Horse Railroad, have signified their intention to abandon the road next August, upon the expiration of their lease.

White Plains.—The franchise of an electric road from White Plains to Elmsford, on the New York and Northern railroad, which was sold by the trustees of the former town at public auction, January 7, was purchased by the Port Chester, White Plains and Tarrytown Electric Railway company. It is understood that the establishment of the road is another move in the Northern's fight against the New York Central. The plan is to run the electric cars in connection with the Northern's trains at Elmsford, and it is said that through tickets to any of the Sixth or Ninth avenue elevated railroad stations in New York City will be sold at thirty-five or forty cents, and the excursion rate will be seventy or seventy-five cents.

Ohio.

Akron.—Since the electric railway has been in operation induction has interfered with the tele-

phone service, and the latter are endeavoring to remedy it.

Cincinnati.—The Thomson-Houston Electric company have closed a contract with President John Kilgour, of the Cincinnati Street Railway company, to equip an electric road between Brighton House and Knowlton's Corner, Cumminsville, a distance of 2¾ miles. The road to be ready for operation in May.

Cleveland.—The East Cleveland Railroad company are anxious to run their electric cars faster than ten miles an hour, the limit of speed now permissible. The success of electricity here has induced prominent railway men to convert their rails. Mr. Tom L. Johnson said that the South Side road will be running by electricity by March 1, and that the South Side cars would cross the new stilt bridge as soon as the board of improvements would give the permission. Supt. Mulherne, of the West Side road, stated that they would start the building of an electric system early in the summer. The Broadway line will commence operations on a plant about the same time.

Columbus.—The Consolidated Street Railway company have obtained right of way for a line on Schiller street.

Mansfield.—The electric street railway line, about five miles long, has never been accepted by the Mansfield Electric Street Railway company from the contractors, Neftel and Cothout, No. 41 Liberty street, New York. The railway company brought suit against the contractors for $15,530, January 15. The plaintiff recites that the line and electrical equipments are not satisfactory, that only inefficient service could be rendered and that the defendant has not since complaint was made placed the line in a satisfactory condition. Another allegation is that the contractors received $3,500 worth of bonds more than they were entitled to and also received $2,700 as interest on the first mortgage. This, together with $9,330 for an uncompleted three-fifths of a mile, makes up the aggregate of $15,530. The papers filed here are to give the plaintiff the right to attach the contractors' property in this city. The real suit is in New York.

Toledo.—The Central Passenger Street Railway, which recently passed into the hands of the Consolidated people, is to be improved at once.

Mr. David Robison, jr., seeks a franchise to build about 15 miles of electric road in this city.

The Metropolitan Street Railway will double track their line on St. Clair and Cherry streets, before the base ball season opens, and will try to accommodate patrons of the game with rapid transit to and from Speranza Park.

Zanesville.—The Mill Run Tramway company has been incorporated, with $6,000 capital stock.

OREGON.

Portland.—The Mt. Tabor Street Railway company has been incorporated, by G. N. Brown, A. W. Powers, D. Goodsell. Stock, $40,000.

Salem.—It is said that the Salem Street Railway is paying well. The line runs from the Chemekete hotel to the depot.

PENNSYLVANIA.

Allentown.—The company which has purchased the Allentown Street Railway, in addition to the purchase money, will spend $60,000 in extending the tracks and purchasing new cars.

Norristown.—The Norristown Passenger Railway Co. carried 190,227 passengers last year. Total earnings, including rent of blacksmith shop and advertising, was $9,567.12. The following board of directors has been elected: H. M. Lutz (president), Wm. R. Pechin, A. W. Geiger, I. W. Smith, Norman Egbert, J. Cloude Smith, Joseph Blackfan, N. R. Haines, M. R. Witts, Henry Freedly Jr., Eugene D. Egbert and Joseph A. Coleman.

Lancaster.—The Lancaster City Street Railway stockholders have elected the following officers for the ensuing year: President, George K. Reed; directors, John H. Baumgardner, John A. Coyle, A. F. Hostetter, Levi Ellmaker, S. S. High and C. A. Fon Dersmith.

The stockholders of the East End Railway company elected the following: President, Martin Kreider; directors, George Nauman, William A. Heitshu, M. F. Steigerwalt, Henry Hershley, Thomas Ellmaker, D. K. Burkholder.

Easton.—The Electric Railway, which was recently purchased by the Easton and South Easton Passenger Railway, and under its management extended to the Fourth Street Depot and to near Paxinosa Inn, was leased January 5th for 999 years to the Pennsylvania Motor company, J. Marshall Young, president; D. W. Nevin, secretary and treasurer. This new company is composed of many of the Lafayette Traction company people and virtually places the road back in its original hands. It is quite probable that President Sage, of the Easton and South Easton company, will adopt electricity for horse power. The companies work in harmony.

Philadelphia.—A fire broke out in the hay lofts of the Ridge Avenue Passenger Railway Co's. stables January 7. How it originated is a mystery. Two hundred and fifty horses in the stables below were turned out loose in the street, and were thus saved uninjured. The hay consumed was alone valued at over $5,000 and the total damage is estimated by Superintendent Myers at $15,000. There is an insurance of $75,000 on the building and contents. A thick partition wall of brick separates the southern room from the one in which the fire broke out and this room was untouched. The building is of brick and the walls were uninjured.

The People's Passenger Railway company stockholders held their annual meeting. The number of passengers carried during the year, including transfers, was 31,661,527. This is an increase of 2,016,241 over the preceding year. The increase is attributed to the reduction of fares begun a year ago. The year has been a prosperous one to the company. Thomas C Barr was re-elected president, and David C. Golden secretary. The directors chosen were: Robert N. Corson, William H. Shelmerdine, William Rotch Wister, E. J. Moore and J. J. McFarlane. The only change in the board is the election of Mr. McFarlane in place of John R. Baker Jr., who declined.

Most of the city passenger railways held their annual meetings January 14. The Fifth and Sixth Streets stockholders elected J. J. Sullivan president, and directors, Alfred Smith, I. Noblit, Thomas McClary, Edgar Fries, J. H. Gay, M. W. Lipper, C. S. Lincoln, I. L. Lawson, D. Fleming, Horace Geiger, Frank Weckerly and G. S. Gandy. The report for the year shows the gross receipts as amounting to $646,856.24; expenses, $416,482.10; number of passengers carried on the road, 13,654,292.

At the annual meeting of the Second and Third Streets Passenger Railway the following officers were elected: President, Alexander M. Fox; directors, William Anspach, Andrew J. Holman, William Eisenbrey, M. Hall Stanton, E. T. Eisenbrey, A. L. Crawford, J. A Freeman, Horace T. Potts, George Hoff, W. Dulles, James McManes and W. G. Fox.

The Citizens' Passenger Railway, at their meeting, elected Charles E. Ellis, president, and the following directors: John H. McIlwain, Charles T. Colladay, R. M. Hartley, John H Sloan and Frank H. Ellis.

The stockholders of the Ridge Avenue Passenger Railway re-elected President E. B. Edwards; treasurer, W. S. Blight, and directors, J. E Lambert, Henry Norris, W. S. Grant, W. T. Carter and Dr. R. A. Penrose. The annual report shows the gross receipts as $341,066.63; expenses, $205,947; number of passengers carried on this line, 6,865,973.

The Empire Line at their meeting chose James McManes president and William H. Kemble, W. L. Elkins, P. A. B. Widener, W. McClary and G. H. Colket directors.

The Continental Line elected president, W. L Elkins; Directors, P. A. B. Widener, Clay Kemble, G. W. Elkins, W. J. Elliott and G. D. Widener.

The Union Line elected president, W. H. Kemble: vice president, P. A. B. Widener; directors, W. L. Elkins, J. McManes, Henry Bumm, W. S. Stokley and M. S. Quay.

The Philadelphia City Passenger Railway—Chestnut and Walnut streets—elected president, W. W. Colket; directors, W. S. Wilson, W. Cochran, J. M. Chestnut, John Markoe, C. M. Walton and J. A. Brown, Jr.

The Philadelphia and Darby company elected president, Beauveau Borie; directors, M. Hall Stanton, C. W. Walton, W. W. Colket, T. W. Walker, C. W. Kunkel and C. J. Walton.

The annual meeting of the stockholders of the Hestonville, Mantua and Fairmount Railway company was held at the offices of the company, 4300 Lancaster avenue. The following officers were elected for the ensuing year: President, Charles H. Lafferty; directors, John Keller, Levi N. Wagner, J. R. Griffith, Henry Donahue, Daniel Glackin and S. Gordon Thompson. The receipts from passengers during the year were $285,884.29; from other sources, $4,857.96. The running expenses were $249,720.78, leaving a balance of $41,021.47. Number of passengers carried, 5,804,686; horses owned at the beginning of the year, 489. The bonded debt remains the same as last year. Floating debt has been decreased $5,000.

Councils' Committee on Railroads January 24 referred to a sub-committee the ordinance granting permission to the Traction company to extend its tracks northward from Seventh and Columbia avenue to Lehigh avenue, thence along the latter thoroughfare to Ninth, on Ninth to Dauphin and on Susquehanna to the present track.

Chairman Hammett announced that he would call a meeting of the committee on February 6 to consider the Northeastern Elevated Railroad ordinance.

Pittsburgh.—The syndicate that started out to secure the Pittsburgh, Alleghany and Manchester Street Railroad has succeeded. Several of the oldest and prominent stockholders have sold their stock, and now the syndicate owns 4,500 out of 7,000 shares. There is some talk of substituting electric power for the horses now used. John H. Dalzell is the new president.

The new cable cars on the Butler street division of the Citizens' Traction company were put on January 10, and the horse cars taken off. This change was hailed with delight by the patrons of the road. While the street cars were still running the cable cars of the East End division were obliged to creep along at a snail's pace. This was disagreeable to those depending on the Citizens' cable cars, especially when they saw the speed of the Fifth avenue cars.

The annual report of the passenger business of the Pennsylvania Railroad for 1888 shows a decrease in the sales of commutation tickets between Union station and Torrens station of fully twenty-five per cent. It is also said that, owing to the cable lines taking much of the local traffic from the Pennsylvania road, President Roberts will take off four accommodation trains.

The horses of the Citizens' Traction Co. were sold by auction January 28. Several hundred persons were present, and while the bidding was brisk it was attended by no special excitement. The prices obtained ranged from $75 to $150, and it was the general opinion by gentlemen who had examined the horses carefully before the sale, and who were previously acquainted with them, that they brought their fair market value and in some cases a little more.

Reading.—At the annual meeting of the City Passenger Railway company, the following officers were elected: President, B. F. Owen; vice-president, J. L. Douglas; secretary and treasurer, H. A. Muhlenberg; directors, H. A. Muhlenberg, A. Thalheimer, C. H. Schæffer, M. Harbetee, W. A. Sands, John Rice, W. R. McIlvain. The total receipts for the year were $155,228.80. The total expenditures, $150,551.24. On account of the purchase of the Perkiomen Avenue Line and the expense connected therewith, no dividend was declared.

RHODE ISLAND.

Newport.—The horse railroad is settled at last. The first annual meeting was held January 29, A. C. Titus presiding. It has been decided to lay the road immediately the weather is sufficiently settled. It is expected that cars will be running the latter part of the spring. There has been a tremendous opposition to the road for fear it would be laid in the section occupied chiefly as summer residences.

Providence.—The following bill for a horse railroad has been adopted:

SECTION 1. The permission heretofore granten to the Union Railway company to lay rails on Waterman street from Governor street to Gano street, and on Angell street from Gano to Way-

land street, is hereby revoked and annulled, and said Union Railroad company is hereby ordered to take up and remove its rails on said Waterman street from Governor street to Gano street, and on said Angell street from Gano street to Wayland street.

SEC. 2. Permission is hereby granted to said Union Railroad company to run its cars, to be used with horse power and for passengers only, over the tracks of the Providence Cable Tramway company, to be laid in said Waterman street from Governor street to Gano street and in said Angell street from Gano street to Wayland street, with all the privileges and subject to all the conditions of the ordinances on railroads and all ordinances in amendment thereof or in addition thereto.

SOUTH CAROLINA.

Columbia.—A meeting of the board of directors of the Columbia Street Railway, recently elected at a stockholders' meeting in this city, was held January 8, at the company's office in New York City. The following officers were chosen, an entire change being made save as to superintendent: President, Wm. Roth Wister of Philadelphia; secretary and treasurer, W. S. Opdyke of New York City; superintendent, W. D. Starling of this city. Mr. Wister represents the Guarantee Trust and Safe Deposit company of Philadelphia, and Mr. Opdyke the Fourth National Bank of New York, which institutions are now the chief owners of the railway and hold the great majority of its stock and bonds. It is believed the new management are disposed to improve and add to the present plant and to add to its efficiency in every way possible.

TENNESSEE.

Chattanooga.—An order has been given the Sprague Electric Railway & Motor company, for a thirty horse-power electrical machine to be used on the new road here.

Dayton.—The street railway movement is assuming business proportions, with John M. Howard and other leading citizens at the head.

Nashville.—Electric street cars will be in operation in Nashville by the 15th of April.

Simpson's Ferry.—The charter for the Simpson Ferry Tramway has been filed for registration. The incorporators are Messrs. W. C. Boyce, Wm. Sanford, J. C. Boals, N. W. Baptist and others. It is proposed to extend it from Covington to Simpson's Ferry on Hatchie river, a distance of about ten miles, passing through the finest timber region in Tipton.

TEXAS.

Dallas.—The city secretary, on January 7, reported the following corporations delinquent on their annual or semi-annual bonuses in the following amounts: Dallas Consolidated Street Railway company $750.00. Dallas & Oak Cliff Railway company $50. Two hundred dollars due by the North Dallas Circuit Railway company Jan. 1st it was understood had been paid after it became delinquent. Upon Mr. Rowley's motion the secretary was instructed to refuse to receive the money in each or either instance without a written statement showing why it was not paid when due.

Mr. Jules E. Schneider has been elected president of the Dallas Consolidated Street Railway company and Mr. Royal A. Ferris vice president and general manager. Three years ago in this capacity with the same company Mr. Ferris distinguished himself with success, and his election this time shows the confidence of the stockholders in his superior judgment and executive ability and insures a year of healthy progress for the Dallas Street Railway system.

San Antonio.—The construction of the street railway is progressing under the superintendence of Mr. Samuel Bratton.

UTAH.

Provo.—A street railway is to be built here. At a meeting of a few of the business men of Provo, called by the committee recently appointed by the Chamber of Commerce, a good healthy subscription list was commenced and a committee appointed to canvas the city for subscriptions and the establishment of a company to build and operate a passenger street car service; also to transmit gravel, building rock, sand, clay, etc., which is found in abundance at the head of Center Street east of the asylum. Besides this, it is the ultimate intention to run the track west from West Main Street (the present proposed terminus) to the lake for the very wise purpose of carrying pasengers to and from the new bathing resort; and in the winter time for skating and ice hauling trade. It is the intention to incorporate for $25,000, with shares placed at $50 each, 61 shares are already subcribed.

VIRGINIA.

Norfolk.—It is reported, says the *Landmark*, that the Street Railway company will soon extend their line to the Naval Hospital property.

Richmond.—Mr. Flynn says his electric road will be running by April 1st. The City Railway having mortgaged its lines to raise money for improving its property, it is hoped that the work of betterment will begin at once, says the *State*.

WASHINGTON TERRITORY.

Tacomah—Mr. F. Mackintosh, of San Francisco is looking over the city for the Tacoma Street Railway company, and is figuring for the laying of a cable road from Pacific avenue up Ninth and Eleventh streets to the top of the hill. Plans will soon be decided upon for the construction of the road

Mr. Ayres D. Lundy, representing the Sprague Electric Railway and Motor Co., was here the latter part of January, looking over the proposed routes of the electric railway.

WEST VIRGINIA.

Wheeling—The electric railway is to be extended to the Island.

The new Indian Run Bridge arrived January 29. The street railway, so long delayed for want of the bridge, will now be completed as soon as possible.

WISCONSIN.

Green Bay.—The street railway ordinance has been "laid over under the rules."

Racine.—The Racine common council has passed an ordinance compelling the street car company to run cars every five and ten minutes under penalty of a $50 fine.

Milwaukee.—Senator Lempf introduced a bill at Madison, January 31, to amend subdivision 14 of section 1038, revised statutes, so as to provide that "the track, right of way, depot grounds and buildings, machine shops, rolling stock and all other property used in operating any railway in this state, shall henceforth remain exempt from taxations, except that the same shall be subject to special assessments for local improvements, but that the section shall not apply to any railroad that now is or may be operated by horse, cable or electrical power, whether now or hereafter constructed." The special object is to reach the Hinsey cable line in Milwaukee.

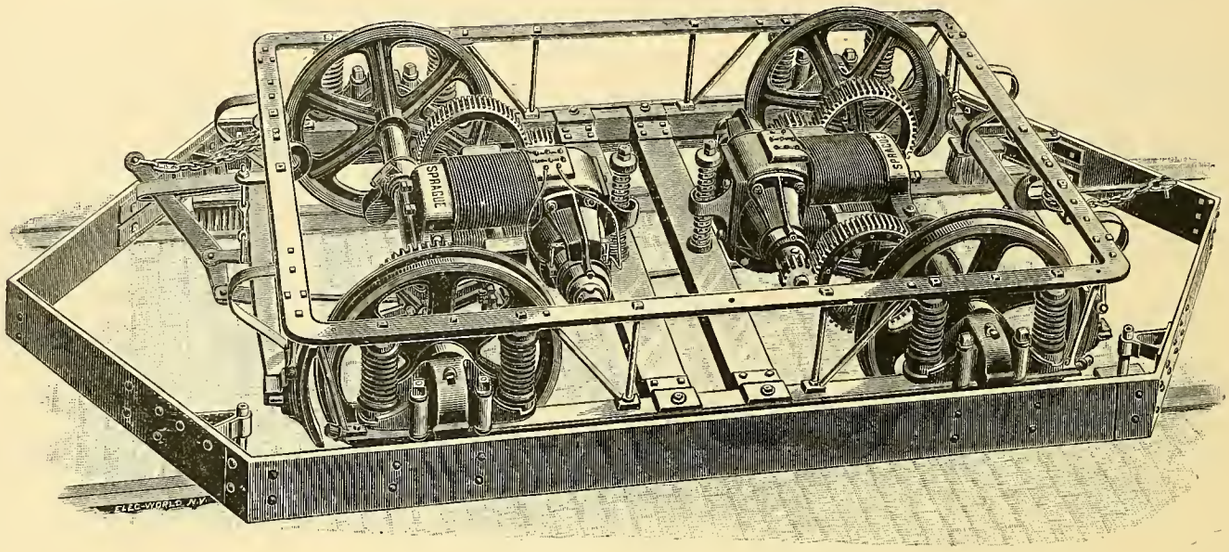
Complete plans for the viaduct by which the Milwaukee and Wauwatosa dummy line will cross the Menomonee Valley, have been prepared by Gustav Steinhagen, the civil engineer employed by the company, and the work of construction will be commenced in February. The viaduct will be 2,060 feet in length, and will be built entirely of iron. The superstructure will rest upon piers constructed of iron beams resting on a stone foundation, and will be wide enough for a double track. There is a great disparity between the estimated cost of this viaduct and the estimates for those which it was proposed to build at the city's expense, at various points in both the Menomonee and Milwaukee valleys. The city, it was calculated, could not build a viaduct across the Menomonee for less than $220,000, and from this amount the figures ranged upward very altitudinously, while the cost of the dummy line viaduct is not to exceed $60,000.

Sprague Electric Railway System

IS SUPERIOR TO ALL OTHERS FOR STREET RAILWAY WORK IN

DURABILITY AND RELIABILITY

AS WELL AS IN ALL OTHER POINTS OF GENERAL EXCELLENCE.



VIEW OF

SPRAGUE IMPROVED ELECTRIC MOTOR TRUCK

FOR STREET RAILWAY USE, SHOWING METHOD OF FLEXIBLE SUSPENDING MOTORS FOR BOTH DIRECTIONS OF DRIVING, ATTACHING MOTORS AND OTHER DETAILS OF ARRANGEMENT.

We have received from Mr. W. L. Allen, President of the Davenport Central Railway Co., the following *unsolicited testimonial* in regard to the *signal success* of that line, installed by the Sprague Electric Railway and Motor Company of New York, even under the most adverse conditions of weather.

Davenport Central Railway Co., Davenport, Ia., Jan. 9, '89.

Sprague Electric Railway and Motor Company, New York, N. Y.:

Gentlemen:

"We have had as bad a snow storm, as far as street railroading is concerned, as is usually encountered in this section of the country, which you know is subject to very heavy snow and ice storms. Our cars made the usual time, while the horse cars ran slowly on their lines on a practically level road, and could not attain any speed over a walk all day. We naturally feel jubilant over our grand success. The President of a prominent Iowa Street Railway Line was here to-day inspecting the system. He declared it was not possible to do with horses what we did with electricity to-day. As we telegraphed you, our citizens are jubilant over the grand success. The wind was very strong and blew the snow back on the tracks almost as fast as it was cleared off. The only difference that we could notice in the propulsion of the cars was that at our power plant it took about 50 per cent. more all day long to propel the cars. We would not have minded it had it taken 100 per cent. increase, we were so pleased at being able to satisfy ourselves and the public even in a blizzard.

When any railroad men are in doubt when you assert to them, as you did to us, that you can operate better in a snow or sleet storm than cars propelled by horses, refer them to us, and we will be only too pleased to verify your assertion."

Yours truly,

DAVENPORT CENTRAL RAILWAY CO.,

W. L. ALLEN, President.

It should be noted in this connection that the Davenport Central Railway Company have a grade of 7½ to 8 per cent., 16,000 feet long, upon their line.

Sprague Electric Railway and Motor Company,

16 AND 18 BROAD STREET, NEW YORK.

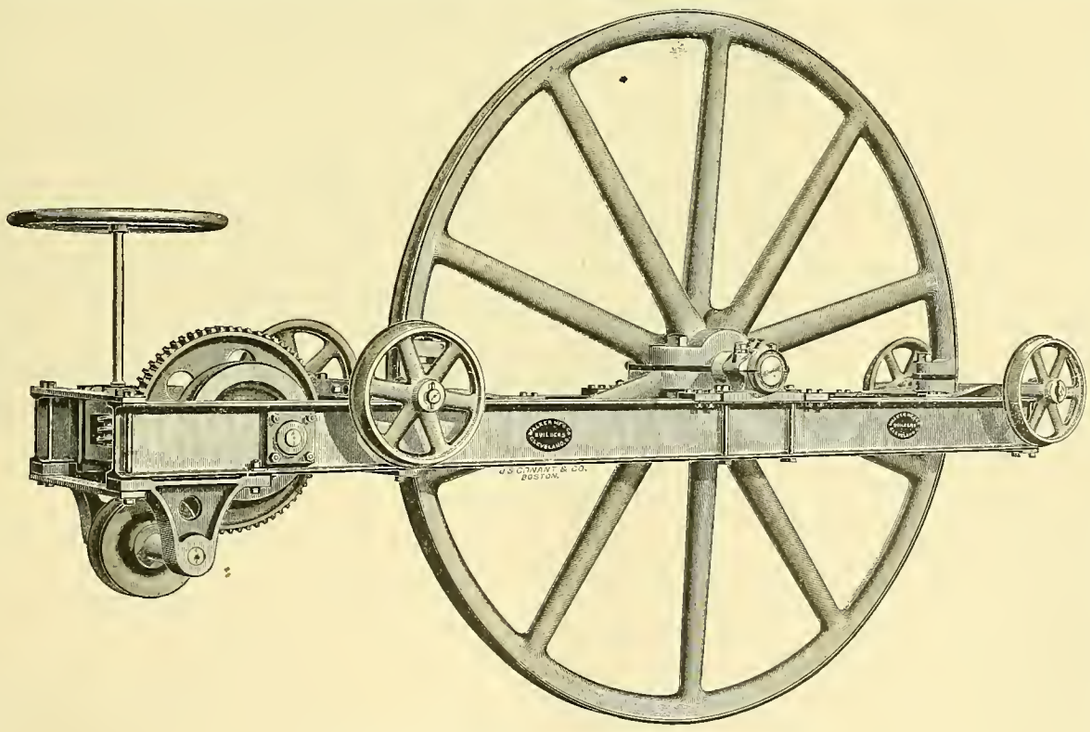
The Street Railway Gazette.

Vol. IV. Chicago MARCH, 1889. New York No. 3

New Tension Carriage with Staggered Arm Sheave.*

The frame-work of the tension carriage, as shown herein, consists of iron beams forming the sides of same, secured to the upper side of which are the axles on which the truck wheels revolve; these wheels are chilled on their outer faces, and are supplied with a series of anti-friction rollers within their bores, to facilitate their sensitive action. The large sheave over which the cable passes is made with staggered arms which adds rigidity. The chain connecting with the tension weights engages in a sprocket wheel, and an idler is placed below the chain, thus admitting of a contact of the chain on the sprocket wheel of one-half its circumference. The worm shaft on which the operating hand wheel is located, being carried in a slide in connection with eccentric, is readily engaged and dis-engaged.

These tension carriages have been supplied and are giving good satisfaction on the 5th St. Cable R.R., 12th St. Cable R. R., 18th St. Cable R.R., and Union Railway Co., of Kansas City, Mo., St. Louis Cable & Western Railway Co., St. Louis, Mo., Butte City St. R.R. Co., Montana, etc., and other cable roads have already placed their orders for this device.



New Tension Carriage with Staggered Arm Sheave.

Cincinnati Cable Roads.

A largely attended meeting was held on the evening of the 10th inst., at the Odeon, on Madison Pike, Cincinnati, Ohio, to take into consideration means for better facilities and more rapid transit from the city to Walnut Hills. Rufus B. Smith presided. He called for the report of the committee which had been appointed at a former meeting to wait upon the representatives of the Martin and Kerper cable lines. The report was read by M. C. Buxbaum, as follows:

"Your Committee, appointed at the previous meeting, held Tuesday evening, March 5th, for the purpose to obtain additional transit to and from Walnut Hills, leave to submit the following report:

"This Committee called upon Mr. Henry Martin, and he proposes to build a cable road from Highland avenue to Oak street, from there to Lane street, out Lane to Lincoln, and from Lincoln to Woodburn avenue, double track the entire way, to be completed in six months from the time proper permission is granted; special cars to be run on this route through from Fourth and Sycamore streets to Woodburn avenue, alternately with the Avondale cars, two minutes apart. This line is using now thirty (30) cars, and, if the proposed route is built, Mr. Martin proposes to double this number. This route is now being operated to Avondale and the Zoological Garden, and passengers, by the proposed route, can be transferred to either of the other divisions, either going north or south, for one fare of five cents, and while this proposed route is about a quarter of a mile longer from Fourth and Sycamore to Woodburn avenue than the Walnut Hills Cable road, Mr. Martin assured us that the trip could be made in thirty minutes. Mr. Martin further stated, that it is his intention, in course of time as the requirement may arise, to extend this line from Woodburn avenue in different directions. He also claims to have a cable on hand at all times in case of accident. Mr. Martin promised to be at this meeting and give any detailed information desired.

"Your Committee has had also a lengthy interview with Messrs. Kilgour and Kerper, of the Walnut Hills Cable Line. These gentlemen seem to be anxious to meet the requirements of their patrons on Walnut Hills, but did not seem inclined to give us anything positive, but preferred to state their case to this meeting personally; told us, however, of their intention to complete the McMillan branch by electric power to the Vine street cable, and the same system to be extended to Norwood, and promised to run on their present line six additional cars between the hours of 5.30 p.m. and 7 p.m.

"We can not see that the relief offered by Mr. Kerper will give us the increased and rapid transit facilities the fast increasing population of this part of the city requires; and, inasmuch as the residents of Walnut Hills can only be largely benefited by an additional cable line, we recommend that by this meeting it be—

"Resolved,—That the citizens of Walnut Hills recommend and urge the Board of Public Affairs and City Council to grant an extension of the Mt. Auburn Cable road to Walnut Hills over the streets, and on the conditions as proposed in the ordinance presented to said Board March 5, 1889, and that a committee be appointed to attend the next meeting of the Board of Public Affairs, and ask for the passage of said ordinance.

The following was read from Mr. Kerper by Ed. Barton.

"To the Citizens of Walnut Hills:

"It is due to the patrons of Walnut Hills lines, that they know what our company proposes to do to give them increased facilities to and from the city. We have been at work on this proposition for several years. We began, first by changing Route 10 into a cable line, and, after two year's work, we completed and equipped as good a cable line as is to be found in any city. It has been improved from time to time, and the experience of the past will enable us to get it in its operation as perfect as a cable line can be. The carrying capacity of this line is equal to minute and a half headway, which is equal to forty-five trains of two cars each.

"Our travel now is accommodated by two and a quarter minutes' headway, morning and evening, and five minutes at other hours. We propose to run evenings at one and a half minute's headway.

"In the morning, those who work go early, the clerks follow, and the shirks come last. In the evening, those who work, the clerks and the shirks, all rush home during the same hour, so that crowded cars will be the rule for an hour in the evening. This is the case in every city and every locality where large numbers of people live, and especially so in cases like ours where ninety-five per cent. is through travel. We are aware that, when one line is stopped, the other is not sufficiently capable of carrying the

* The Walker Manufacturing Co., Cleveland, O., U. S. A.

passengers, and we are, and have been for the past year, arranging to overcome this by making the Eden Park line a rapid transit line, equal to or of greater carrying capacity than the cable, and contracts are in progress to carry this into effect.

"We further propose, as provided in our ordinance, to carry out every project contemplated therein, to a speedy completion. The greatest need, next to placing of rapid transit on the Eden Park Line from the city to the hills, is to give a cross town line, so that we can send our patrons to Music Hall, and all the theaters in the city. This is provided for in our McMillan street extension, which will connect with the Vine Street Cable and with the Bellevue House Hill Line; extending eastwardly on McMillan street to the Madison pike, and on the Madison pike to O'Bryonville, and through same to the corporation line. In this extension we have the co-operation of the Cincinnati Street Railway Company, and patrons on either line will be transferred through at a single fare. We will also build from the C., W. & B. crossing, at Norwood, to Woodburn Avenue and Lincoln Avenue, and thence on Lincoln avenue to Elm, on Elm to McMillan, thence on Park avenue to Windsor street, to the Gilbert Avenue Driving Station.

"When this is completed the Park avenue line will be operated both ways on Gilbert avenue, and be extended to the corporation line on the Montgomery road. The Oak street branch will at the same time be operated through Eden Park to the city, without change. A station will be centrally located, and an electric plant of sufficient capacity to operate all these lines will be erected thereon. In addition, the Avondale lines on the Reading road, also the hill line from the Bellevue Incline, will be extended, via Clifton avenue, through Clifton, and both these lines will be operated through the same plant, thus uniting the northern suburbs from east to west in a complete belt with this city at Fountain Square. These are our plans as far as completed, and our good faith in the past must be our guarantee that they will be carried to completion as fast as a work of this magnitude can be. We claim that we have been on the alert to meet the demands of our patrons, and that we undertook the work of the cable construction when it was in its infancy, and when it was considered a doubtful undertaking.

"We completed it and added to its equipment every season, until we have expended over $600,000. We voluntarily reduced the rate of fare to five cents four years in advance of the time required by our ordinance.

"We advocated free men and established a precedent by which every man can work for whom he pleases, and, under the law, as defined by our Courts, every merchant, manufacturer and corporation of this city benefitted by it, as well as the thousands of workingmen they employ. The things that we have accomplished and pushed forward as pioneers have cost us thousands of dollars.

"We expect to be paid by the growth of the territory we have helped to develop, and we ask the support of the entire community for the work we have done, and in the work we propose to do. GEO. B. KERPER President."

Henry Martin, who was present, was called for and responded. He said he hoped there would be room for another cable line on Walnut Hills, and that the people would give him their aid to build one. He was willing to extend his line to Walnut Hills if the grant would be given him by the authorities. Mr. Martin was loudly applauded at his close.

Victor M. Abraham was the next speaker. He said that proper facilities for travel were needed, and needed right away. It had been demonstrated that no one line could accommodate the people. There was one sure thing that the citizens of Walnut Hills must remember, and that was the good things that Geo. B. Kerper had done for Walnut Hills. The late accidents on the cable line were unavoidable, and it was an annoyance to the people who were obliged to tramp long distances home.

Mr. Kerper, in his letter, has given his word that he would endeavor to see that there should be no repetition of the kind, and, judging from his actions in the past, there was no doubt but that he would keep his word. Granting that the proposed new lines are given Walnut Hills by Mr. Kerper's company, and that Mr. Martin will come over our way with his line, that is something we all will hail with pleasure; yet all these lines will not be sufficient to accommodate the fast growing population of this section of the city. The great trouble is that the growth of the hill is so great that it is going away ahead of the transit facilities.

R. C. Rohner said it looked like the meeting was organized in the interests of Mr. Martin as against the Kerper lines. He detailed how Mr. Kerper had to fight injunction after injunction when he proposed to build his line, and not one man in a hundred would have fought the council as he did, and his enterprise and pluck should merit the good will of the public.

M. C. Buxbaum, David Rice and others made short speeches, the tenor of which was that Mr. Kerper would not have made any statement to the meeting unless he thought that Mr. Martin meant business.

Alfred Hill made quite a lengthy speech, in which he earnestly urged that the meeting adopt the resolution offered by the committee.

Richard Rohner said it was evident to his mind many present, sore over the experience of the past fortnight, were blind to the fact that the present cable line had been in a great measure the means of causing the great and rapid growth of Walnut Hills. The meeting seemed to be run in the interest of the Martin company. If a resolution to council asking an extension of the Martin lines should be adopted, there should by all means be inserted in the resolution that the proposed extensions and new lines of which Mr. Kerper speaks be also granted a right of way and be recommended to council.

Victor Abraham offered an amendment to the resolution that the committee be also instructed to aid all in their power to secure for the Kerper lines the new routes and extensions proposed in Mr. Kerper's letter, and to use their influence with council and the board of public affairs to gain that end. The resolution as amended was unanimously carried. The chair was instructed to appoint a committee of nine persons, to be named by him at his leisure, and then the meeting adjourned, subject to the call of the chairman.

New Brush for Railway Motors.

The Thomson-Houston Electric Company, has recently made a great improvement in motor brushes by substituting for the copper brush one made of carbon.

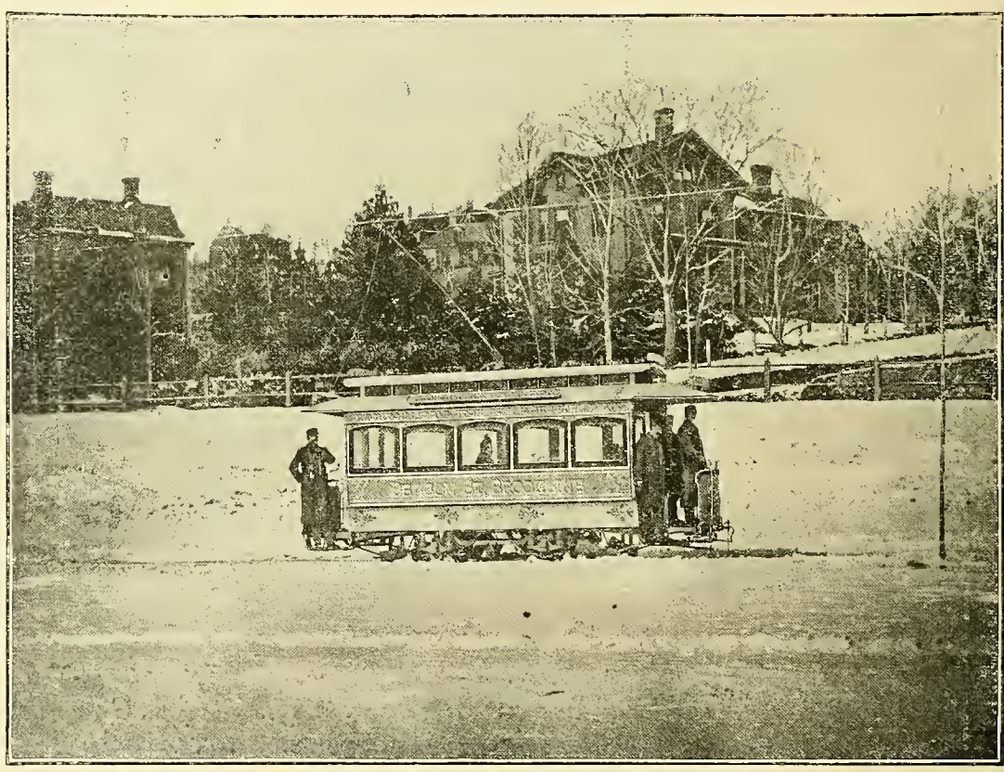
The copper brushes heretofore used are of original design, patented, and allow the armature to rotate in either direction with perfect freedom, and are always maintained at an even pressure upon the commutator. They have invariably produced excellent results, but the experiment made with the carbon brush led to the belief that it possessed points of superiority over the copper, which supposition has since been found to be correct. The carbon brushes are now in general use on all the railways using The Thomson-Houston System.

Reports regarding the brush indicate that it is of longer life than the copper brush and has a much better effect upon the commutator.

One report states: "The commutator is in good order, and the carbon has been worn less than $\frac{1}{32}$ of an inch after running seven days of sixteen hours each. I have another set which is doing equally as well." Another states: "I have not taken out any of the carbon brushes yet. They have been running for nineteen days in two cars." A later report from the same place states: "I have had one set of carbon brushes in car No. 1 twenty-seven days, and in that time the car made 557 round trips, and the brushes are good yet for several days. The commutator lasts longer with the carbon brush, and the carbon brush lasts longer than the copper one."

Another report says: "On Dec. 15th I put carbon brushes into motors on car No. 11. They ran well, causing no sparking at the commutators. They caused the commutator to present a very smooth, glazed surface, which was quite black. I used no oil or other lubricant. They ran eight days of eighteen hours each and covered an approximate total of 700 miles." A later one from the same place states: "On Dec. 31st I put carbon brushes into the car Nay Aug. These brushes worked well and have the same effect upon the commutator as those on car No. 11. They were in use from the 3d inst. to the 20th inst., sixteen days, and making an approximate mileage of 703 miles."

One of the latest reports states: "We have had brushes in use sixty-five days, during which time the car covered a distance of 4,300 miles." "We have had brushes in use forty-three days, in which the car ran twenty-nine hundred miles."



SPRAGUE OVERHEAD ELECTRIC RAILWAY IN BOSTON.

Sprague System in Boston.

The illustration which we publish this month of the West End Electric Railway (Sprague system), Boston, Mass., was taken from a photograph, and gives a very good idea of the general appearance of the cars in operation.

It represents one of the Sprague electric cars on Beacon street, as seen from the railway bridge of the Boston & Albany R. R.

On the Beacon Street Boulevard the electric road does not run in the street proper, but occupies an open space about thirty feet wide and running the whole length of the boulevard between the two roadways. This strip is grassed over and planted with trees throughout the entire distance, enabling the electric cars to attain a speed of fifteen miles an hour, since they are not delayed by other vehicles on the track. The road throughout the entire distance is lighted by electricity, using both the Arc and Edison Municipal system.

The road is equipped in a first class manner, using iron poles throughout the entire distance of the line, and these, in connection with the light and unobtrusive Sprague overhead system, make all the overhead work very inconspicuous.

Conduit Yokes.

HOW TO OBTAIN A MAXIMUM STRENGTH FOR A MINIMUM OF MATERIAL.

By J. B. Johnson, Am. Soc. C. E.

Professor of Civil Engineering, Washington University, St. Louis, Mo.

The purpose of a conduit yoke is to carry the bearing and slot rails, and to maintain the slot opening a constant width against all external forces coming upon it. For this latter purpose stiffness is even more important than strength, since a change of slot opening of over ¼ inch, either more or less than the normal amount, should not be tolerated. The maximum resistance to these small changes is, therefore, the real thing to be sought in designing a conduit yoke.

It has been the writer's privilege to test the strength and stiffness of many of the more common forms of cast iron yokes, at the testing laboratory of Washington University. His attention was very soon called to the great weakness, both as to strength and stiffness, of these designs, as compared to the amount of iron put into them. In seeking for the reason of this great weakness, he was led to the discovery that one of the fundamental principles of such a design had been neglected. That is to say, *the longitudinal shearing strains, along the neutral, or axial line of the yoke, had been but feebly resisted.*

When a conduit yoke is subjected to external forces, tending to close the slot opening, it acts as a beam, and is subjected to bending stress. But when there is bending stress in a beam, there is not only compression on the concave side and tension on the convex side of the bent beam, but there is always a large shear-

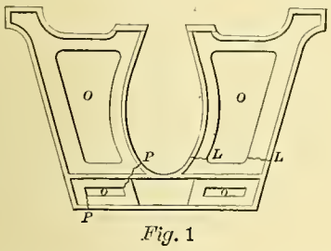


Fig. 1

ing strain along the neutral axis, which is zero at the center of the beam, and a maximum at the ends. This principle holds, not only for beams, but also for all bridge or roof trusses.

There are but two ways of overcoming these shearing stresses, and they are, either by making the web of the beam solid, or by tressing the yoke according to mathematical principles. For a cable yoke, made of cast iron, the former method is probably the most satisfactory. So we have plate girders and trussed bridges, either being competent to resist all the strains found in a beam.

All the ordinary forms of yokes are made of a tension flange around the outside, and a compression flange around the inner side, next to the conduit opening, and these flanges joined by radial spurs, or spokes, all cast in one piece. Although no engineer would think of building a bridge with a top cord, a bottom cord, and there joined by vertical posts, yet this is exactly what they have been doing in the matter of cable yokes, which are as much beams as a bridge truss is a beam. It is quite evident that such radial connections cannot act with much efficiency in resisting these shearing stresses, and the result is a weak and flexible frame.

If two planks be firmly bolted or spiked together and laid flatwise, their combined strength is four times the strength of one alone ; but if these planks be singly laid one upon the other, their combined strength is only twice the strength of one alone. Also if they be bolted together with high washers or blocks, to hold them apart, so that they can move slightly one upon the other longitudinally, then again they are only twice as strong as one alone. On the other hand, if they be separated by some distance, and so fastened together that they cannot move longitudinally one upon the other, then their combined strength is many times that of one alone, depending on the vertical distance between them.

So when we have inner and outer flanges in a conduit yoke (Fig. 3), joined by radial spurs which do allow a slight movement of one with reference to the other, along the line of their neutral axis, then we have but little more than the combined strength of the flanges, when acting separately, each as a beam.

If now the material in these spurs be made into a solid web, joining the exterior flanges, then this solid web does effectually prevent the relative movement of the flanges, and by so doing greatly increases both the strength and stiffness of the yoke. In fact, a solid web yoke, as

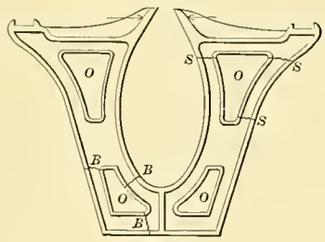


Fig. 2

shown in Fig. 4, has been shown to be *from 2 to 5 times as strong, and from 3 to 7 times as stiff as open web yokes having the same weight.*

The writer has tested more than twenty five full size cast iron cable yokes at his laboratory, of various patterns, with the following results, all loads applied at top, and all conduit openings 36 inches deep.

Yoke shown in Fig 1, weighing 320 pounds, breaks at 6,000 pounds, with a slot closure of 0.6 inches.

Yoke shown in Fig. 2, weighing 425 pounds, breaks at 9,000 pounds, with a slot closure of 1.2 inches.

Yoke shown in Fig. 3, weighing 360 pounds, breaks at 15,000 pounds, with a slot closure of 0.75 inches.

Yoke shown in Fig. 4, (solid web) weighing 350 pounds, breaks at 28,000 pounds, with a slot closure of 0.77 inches.

The same yoke, weighing 425 pounds, breaks at 40,000 pounds, with a slot closure of 0.77 inches.

To better illustrate the relative stiffness of these various designs of yokes, we give the loads which will deflect, or close the slot, 1-4 inch in each case.

RELATIVE STIFFNESS OF CONDUIT YOKES.

Design.	Weight	Load required to close slot opening ¼ inch.	Relative efficiency or resistance per lb. of metal.
1	320 lbs.	3,500 lbs.	11.0
2	425 "	4,500 "	10.6
3	360 "	6,000 "	16 7
4	350 "	10,500 "	30.0
4	425 "	16,000 "	37.7

All the tests given above were made on a 100,000 lb. Riehle testing machine, at the Washington University testing laboratory. The last column of the above table shows the relative efficiency of these various forms of yokes, in maintaining the slot opening. It shows the solid web yoke to be from 2 to 3 times as efficient per pound of metal, as the open form of yokes.

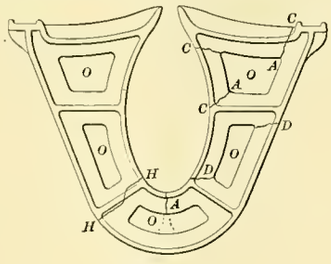


Fig. 3

Since these patterns are all equally successful in carrying the slot and side rails, and differ only in their ability to maintain the slot opening, and this ability varies directly with the stiffness of the yokes, is it too much to say that the value of a particular design increases directly as its rigidity ? If this be so, how much more valuable yoke No. 4 is, having the solid web, than any of the other forms, is evident.

Furthermore, if double or treble the strength and stiffness can be obtained for the same or even less material, why should it not be done ?

The metal in the 350 lbs. solid web yoke was composed of 70 per cent mill iron and 30 per cent No. 2 pig, treated with silica by the Mullins process, and cast by McMurray & Judge, of St. Louis. They are now filling a large contract on cable yokes, with this iron, at one and one half (1½) cents a pound. The tensile strength of the iron is 21,750 lbs. per square inch. At this rate this solid web yoke, having a strength of 28,000 lbs., would cost $5.25 delivered on the streets in Kansas City, from St. Louis.

An opening in the wide part of the web near the top is a cause of both weakness and flexibility. Thus in the form of yoke shown in Fig. 3, the addition of an inner rib, or flange, about the upper openings increased the strength of the yoke over 30 per cent. Before this interior rib was added the yoke broke across this opening, by cracks starting from the inside at the points *aa* in the figure. This showed clearly that the distortion of this upper quadrilateral form from shearing stress was the cause of the failure. Even after the interior flanges were added to all the openings in the web the rigidity of the yoke was only one half that of a solid web yoke of less weight.

The principle of the solid-web yoke is equally applicable to cable and electric conduits. The particular form or size of the conduit is a matter of indifference. The principle of effectually resisting the sheaving strains is the important matter.

A common objection to the solid web yoke is that it offers no opportunity to bond the concrete

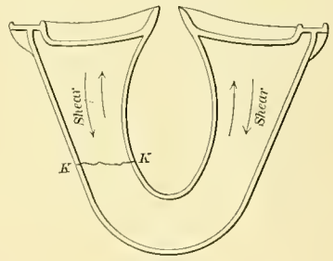


Fig. 4

through it. The necessity of this is not apparent. The concrete does bond itself around behind the yoke, and furthermore it is set in between the inner and outer flanges of adjacent yokes, like a tenon in a mortise, so that it is as rigidly attached to the yokes as though holes were left in the web. In case of excavations under the entire conduit it would be held up by the yokes quite as effectually as by any form of yoke now in use.

This solid web yoke is patented and the patent owned by the Mullins Silicated Iron and Steel Co., of St. Louis, Mo. The patent covers all yokes having a practically solid web, or one sufficiently solid to effectually resist the shearing strains.

Tramway Rails, Connections, Etc.

(A continuation of Mr. Nonnenberg's Questions and Answers he received. Continued from page 32 in February issue.)

Tramways de Dantzig.

A. We use the Haarmann system manufactured by the Georgs-Marien Hütten und Bergwerks Verein at Osnabruck. The weight is 15.9 kilos. per running metre of rail. Weight of system, 73 kilos. per running metre.

D. We have abandoned the use of flat rails. In the cases of short curves (15 metres) we use an exterior common rail.

E. The firm furnishing us material guarantees workmanship and material for five years.

F. We have used the Haarmann system since 1885.

Societe Allemande de Chemins de fer d intérêt local.

At Chemnitz, the ground upon which the rails are laid is very hard. Water frequently remains on the rails, with the result that a sharp frost will cause a forcing of the joints. Cleaning the track is very difficult as it is so narrow.

Tramways d' Erfurt.

We use the Haarmann system which has given good results. This style of rail we have used since 1883.

MM. Fischer-Dick, Chief Engineer, and Peiser, Engineer of the Berlin Grand Horse Street Railway company.

A. The system we principally employ is the Phœnix-Berlin, constructed with regard to the conditions of Berlin and recently perfected. We are now trying the Haarmann rail, of which type we have laid five kilometres on the most frequented streets.

The Phœnix rail weighs 42 kilos, Haarmann, 46.20 kilos; Phœnix system 90 kilos and Haarman system 98.50 kilos per running metre.

B. The Phœnix system adapts itself to any kind of road. The Haarmann rail gives best satisfaction in asphaltum and wood paving. The Phœnix rail is extraordinarily solid and fortified against a great resistance. The joint plates of the rails instead of being perpendicular are secured while describing an angle of 45 per cent. We find the best results from this, having commenced their use in 1881, and have been satisfied with the same ever since. In the Haarmann rail, which is really a double one, the joint for same is so fashioned that no jar can take place. Taking into consideration the great expense of repairs to joints in asphaltum and the paving with wood, it is even possible that the cross-tie rail, notwithstanding its high cost, being advantageously employed, may prove the best if it should come up to our expectations for solidity.

Roads can be cleaned easily on both systems.

C. Experience has shown us that to preserve the road bed the check rail should be wide and solid.

D. The exterior rail on curves is an ordinary rail of the system we employ.

E. The house of Laminoirs guarantee their material and workmanship for five years. During this period they will, at their own expense, replace defective rails and repave.

F. The Phœnix rails are in market since 1836. We have used them since 1886.

The rails laid on wood we have used since 1886, have passed two vigorous winters and remain intact. This system was subjected to 17 hours travel daily by our imperial, metropolitan and one horse cars, following in succession every 61 seconds.

Last summer we laid various sections of this system on asphaltum, wood, etc.

Tramways de Francfort.

A. The first rails used were laid on wooden foundation. Later we laid the Demerbe iron rail, succeeded by one of steel. In 1884 we ultimately adopted the Haarmann system.

B. This latter system gives satisfaction, being perfectly adapted to rectangular pavings such as we have. The joined parts are very good. The roadways can easily be kept clean.

C. The counter rail we find gives best satisfaction when of the same width as the rail.

D. We do not use flat rails in curves.

F. We have used our present system since 1884.

Tramways de Halle.

We have used the Haarmann system since 1882. The sleepers are made of flat iron, resting on the ground. The weight of the rail itself is 11.5 kilos.; the complete system weighing 56.9 kilos. per running metre. This rail gives perfect satisfaction. The counter rail is the same width as the rail itself. We do not use flat rails for exterior of curves, no special rails for interior of same. We do not impose any special conditions of guarantee upon our supply houses. Our rails are laid since 1882.

Tramways de Hambourg.

A. After having used and abandoned a number of systems we have adopted the Culin rails, which have the advantage that they are in one piece, and receive the weight of cars and passing teams directly on the road bed, without sleepers or cross pieces, and evenly at that. Weight 42.5 kilos. per running metre; system complete, 100.585 kilos.

B. These rails give perfect satisfaction. The joints are good and solid.

The road bed can be easily cleaned.

C. Our experience has shown that the counter-rail should be a little wider than the other.

D. We gave up the use of flat rails for exterior of curve about five years ago.

E. We exact a guarantee from our supply men as follows: A five years warranty as to quality of merchandise and workmanship. All rails proving defective during this period to be replaced by the contractors at their expense, or price of article and freight, etc., reimbursed. Furthermore, the manufacturers remit a draft for 3 per cent. of the purchase money, which is to be returned if the company is satisfied that the supply men have fulfilled their guarantees, after the five years before mentioned. Should the manufacturers fail to do this, the company has a right to deduct this amount from the first payment until that draft is remitted.

Tramways de Heidelberg.

A. We employ the Haarmann system.

B. In point of fact, the joints of the Phœnix system are easier to manage than the Haarmann. Otherwise they give the same satisfaction. Both systems allow the road to be easily cleaned.

D. No.

E. We exact a guarantee of one year from our supply men.

F. Since the construction of our road in 1885.

Cost being taken into consideration, we consider the Haarmann system as being superior to the Phœnix."

Tramways de Leipzig.

A. We have adopted the Haarmann system. Its height in the city is 180 mm., whereas in the outskirts it only measures 130 mm. The former weighs 17.70 kilos., the rail itself, and 78.60 kilos. complete, i. e., per running metre. The latter weighs 12.60 kilos. and 59 40 kilos. complete per running metre.

B. The roadbed, we find, packs snugly against these rails as well as evenly. This rail being of one piece adjusts itself well in macadam. The joints are strong, satisfactory and solid.

C. The rail and counter-rail are identical in width, hence rails can be laid either right or left.

D. We do not employ a flat rail for the exterior curve line. In curves of 25 to 30 metres we allow a spreading of 5 mm., and in a circle of from 35 to 50 metres, 3 mm. We make no allowances over 50 metres.

E. Our supply houses deliver a five year's guarantee, all condemned rails to be replaced by new ones at their sole expense.

F. We have used the Haarmann system since 1880.

Tramways de Lubeck.

A. We employ a modification of the system of rails employed in Paris, which are steel rails, laid on wooden foundations of a length of from 8 to 10 metres. Length of sleepers 6 to 9 metres, being injected with chloride of zinc. Joints secured by iron plates of a length of 15 centimetres. We have no crossings. The rails are also kept from spreading by iron cross-pieces 2.50 m. apart, secured to sleepers. The rail weighs 15.9 kilos. per running metre.

D. We do not use flat rails for the exterior of curves and do not modify for the spreading of the rails.

Tramways de Magdebourg.

A. On our horse tramway line we use the Phœnix system. On our steam car line outside of city we employ the Vignole type, laid on wooden sleepers. The former weighs 33½ kilos. and the latter 20.4 kilos. per running metre and respectively, complete, 76 and 45.2 kilos.

B. We are satisfied with the Vignole system. The Phœnix type, we find, makes too wide a gauge track for us.

C. Our counter-rail is only 10 mm. wide, while the rail itself is 40 mm. We do not suffer any inconvenience from this, however.

D. We do not employ flat rails for the exterior lines of our curves. For the spreading of the rails in curves we make an allowance of 5 mm. for the Vignole rails only.

F. We have employed both these systems since 1884.

Tramways de Munich.

A. We employ on all our lines the Hartwich system without sleepers, furnished by the "Bochumer Verein fur Bergbau und Gusstahlfabrication," the weight of which is 37 kilos. per running metre; complete system, 77.540 kilos. per running metre.

B. This system is easily laid and does admirable service when once put down, as regards adaptability to road bed.

As other roads in Germany have reported unfavorably in regard to the system which we have adopted, we would report our views as follows: The great objections are: 1st, that the rail is too wide and hence the pressure on the ballast is too great; 2nd, the rail will not permit of a clean, even surface where joined together.

A glance at our road will at once convince anyone that the latter claim is unfounded, as it proves so satisfactory as to leave nothing to be desired. In regard to the first we would say that the road being so well ballasted we failed to find the inconvenience which, they charge, would result from the wide rail, and we are at a loss to see where these disadvantages come in, that is, in our case.

C. The road bed is easily and thoroughly cleaned. Our counter-rail is broad.

We always believed that a feeble counter-rail riveted to the rail proper, presents many advantages, because the replacing of the check rail by another, by means of rivets, can be effected without any great expense, as well in curves as on straight road. In 1885 we tried this to our entire satisfaction, on a test road through Munich street, our most heavily traveled thoroughfare, where the rails were originally put down in 1877. Hence we do not consider it advisable to give an equal width to both rail and check rail.

D. For an exterior curve we use our common rail.

E. Our supply men are not subjected to any special conditions. The Bochumer Verein have spontaneously offered a guarantee for 3 years against bad materials, workmanship and breakage.

F. In 1877 we placed our first iron rails, only to be replaced in 1882 with steel ones. During the six years that we have used the Hartwich steel rails we have never been compelled to repair a connection on our road, and to-day the joints are as solid as when they were put down.

La Premiere Compagnie de Tramways de St. Petersbourg.

A. We use the Bazaine system. These are steel rails with iron connection and sleepers and crossings of wood. The running metre weighs 20½ kilos.; complete system 79 kilogrammes.

B. This rail is perfectly adapted to roadbeds of earth and wood, so that vehicles of all kinds can traverse our roads without fear of jars and sudden shocks. The feeblest portion of this rail is the jointing, which, in two years, began to show the effect of the vehicles passing over the road.

The braces began to weaken and break, the holes in the rails commenced to enlarge and the connections yielded to every motion of passing wagons. As the steel was first-class many years passed before we noticed a wearing of the heads of the rails. During the five months the rails are exposed to frost, they remain in perfect condition, that is if they are evened before winter. The road bed is easily cleaned, in summer as well as winter.

C. We have no independent check rail as the rail we use has its own, and as our curves are not large ones, the small circle being 35 metres, we use the same rail.

D. We do not have any flat rails as exterior lines, to curves.

E. As the rolling mill which furnishes our rails enjoys a first-class reputation and has always delivered us satisfactory material and workmanship we have not considered it necessary to impose upon them any special guarantees or conditions.

F. Since 1882.

Tramways de Stuttgart.

A. We have employed two rail systems:

1. The Hartwich and Haarmann rails.

B. The former has given satisfaction in ordinary road bed. We have never used it in asphal-

tum or wood-pavement. The latter rail seems to admit of being better joined together.

D. We do not use flat rails for outside curves.

E. We demand of our supply houses material of the very best quality, good workmanship according to specifications and correct weights.

F. The Hartwich and Haarmann systems were laid in 1868 and 1887 respectively.

La Societè des Tramways de Temeswàr.

A. The Laubat system resting on wood foundation, has been used on our road since 1869, the rail weighing 22 kilos. per running metre.

B. This rail is very satisfactory considering our bad streets and paving. In regard to joints, notwithstanding the precautions we have taken we must frequently repair them and renew the wooden rests. Our road is easily cleaned.

Tramways de Vienna.

A. We use several systems.

B. The two systems, with wood cross ties which we used up to 1877 were unsatisfactory because the rail was so narrow that the road bed could not be well packed without interfering with the tread of the wheel. To overcome this we then used rails with wider heads. These proved satisfactory on ordinary paved roads, but not so when wood paved where the rails, despite all exertions to securely anchor them with sleepers and cross-pieces, would work up above the road bed. This rail would do well in macadam. On asphaltum roads we have never tried it.

The Haarmann and Phœnix systems have given good satisfaction. The Heusinger von Waldegg and Haarmann rails were tested, but only in macadam. The joints in the Haarmann (twin rails) and Heusinger von Waldegg where the joints alternate in the rail and the check rail can be considered as satisfactory. The same verdict we think could be rendered in the case of the Phœnix rail but our limited experience would not warrant us giving a decided opinion on the matter.

Thanks to the use of salt, the cleaning of the road in winter has become an easy matter, barring the Haarmann rail, which, owing to its peculiar shape, is liable to be so clogged at the side with ice that the salt cannot penetrate, so that recourse must be had to a pick to remove the frozen matter.

D. Thus far we have not employed flat rails for outside curves, excepting in cases of less than 30 metres turns. In all cases where the curve is over 200 metres we make an allowance of 9 millimetres.

E. In our last purchases we have stipulated the following conditions: The manufacturer to guarantee the rails for six years. All rails and accessories which shall have been condemned, either for the inferior quality of material or workmanship, are to be replaced by new ones at sole expense of the rolling mill, on demand. If compliance is neglected for a period not to exceed five months, then the value of the rejected material to be deducted from the invoice and not paid for.

F. We have used the Phœnix and Haarmann rails since 1887.

Nouvelle Societè des Tramways de Vienna.

A. We use several systems. 1st. Rails on oak wood rests and ties. These rails are made of Bessemer steel and weigh 20.6 kilos. per current metre. 2d. Rails of the following systems: Vignole rail, weight. 14 kilos. with cross ties 775 mm. apart. Vignole rail, weight, 20 kilos. Hartwich rail, weight, 20.2 kilos. These rails have cross ties. 3d. Metal rails without sleepers. Haarmann system, weight respectively, 65.2 and 77.7 kilos. per complete system per running metre. Krauss system. This is a Hartwich rail of 26 kilos. per running metre. Its counter-rail weighs 10.4 kilos. per metre, complete weight, with check rail 82.6 kilos. per running metre.

B. On the paved streets of Vienna, which consist of granite cubes measuring 184 mm. high, the wooden foundation and Krauss systems are the best. The Haarmann and other types exact, on account of the great difference between the rails and the road bed, the need of paving specially adapted to them.

In macadam any style of rail will answer.

In regard to secure jointing, the rails on wood suffer most, especially those which are used with steam cars. The Haarmann rails, and rails with riveted check rails, have given the best of results. The cleaning of the road bed is satisfactory with all systems if regularly done. At all events the Haarmann system presents in winter the particular advantage that the salt thrown on the rails in snow and frost, works more efficaciously and hence more satisfactorily than by any other type.

D. In curves less than 30 metres we have tried flat rails for the exterior line but have been compelled to take them up again on account of the rapid wear and tear of the flanges of the wheels, especially those on locomotives. Now in short curves we use an ordinary rail to do the exterior duty.

E. We exact of our supply men a guarantee of from three to five years, during which they are to replace all rails condemned for lack of proper material or workmanship.

F. Our system of rails resting on wood is in vogue since 1882; the Hartwich type of 150 mm. in height and Vignole of 14 kilos. we have used for three years, the Vignole of 20 kilos. for only a period of two years however and the Hartwich-Krauss type of 200 mm. high since 1885. The rail laid on wood is not to be recommended, as it is bad for steam car travel. The all iron system can be recommended however on account of the facilities for keeping in good condition, for laying down in cities, for advantages of mechanical traction, as it can be laid on old soil where the height of the pavement corresponds to the height of the rail. Where these conditions do not exist however, preference should be given to a cross tie system.

Societè des Tramways de Zurich.

A. We have adopted the Phœnix rail.

In the laying of our first rails we used iron sleepers under the rails but without satisfaction. To overcome this we have the iron cross ties, especially in macadam, pass through the rails and screwed on the outside. This gives satisfaction and thus avoids any widening of the track.

B. This rail, when well made is good and gives perfect satisfaction in paving as well as macadam. The joints are comparatively good, although the connections are less perfect than those of the Haarmann system for instance. The cleaning of the road bed presents no difficulty.

C. No.

D. In our curves, where the bend is so low as 15 metres, we do not use flat rails. In large curves we do not allow for spreading as we do not see any reason to do so, as we use the ordinary rails.

E. We have never prescribed any special conditions of guarantee.

F. Our road was constructed in 1882, the Phœnix being the only system employed.

SIXTH QUESTION.

A. What system of brakes do you use? 1st for horse tramways; 2nd, for steam tramways?

B. What is your opinion of a continuous brake on steam tramways?

Tramways d' Aix la Chapelle et Borcette.

We employ the common hand brake and chain now in use on nearly every tramway line.

Société Anonyme des Tramways du Sud Anvers.

A. On our brakes we use cast iron shoes, which completely cover the profile of the wheel.

Tramways de Breslau.

Our line is using the ordinary hand and chain brake.

Les Tramways Bruxellois.

A. We use the ordinary chain brake on both our horse and electric lines, the blocks of which are fastened to cross pieces to guard against the wear and tear of wheels and to obtain as perfect a stoppage as possible we formerly employed wooden blocks in this connection. We were compelled to abandon them on cars passing over uneven roads, because, in wet weather notably, these blocks did not last very long, and we have replaced them with cast iron blocks, although we have some yet on cars running on even roads, as well as on electric cars. In the case of the former, the wear and tear is nominal, but in the latter, the cars being very clumsy, and covering a road which is hilly and generally hard on rolling stock, the question of security must be made paramount to that of economy, and it cannot be denied that the wooden brake is more satisfactory than that of cast iron.

Tramways de Cologne.

A. The chain brake generally used on tramways is the one we use, the blocks being of iron

B. As we have no steam line we have had no experience in steam tramway brakes.

Tramways de Danzeg.

This line employs the chain brake.

Société Allemande de Chemins de fer d' intérêt local.

A. Our horse cars are furnished with the ordinary chain brake. The steam cars are only partially using same and the greater part, and above all, the larger cars have a screw chain. All locomotives have lever brakes which are moved either by weight, hand, or foot power.

B. In regard to continuous brakes we cannot give an opinion as we have no data of our own experience. This much is certain, however, that they must present great advantages on lines of few stoppages. Although on the one hand this style of brake requires constant attention and represents a greater cost than that of the ordinary brake; still, on the other hand, the management of the brakes of the whole train is under the control of the engineer, and it is quite probable that the ordinary brakes on steam tramways will be superseded by them.

Tramways d' Erfurt.

We employ the ordinary tramway brake.

MM. Fischer, Dick, chief engineer, and Peiser, engineer of the Grand Berlin Street Railway company.

The cars of the Grand Berlin Street Railway company are supplied, without exception, with the Stephenson brake. We had formerly employed screw brakes on certain of our cars, but discontinued their use as they did not prove satisfactory.

The Stephenson brake, being so generally used, its description is here deemed unnecessary. We would only state that it offers great security, and is easily examined and kept in order.

Tramways de Franefort.

A. This road uses the ordinary chain brake.

Tramways de Halle.

We use, with success, the common chain brake.

Tramways de Hambourg.

A. Our horse tramways are controlled by the ordinary chain brake, the steam road having lever and hand brakes.

B. As the police regulations limit a train to two cars and a speed of 12 kilometres per hour within the city limits, and 16 kilos. outside, the need of a continuous brake is not necessary, and moreover, our locomotives are furnished with powerful and rapid brakes, and when necessary the return steam can be utilized. Generally speaking, we do not think that the employment of a continuous brake should be used, excepting on trains of over two cars which are not provided with special brakes.

Tramways de Heidelberg.

We only run a horse car line and employ the ordinary chain brake with four blocks.

Tramways de Leipzig.

On old styles of cars we use the screw brake, and the latest patterns are provided with the chain brake. We have no steam tramway.

Tramways de Lubeck.

This line is supplied with the ordinary brake.

Tramways de Magdebourg.

A. The ordinary chain brake is used by our horse cars. On our steam line we have adopted the screw brake. All our rolling stock has been furnished by MM. Herbrands et Cie. of Ehrenfeld, near Cologne.

B. We do not employ a continuous brake.

Tramways de Munich.

A. All our horse cars have the ordinary brake. On our steam line we are using for the past two months, a continuous vacuum brake of the Körting system of Hanover.

B. We consider the use of continuous brakes as being advantageous for steam tramways, and we can state that our engineers prefer the con-

tinuous brake. We are convinced that we will enjoy some good results from this style of brake when the imperfections, which are always to be found in new innovations, have been overcome.

La Premiere Compagne de Tramways de St. Petersbourg.

A. We use the ordinary hand brake, with blocks of cast iron.

Tramways de Stuttgart.

A. The screw brake we primarily employed has been replaced some time ago by the chain brake. This latter was furnished with the last one horse cars we ordered.

La Société des Tramways de Temeswar.

Our brakes are double acting and the blocks being of wood. We are very well satisfied.

Tramways de Vienne.

We use a screw brake.

With a view of closing the brakes more rapidly we are trying several systems making such claims, notably those of "Lössl-Gassebner," G. Weikum, and Seppert. We have no steam railway line.

Nouvelle Societé des Tramways de Vienne.

A. Our one horse cars are supplied with a chain brake. On all our other cars (both horse and steam) we use the screw brake, worked by traction in horse cars and compression in mixed and steam cars. We are now experimenting with the Steppert brake, an Austrian invention.

B. The employment of continuous trains result, all conditions being equal, in quicker stoppages, and a saving in the wear and tear on every wheel of the train.

In a technical view, when the security of an enterprise is considered, the continuous brakes should be employed where heavy trains pass over uneven surfaces, or much traveled streets, and let it be well understood, that all cars forming such a train should not be used separately, that is to say, not be propelled by horses.

In a financial point of view, we consider it well worthy of serious reflection before a consideration to apply continuous brakes is decided upon. We can state from experience that the expense of substituting the continuous for the ordinary brake is out of proportion to the advantage to be attained.

Societe de Tramways de Zurich.

A. We use the ordinary hand brake.

SEVENTH QUESTION.

A. Of how many cars do your trains generally consist? How many seats in each car? In busiest times what is the greatest number of cars entering into a train? By what circumstances (power of machinery, topography of line, police regulations, etc.) are the number of cars composing a train affected?

B. What employees do you generally have on a train (engineer, fireman, guards, conductors, brakemen, etc.?) How do you receipt for fares, and how do you manage your business as regards both public and employees.

C. What is the schedule speed of your trains? 1st, in the populated districts. 2nd, in the open country.

D. What is the average distance between two successive stoppages.

Tramways d' Aix la Chapelle et Barcette.

A. We do not make up any trains. Our cars will seat 14 passengers with room for 12 more outside, a total of 26.

B. The car is under the sole charge of the driver, the passengers depositing their fares in a fare box near him. We have no special control over the public.

D. We have no special stopping place.

Tramways de Breslau.

A. Each train consists of one car only. Our closed cars accommodate 14 passengers inside and 6 passengers on each outside platform, a total of 26, excluding driver and conductor. Our open cars have 28 seats and 3 places on each platform, a total of 34.

B. Every car is manned by a conductor and driver. The conductor receives the fare and remits to the passenger a numbered ticket (tickets are in rolls). For the facility of accounting, each ticket has a letter in addition. Upon leaving in the morning the conductor receives a new roll of coupons (changed daily) and the numbers of which to be detached are on his route report. The difference between what he receives and what he turns in he is responsible for, and must pay in. In handing a ticket to the passenger the conductor tears the upper left hand corner of a coupon. The office receiver tears off the upper right hand corner and places his seal on the way bill, to be used as a check in the office.

C. In populated districts the average speed of cars is 150 to 160 metres per minute, in open country, 160 to 200 metres per minute.

D In the city our stoppages are 120 to 140 metres distant, and outside, 160 to 200 metres. Local conditions determine the stoppages, etc.

Tramways de Danzig.

A. Our train is only composed of one car in accordance with police regulations. The "Imperial" two horse car will contain 18 seats inside, also 26 places "a l'imperiale" inside, and 12 places outside on the platforms, a total of 56 passenger capacity. The one horse cars will accommodate 16 inside and 12 outside passengers. One horse cars which only travel over the populated part of the city have a seating capacity for 12 passengers with standing room for 16 more.

B. Our cars are supplied with a conductor and driver. The former receives the fares and hands the passenger a coupon in receipt thereof. The tickets, in packages of 200, bear a serial letter and number, of different colors according to section traveled and the direction of same. The transfer tickets indicate all the lines which can be reached by them and the hours they are made use of. When the conductor delivers such a ticket he punches the hour and the lines transferred to. This ticket can be used within the first half hour after the ticket has been punched. To avoid the abuse of this transferring accommodation the conductor of the second car takes from the traveler the transfer he has first received and exchanges it for a new one. The transfer tickets, which should agree with those exchanged for, are sent to the management who are thus enabled to compile statistics as to the number of transfers delivered and the most patronized sections.

Inspectors verify whether the number of the coupons in the hands of passengers agree with those in the trip report of the conductor. At the end of each round trip the conductor will note on this paper the number of the first coupon to be detached when he leaves for another trip.

D. In the interior of the city, where the distances are short, we stop everywhere. Outside of same the average distances between two stoppages is about 400 metres.

Société Allemande de Chemins de fer d' intèrét local.

A. At Dortmund the steam car trains consist of three to five cars containing from 28 to 52 seats. Its make-up depends on the line and amount of traffic. The police regulations limit it to five cars. The power of our locomotives would permit our putting on heavier trains on a level road.

At Duisbourg trains are made up of three cars, seating 27 to 30 passengers, that being the police limit.

At Chemnitz and M. Gladbach we use horses as motive power.

B. Our employes are as follows: On the locomotive an engineer and fireman, when the condition of the road only allows short stops at the end of the line or when the road passes through crowded streets. When the trains are made up of three to five cars, as at Dortmund, a brake is manipulated on the last car.

Fares are receipted for with numbered coupons The conductor must record on each trip, on his trip register the first numbers to be detached on going out; and an inspector is then to verify if the coupons in the hands of passengers bear a higher number than has been put down by the conductor. The sale of a false coupon, that is to say one which has already been used, will cause the immediate discharge of the culpable employe and the forfeit of his surety bond. All return tickets are marked Z, otherwise all the tickets tear a letter to denote through which conductor's hands they have passed. The color of the tickets varies with the prices. Trips at equal rates have but one ticket which the conductor punches at the point indicated by same. The transfer tickets are punched a second time when the passenger enters the connecting car. The system of transfer makes the keeping of accounts very difficult.

C. In the interior of the city of Dortmund the maximum speed allowed on trains is 9 kilo metres per hour, outside city limits 12 kilos. hourly.

At Duisbourg we make 12 kilos. in the settled portions, but we cover 15 kilos. per hour in the country.

D. Stoppages depend upon locality, certain stoppages are obligatory, for instance, in front of large business houses, crossings, etc. These are generally from 3 to 500 metres distant.

Tramways d' Erfurt.

A. As we have horse cars, a train consists of but one car, seating 24 persons. In very busy times we have one car follow directly after another, using one horse on each.

Fares are received in a fare box, there being only a driver in charge, and to stimulate his vigilance we give him two per cent. of the daily receipts.

C. The average speed on our line is 143 metres. The public also exercises an interest, because, whenever a stranger or a person not conversant with the fare box system is dilatory in paying his fare, the other passengers do not fail to call his attention to that fact. We have no special stops, being at the disposal of the public which frequently takes advantage of this, causing a great wear on our horses. In view of this, we have under consideration, the establishing of certain halting stations.

Tramways de Halle.

We use one and two horse cars, the one horse car will seat 10 persons with room for 10 outside; the latter with room for 20 inside, and standing place for 10. The fare is deposited in a fare box. The driver, backed by the passengers themselves, looks out for the receipts. The average distance between two halts is about 300 metres, the public, however pays no attention to the distance rules in this regard.

Tramways de Hambourg.

A. Our train is composed of two cars. Our vehicles are two stories high and will seat 18, 20, or 22 persons, and 5 passengers can be accommodated on the platform. Each car represents 46, 50, or 54 places.

The above mentioned two cars form the maximum of our train, for the reason that our trains pass through very popular thoroughfares where the travel is greatly augmented from side streets. A longer train would only serve as an impediment to vehicles and foot passengers crossing over, and in fact, at every cross street its speed must be retarded. Again, the sudden stoppage of a train of greater length would be rather difficult without the employment of continuous brakes, because we generally use the locomotive brake and return pressure.

B. Our employes consist of an engineer, a fireman, and a conductor to each car. The fares are collected upon delivery of tickets which are numbered and bear the figures indicating the series. The numbers detached during this trip are recorded in a book at the end of the ride. The management of this branch is in the hands of special agents who enter the cars during the trip, and verify whether the coupons which the passengers have in their hands correspond to those the conductor has recorded. The coupons are printed on long bands of paper. These are rolled up and the roll thus formed is placed in a drum.

C. The trains run 12 kilos. in heart of the city, and 16 kilos. in the outskirts. We have no line in the country.

D. Our average stops are 200 metres apart.

Tramways de Heidelberg.

A. We have a horse car line. A one horse closed car will accommodate 12 seated passengers with 12 standing; an open one (one horse) contains room for 28 inside and 14 on the platform.

B. We employ a driver and conductor on our principal line. On secondary lines we only employ a driver who supervises the receipts by the fare box system. When the fare is received by the conductor he gives the passenger a coupon, the number of which can be verified by the trip register the conductor carries. We have a tariff for distances and transfer tickets. We issue commutation tickets at 33 1-3 discount

and annual tickets to ride on all our lines, which have a length of 3.5 kilometres, for which we charge 75 marks.

C and *D*. Apply exclusively to steam tramways.

Tramways de Lubeck.

Each car has room for 12 inside and 10 outside passengers.

Tramways de Magdebourg.

A. On our steam line each locomotive pulls two cars; the latter will accommodate 52 passengers, viz.: 36 inside and 16 on outside platforms, the number of cars and seating capacity being limited by police regulations.

B. Our employes consist of an engineer, fireman, conductor, who is also in charge of the brakes on one car, and a brakeman.

When travel is dull or average, the conductor sells coupons on the train, while in times of brisk business the passengers must procure them at places specially established for this purpose. The tickets are kept control of by the fact that they bear the number of the series, and the conductor, at the beginning of each trip, must note down on his trip register the number of the first ticket to be detached on that run. The special inspectors then investigate the cars to learn if all the passengers are furnished with coupons for their fares, and if their numbers agree with those of the car trip then made. By these vigilant means it is impossible for the conductor, as well as the passengers, to use the same ticket twice.

To accommodate our regular patrons we sell a series of twelve tickets with a discount of fifteen per cent. The conductor turns in the amount of money represented by tickets sold and the commutation tickets as well.

C. The usual speed of trains is: in the city, 220 m. per minute, and 350 m. in the country.

D. We have not stops on our steam line of 3.6 kilometres.

Tramways de Munich.

A. As a general thing, our trains are made up of two to three cars. Our closed car will seat 18 inside passengers, with room for 18 outside, whereas our open car will accommodate 24 inside and 18 outside. The greatest number of cars (allowed by police regulations) to a train is five.

B. When the train is composed of three cars the crew consists of an engineer, a brakeman and a conductor; if of four or five cars two conductors are employed. We are in hopes that the employment of a continuous brake will enable us to dispense with a brakeman. The money is received in the same manner as it is done on horse cars, the means employed being the same as reported you last year. We employ the ordinary system of tickets. The conductor collects the fare on the car and delivers the coupon. In regard to the tickets, we have them in two colors, one for going and the other for return respectively.

C. Our trains' record for speed is 10 to 12 kilometres hourly in the city, and 16 to 20 kilometres in the country.

D. The average distance between two successive halts is 500 to 1,000 m.

La Premiere Compagnie de St. Petersbourg.

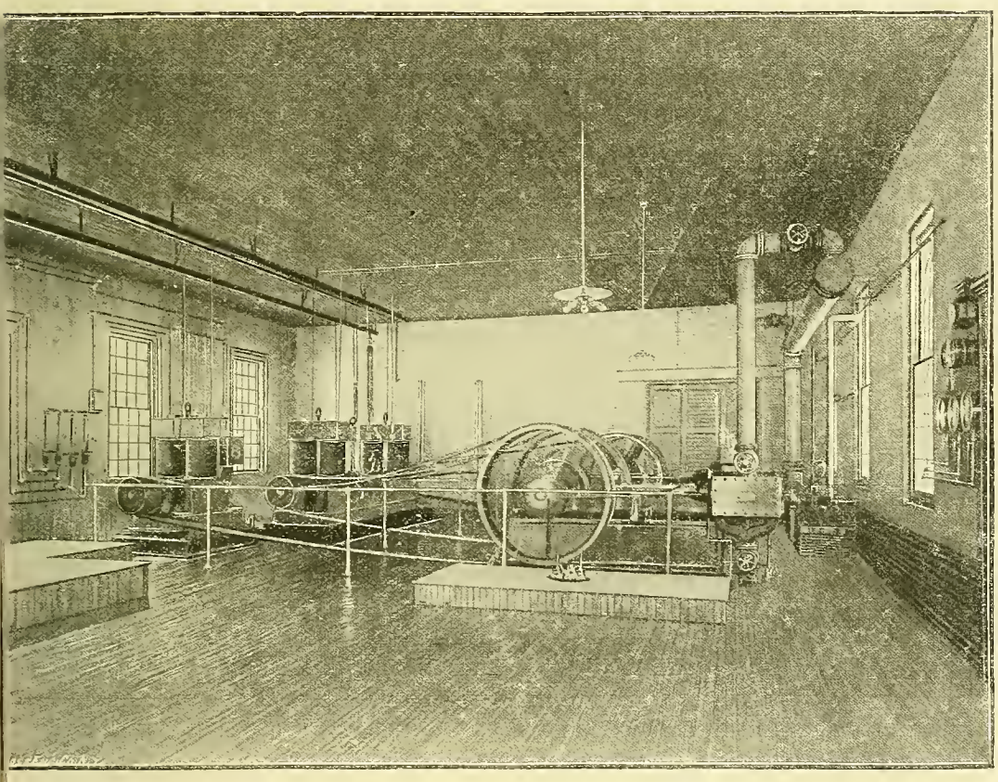
A. We only use horse cars in our enterprise. Properly speaking, we have no trains of cars, but as our line is single track and long distances between crossings, we have two or three cars follow in succession. Our cars have a capacity of 25 seats in summer and 23 in winter; the "imperial" will accommodate 24 passengers in summer and 22 in winter. On the rear platform there is standing room for four passengers, while on the front platform, where the driver is, we do not allow any, this platform being inclosed with portable wirework.

B. We allow each wagon two drivers and three conductors for two cars, hence one and one-half conductor per wagon. Each wagon, when by itself, has its driver and conductor. The fare is received by the conductor, who, upon receiving the money, gives to the passenger a corresponding coupon. For the management of same we have: 1st. For each line we have tickets of different colors as well as for first and second class tickets. 2d. Each ticket bears the number of the conductor. 3d. Each series of tickets (for example, line and conductor No. 50) commences annually with the ticket bearing number one. 4th. At each trip, before departure, the conductor exhibits on a frame with movable numbers secured on the inside of the car, the number of the ticket which will be first sold on the trip, so that each passenger can at a glance see if the ticket he receives is valid. 5th. On the lines there are constantly seven *controleurs* (on a road of eight and one-third kilometres) who enter the cars to verify the tickets sold and note the number of the next ticket on the conductor's trip register, which is in turn verified on the next morning by the ticket receiver and the directors' office.

C. The normal speed of our trains is 10 verstes (10.67 kilometres) per hour, but as we must slack up at many places and make many stops at crossings, the average can be put down at 8.5 verstes (9 kilometres) hourly.

D. The average distance between two successive stoppages is 270 sagenes (576 metres).

(To be continued)



Power Station, Sprague Electric Railway, Scranton, Pa.

Scranton Power Station.

A very complete electric power station for railway work is that belonging to the People's Electric Railway, Scranton Pa. of which we give an interior view.

This power station supplies power for twenty cars operating in Scranton, using the Sprague overhead system of electrical propulsion.

The dynamos, which are of the Edison type, are of 50,000 watts capacity each, and wound for a maximum electrical pressure of 500 volts. The power station is brilliantly lighted by electric lights from a number of handsome electroliers in groups of incandescent lamps, five in each group, being controlled by an independent switch at one end of the engine room.

Although it may seem incredible, it is stated, in regard to this station, that it costs less to supply electric power to the twenty cars in operation in this city upon a line in which there are many steep grades, than it would to keep one horse. The explanation for this given is that the power station of Scranton is very near to a pile of anthracite screens, or culm, as it is called, which may be had almost for the carting, and hence the item for fuel at this station is practically nil. The Sprague road at Scranton has been in operation now for about two months, and it is said to be giving satisfaction to the operating company, as well as the citizens of Scranton.

During the recent winter there were a number of severe storms in this city, but in spite of this the cars ran uninterruptedly, carrying large numbers of passengers without hitch or break-down.

New Cable Grip.*

In this grip, which is called by the inventors the "Un-reversible Cable Grip," there are two intermediate pinions, mounted on two radial arms, securely attached to an axle meshing into two outside discs. On one of these discs is a groove to receive the cable, which is brought into contact with it by means of two small sheaves operated by a compound lever attachment. Both discs are provided with band brakes, by the alternate operation of which, in connection with a single lever, the cars are moved either backward or forward, or brought to a stop.

The device appears to be simple in its construction, and is provided with a very compact arrangement of gearing. The inventors claim for their device the following advantages over the grips now in use on cable roads:

First. That it will enable cars to be moved both backward and forward on a single cable, by the movement of but one lever, the backward motion having the same speed as the forward.

Second. There is no wear on the cable, simply because there is no slipping of it when the car is going at a reduced speed, or when stopping and starting.

The third advantage is that cars can be run at either a high or a low rate of speed, without wear on the cable.

It will make it practicable for cables to be used on elevated roads in place of locomotives, because this grip has in itself the power to make the cars move in any direction that the locomotives can; and, moreover, it is capable of surmounting the steepest grades with perfect safety, the cable being at all times in the same position, not disturbed when the car is stopped or started.

This machine can be used to great advantage on an inclined plane, and on transfer cars carrying passengers, loaded wagons, horses; and street cars can be run up and down on the same track without reversing the cable.

Judging from reports recently received from Cincinnati, it would appear as though cable propulsion is still holding its own.

*T. W. Lemieux and S. G. Stevens, Duluth, Minn.

A. S. R. A.—Committees to Report.

The following letter from Secretary Richardson is self-explanatory:

BROOKLYN, N. Y., Feb. 16, 1889.

STREET RAILWAY GAZETTE.

Gentlemen.—I am pleased to send you the list of the committees to report at the next annual meeting of this association, to be held in Minneapolis, Minn. The subjects and committees are as follows:

"Street Railway Mutual Fire Insurance," C. C. Woodworth, Sec. Rochester City and Brighton R.R. Co., Rochester, N. Y.; R. Dudley Frayser, Sec. Memphis City Railway Co., Memphis, Tenn.; A. C. Moss, Sec and Treas. Sandusky Street R.R. Co., Sandusky, O.; C. Densmore Wyman, Vice-Pres. Central Park, North and East River Railroad Co., New York, N. Y; V. Cronyn, Pres. London Street R.R. Co., London, Ontario.

"A Street Railway Employees' Mutual Benefit Society," Henry Hurt, Pres. Washington and Georgetown Railroad Co., Washington, D. C.

"How can Public Sentiment be best Cultivated so that Corporations may Receive Equitable Treatment," G. Hilton Scribner, Pres. Central Park, North and East River R.R. Co., New York, N. Y.

"Street Railway Motors, other than Animal, Cable and Electric," Henry H. Windsor, Sec. Chicago City Ry. Co., Chicago, Ill.

"The Conditions Necessary to the Financial Success of Electricity as a Motive Power," Thomas C. Barr, Pres. People's Pass. Ry. Co. and Lombard and South Street Pass. Ry. Co., Philadelphia, Pa.

"The Food and Care of Horses," George G. Mulhern, Supt. Woodland Avenue and West Side Street Ry., Cleveland, O.

Sincerely yours,

WM. RICHARDSON, Sec.

Married.

WINTERS-CLEGG.

The marriage of Miss Helen Clegg, only daughter of Mr. C. B. Clegg, of Dayton, O., was solemized in Christ Episcopal church, Dayton, on the evening of February 28th. The Rev. Herbert J. Cook performed the ceremony — the full wedding and ring service of the Episcopal ritual.

Very sweet and very beautiful looked the bride, robed in a dress of white corded silk embroidered with pearl passementeries, and wearing diamonds and pearls—as, to the familiar strains of Wagner's masterpiece, the wedding march from Lohengrin, sung by the choir of the Third Street Presbyterian church—she, leaning on her father's arm, advanced towards the altar.

The appearance of the altar was beautiful in the extreme. To the right and left stood a large bronze and silver pillar, upon which rested candelabras, the radiance from which lighted up the altar, decorated with ascension lilies, tropical plants and myriads of bridal roses.

Over a thousand visitors witnessed the ceremony, and the bridal party left the church to the music of Mendelssohn's wedding march, played by the Metropolitan orchestra.

The reception was held at the residences of Mr. Clegg and Capt. E. Morgan Wood, a bridge, bright with bunting, connecting the two mansions. Over four hundred attended it, and long will they remember the events of that evening.

Among the many guests we recognized the familiar faces of Mr. John Kilgour and Albert G. Clark.

The presents were very numerous, and embraced, together with several checks for amounts varying from twenty-five to fifty thousand dollars, bric a-brac of rare value and exquisite design. The groom, Mr. Valentine Winters, Jr., is a handsome, intelligent-looking young man, and one of the best known young men in Dayton.

The newly married couple started at once for California, where Mr. Winters owns a ranch near Santa Barbara, and THE STREET RAILWAY GAZETTE trusts that its sincere good wishes for a life of unalloyed happiness may reach them in their far off home across the plains.

Electric Railway at Salem, Mass.

We present herewith a view of a Sprague electric car on the Naumkeag Street Railway of Salem, Mass., which connects that place with a neighboring summer resort "The Willows," and of which Mr. Charles F. Odell is president.

The view is taken from a photograph of one of the cars while in operation, and gives a good idea of the loads which these cars are obliged to carry upon pleasant days.

In spite of the heavy loads, however, it is stated that, during the season, the cars are run at a speed of from eight to ten miles an hour, and climb the steep grade upon the line with ease and speed.

This railway operates six cars over two miles of track. The regular Sprague system of overhead wiring is used, with small No. 6 wire as a working conductor. We understand that the directors of the road intend extending the line in the direction of Beverly in the spring.

These cars are equipped each with two Sprague motors of 7½-h. p., or an aggregate of 15-h. p. to the car. In spite of this small power capacity, which is only about half that used on a great many roads now being installed, it appears that the cars have handled and carried the heaviest of loads with ease, and have even hauled ordinary cars loaded to their fullest capacity, in addition to their own loads, up the steep grades upon this line.

NAUMKEAG STREET RAILWAY CO., SPRAGUE SYSTEM, SALEM.

At The Hub.

On the invitation of the Sprague Electric Railway and Motor company for an inspection of its electric railway system, nearly 100 gentlemen, mainly connected with the street railway systems of different New England cities, met in Boston last month. An informal lunch was served at the Thorndike Cafe and the party started in the four special cars which were in waiting, under the charge of Mr. Edward Blake, of the Sprague company. The run, which was to Allston, was leisurely taken, several stops being made, and ample opportunity given to inspect different points in the working of the cars. At the end of the route all alighted and made an inspection of the power shop and its dynamos, furnaces and equipments generally. The return trip was more quickly made, a speed of from 12 to 15 miles being here and there attained, the party reaching the Providence station shortly before 5 o'clock, feeling fully satisfied both with the trip and with the perfect operation of the Sprague system.

Thomson-Houston Electric Railway System.

The equipment of the Cambridge Division of the West End Street Railway, between Bowdoin Sq., Boston, and Harvard Sq., Cambridge, is now completed, and the cars are now operating on schedule time. Work on this line was commenced on November 20th. The construction presented some electrical problems of no mean difficulty, but these have been successfully solved. The most important of these was the drawbridge which necessitated some special construction in order that the opening of the draw should have no effect upon the operation of the cars on either side of it. The automatic switch which is used there is shown in the accompanying cut. The main circuit runs under the draw from side to side, through a special cable, which is joined to the overhead wires on each side, this making the circuit complete. Besides this an auxiliary cable is used for supplying the current on the short stretch of overhead wire on the draw which is independent of the shore wires. This cable is brought up to the center pier on which the drawbridge revolves, and is connected to one part of the automatic switch, which is stationary on the piers.

The work as laid out by the West End Railway company for the Thomson-Houston company to accomplish with their electrical cars, was to handle the entire North Avenue and Arlington business as it centered at Harvard Square, between that place and Bowdoin Square, Boston.

The business on this line is exceptionally heavy, in fact one of the heaviest in Cambridge.

The first car for Boston leaves Harvard Sq. at 6.10 a.m. and thereafter every 10 minutes until 6.10 in the evening, and from that time until 11.20, 15 minutes interval are made. This means a total of 93 round trips a day, per car. Beginning with the first trip on Saturday morning, Feb. 17th, but seven trips were lost. In view of the facts that the traffic was very heavy indeed, that it rained heavily in the afternoon, and that the drivers were unfamiliar with the cars, this record is certainly a remarkable one. On Sunday the regulation 72 trips were made without a miss. Monday, Tuesday and Wednesday, the regulation week day 93 round trips were made without a miss; and as everything is working there is no reason, after this date, why such a record should not be continued.

On some trips two hundred passengers are carried. The total number of passengers carried per day is in the neighborhood of seven thousand.

There was no little surprise and admiration manifested at the manner in which the car took its haul of more than 150 passengers up the 5½ per cent grade on Cambridge Street, and the ease with which the car was stopped and started upon it. Considering the fact that Cambridge Street is one of the most crowded thoroughfares in the city of Boston, being the main street over which all the Cambridge business from Boston travels, it is astonishing that such a record could be made, and it reflects the greatest of credit upon the engineering skill, and perfect working of the machinery of the Thomson-Houston company. Taking the performance of these motor cars for one day, as above stated, they made 93 round trips. On account of delays through the steam railroad crossing, or heavy teams, or the drawbridge being opened, on some days it was necessary to put out eight or nine cars at a time. On Monday, seven cars easily handled the entire business, making a total mileage of 604 miles; this is 86 miles per electric car per diem. If to this is added the same mileage of the tow car, a total car mileage was made of 172 miles to the agency of one electric motor car. Figuring on the average mileage that a horse makes per day, this shows that one electric car accomplished the work of 32 horses. Mr. Hapgood, the superintendent of the Cambridge Division of the West End road, stated that he would not want to agree to maintain, as a regular thing, the work done by these seven electric cars with less than 212 horses.

THE ELECTRIC RAILWAY IN CLEVELAND, SPRAGUE SYSTEM.

Third Ward Street Railway, Syracuse, New York.

The Third Ward Street Railway which was equipped by the Thomson-Houston Electric company, has been in operation since Nov. 29th 1888. This line comprises three miles of track with the necessary turnouts. It runs through Genesee street, the principal residence street of Syracuse, and terminates in the business center of the city.

There are nine curves on the line, three of which are reverse. Overhead construction has been used throughout the entire line.

At present there are eight cars in use, two equipped with two 15 h.p. Thomson-Houston motors, and six with two 10 h.p. each.

The station and car house are situated about a mile and a quarter from the center of the city, and directly on the line of the road.

The power plant consists of two 80 h.p. Thomson-Houston generators, two 80 h.p. Armington & Sims engines and boilers, having a total capacity of 250 h.p.

During a severe storm which visited Syracuse some time ago, the motor cars were the only ones to operate on schedule time. This road has run without a hitch of any kind since it was first started. Its patronage has greatly increased, and to-day is the most popular road in the city.

The following letter was received from the president of the road:

SYRACUSE, N. Y., Feb. 9th, 1889.

THOMSON-HOUSTON ELECTRIC CO, BOSTON.

Gentlemen—Our road being equipped with your system of electricity, was opened for traffic November 20th, 1888, and after having given it a thorough trial, to date, experiencing all kinds of weather (and some days most trying) we are pleased to be able to state, that we have not been to any expense for repairs or maintenance, of any important parts of the machinery, the minor mechanical difficulties that are liable to occur to all new apparatus of this nature have nearly all been overcome, and that we are greatly pleased with its workings.

We are now operating only about two miles of our road, running only five cars, each of them making about 80 miles per day, we can easily increase the mileage, and when we operate the entire length of our road, each car will make about 89 miles per day.

We have given a trial to both the copper and carbon brushes and are now using exclusively the carbon, as we consider them much more satisfactory, serviceable, and economical, preventing a large wear on the commutators.

The power which your electrical machinery has developed, and is capable of developing, is more than we had anticipated. During a severe snow and wind storm, when horse cars in this city could be run with great difficulty, and slowly, we were able to maintain our regular trips and speed.

In conclusion we would say, that after two months experience with this system, we are satisfied with this system of motive power and we congratulate ourselves that our cars are not propelled by horses, as we find the expense much less by electricity than by animal power, and gives greater satisfaction to the traveling public.

Yours truly,

(Signed) W. S. WALES,
President Third Ward Street Railway Co.

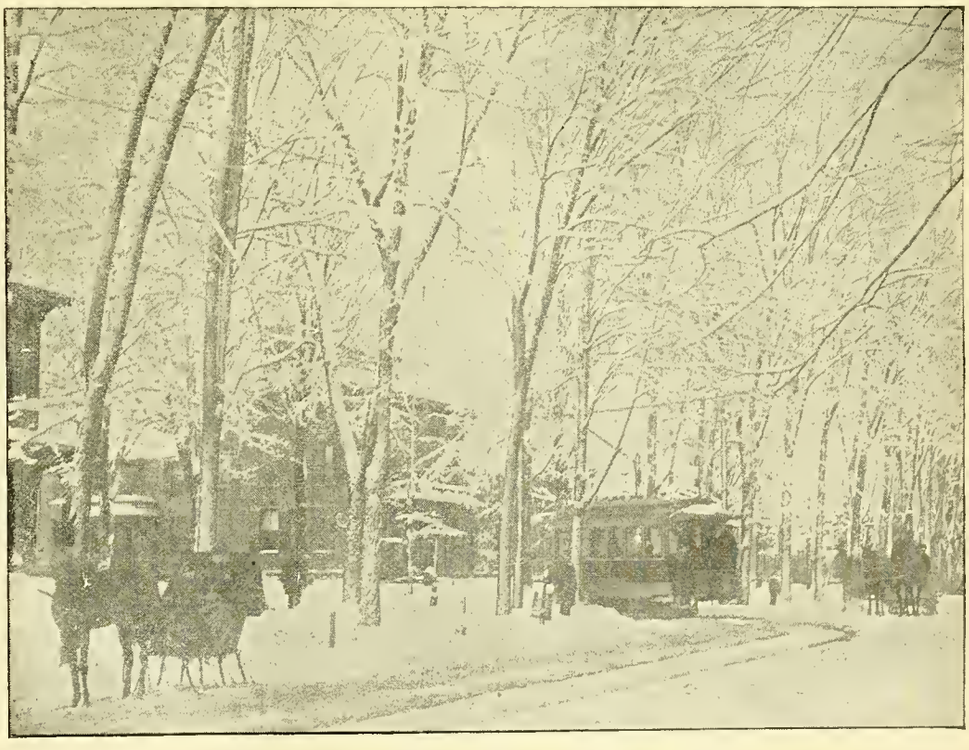
Electric Road at Cleveland, Ohio.

One of the latest electric railways in the country is that operated by the East Cleveland Street Railway company at Cleveland, O., upon the Sprague system, put into operation about a month ago.

We present in this issue a view on the road, showing one of the electric cars drawing a second car on Euclid Ave, which is one of the streets covered by the electric railway.

The equipment of this road is similar to that of the Sprague Electric Road in Boston, Mass. Iron poles are used and the overhead work is neat and unobtrusive. The power station for generating the necessary current is very complete. It is so arranged that its capacity can be quadrupled without changing the machinery.

In a snow storm which occurred in the city the tracks were covered over eight inches, and the horse railways delayed and only ran intermittently. The electric cars made regular trips, easily plowing their own way through the drifts.



THOMSON-HOUSTON ELECTRIC RAILWAY, SYRACUSE, N. Y.

The Street Railway Gazette.

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Articles and papers on subjects relating to intermural transit always appreciated; the GAZETTE's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways—surface, elevated or underground. A special space is devoted to the publication of business notes and items from manufacturers and dealers.

Special Announcements.

MR. E. V. CAVELL has assumed the editorial chair of THE STREET RAILWAY GAZETTE. Mr. Cavell needs no introduction to our friends and patrons. His long connection with the street railway publishing interests, wide and personal acquaintance with the trade, and his thorough knowledge of the business in all branches, warrant us in saying that, under his care, THE STREET RAILWAY GAZETTE will show a marked improvement.

THE STREET RAILWAY GAZETTE.
P. G. MONROE, President.

In consequence of the recent decease of the only son of Mr. P. G. Monroe, the President of this Company, correspondence has been somewhat neglected during the past month, and the GAZETTE, for that reason, begs the kindly indulgence of its patrons, as also for the lateness of the appearance of its March issue.

The opposition of the insurance interests to the extension of the overhead system of wires in the streets for electric railways, has been caused by a desire to determine under what conditions and to what extent the overhead conductor, in many cases of too large a diameter to be cut by the shears carried by the firemen, may necessitate an advance in the rates for insurance. As should be the case, the question has been discussed in all its bearings before the street railway committee of the Massachusetts Legislature. Prof. Houston, of the Thomson-Houston Electric company, testified to the fact that many of the Western Union wires in New York City, to which no one objects on the score of danger to life or property, are at 400 volts potential, while electric roads employ 500 volts, which is by no means dangerous. The quantity of the current traversing the wire, so the professor stated, has nothing whatever to do with the danger, for in welding by electricity as high as 50,000 amperes are used, but, as the voltage is very low, the tongue may be placed in the terminals of the machine without any danger whatever.

Overhead Wires.

Ever since the primary installation of the overhead system of electric railway propulsion, we have repeatedly read in the daily papers arguments against the adoption of the system, on account (as it was claimed) of the disfiguring of the streets, etc, by poles and wires; but time and experience appear to have at least modified this opinion, and now a paper, as influential as the Boston "Herald," in an editorial, admits that, "it is not improbable that, if the entire street railway system of a city like Boston could be run in a satisfactory manner by electricity, the substitution of this force for horses would go a long way towards settling for the time being, the problem of rapid transit." The article then goes on to show the advantages of the adoption of electricity, as to speed, safety, etc. It touches upon the alleged danger to firemen in using non-insulated shears when it becomes necessary to cut the overhead wires, and points out the fallacy of the popular idea of the danger, by stating that the current is of relatively low voltage (not exceeding 500 volts), and therefore, while some might receive an unpleasant shock therefrom, the life or health of the person through whom the current passed would be in no way endangered.

The tone of the article in question is a mild endorsement of the overhead system, and an advocacy of its adoption generally, or, at least, until such time as its advantages are outnumbered by some other system, more economical and equally practical.

Independent Motors.

While the present system of the electrical propulsion of street cars is, undoubtedly, a tremendous advance over the old form of animal or other traction, yet, from daily observation, we are constrained to believe that a large number of street railway men look to independent motors to solve the problem of motive power, as applicable to urban traffic. That the storage battery is yet a practical success, is to-day an open question; for while we believe it to be in successful operation in New York and other places, we have no evidence to show that it is such from a commercial or economical standpoint.

The overhead system, excellent as it undoubtedly is, cannot always be adopted, inasmuch as "citizens," knowing little or nothing about it—its value, its construction or its *modus operandi*, condemn it blindly, fearing the mystic current, and interposing objections on general principles.

The use of steam traction in cities presents so many evident drawbacks that its general adoption for that purpose is hardly within the range of possibility.

The idea of the independent motor is a very fascinating one, and barely a day passes but what it comes to our knowledge that experiments are being constantly made with hot air, compressed air, soda, petroleum or ammonia motors, and are being very closely watched by street railway managers, with a view to the adoption of the most practical.

We know of one prominent gentleman, at the head of an important system of railways, who when in New York lately, spent considerable time in investigating the merits of an independent motor. The company of which he is the president and ruling spirit, uses three distinct modes of traction—horse, cable and electric—if any or all of these were wholly satisfactory, the thought suggests itself, "Why does he still want something different?

Imperfect Detective Service.

That the present system of "spotting," or street railway detective service is crude, unreliable and wholly unsatisfactory, is a pretty well established fact, and the formation of a detective bureau for the protection of street railway companies may possibly furnish food for thought and discussion, if not action at the next convention of the American Street Railway Association.

To judge from the number of new electrical enterprises in the street railway field, it looks as though the general adoption of electrical propulsion of street cars is liable to be adopted in the near future.

Henry Root vs. Third Ave. Railway Co.

A case of great interest to railroads using the cable system as a motive power has recently been decided by Judge Wallace in the United States Circuit Court at New York. This suit was brought by Henry Root against The Third Avenue Railroad company for alleged infringement by the use, in its cable road at New York, of the Root cable system. The case was argued in December last by George Harding, of Philadelphia, on behalf of Root, and Messrs. Frost & Coe, of New York, on behalf of the defendant company, and was decided on the 5th of February last in favor of the defendant.

Root claimed in his patent a new conduit or cable way which consisted substantially of iron-ribs or yokes so constructed as to tie together both rails of the track on which the cars ran in such a manner that neither track could be displaced relatively to the other. The iron ribs or yokes were also to be imbedded and rest upon a foundation of concrete, so that when the concrete hardened all the parts of the device were combined in a solid, rigid, continuous structure, no part of which could be displaced without the whole structure being disturbed.

In this way the patentee claimed to form the whole construction into what, using his phrase, he called a "monolithic" structure, providing a smooth, uniform and continuous cable-way and constituting a great advance in the art of cable roads. The device was first adopted by the California Street R.R. company of San Francisco, then by the Market Street system in the same city, and subsequently by the Chicago City R.R. company and has since, as is claimed, gone into general use.

It is thus seen that the case was one of great magnitude in the interests involved, as, if the patent could be sustained, it is obviously of great value. On the other hand, if it had been decided that the Third Avenue company had infringed, a perpetual injunction would have issued against the road, which would have compelled an entire reconstruction of the road-bed, and thus entailed a very serious loss to the company and a complete interruption in the operation of the road.

In all cases of this character it has to be shown by affirmative evidence that the use of the invention was actually, and in fact, experimental, in order to have its use for over two years justified, without jeopardizing the validity of the patents, and it appeared that the complainant could not show that the public use to which he had put his invention was experimental, inasmuch as the evidence went to show that he built the road in which his invention was embodied (the California Street Railroad in San Francisco); had it in regular operation four years prior to the granting to him of his letters patent; that he built the road for other persons and received his price for so doing; that the road cost $418,000 to construct, to which he contributed nothing, and that it was operated for pay from the beginning.

The company urged various defenses, such as non-infringement, anticipation and justification under the state of the art in cable roads, but their main defense and the point on which Judge Wallace decided the case in their favor was that of public use of the patented device. By our patent statutes if the patented device has been in public use or on sale for more than two years prior to the application for the patent, no valid patent can be obtained. There are, however, decisions of the Supreme court which hold that where, from the nature and character of the structure, it is necessary in order to test it to ascertain its practicability to actually put the structure in use and such test can only be made in public, the patentee is excepted from the limitation of the statute and may have a period, sometimes lasting years beyond the limit fixed by the statute, to test his invention in public. Thus in the celebrated Nicholson pavement case, Nicholson did not apply for his patent for five years or more after he had laid down a section of his proposed road in a public street, and his patent was sustained.

So too, it has been held in a more recent case that the *mere fact* that the article has been sold more than two years prior to the application for a patent does not necessarily invalidate the patent.

But in these and similar cases the burden of proof is always on the patentee to prove that the use in public was actually and in fact made in good faith simply for the purpose of testing the invention and for no other purpose, and if the device was sold that such sale was merely an incident of such experimental public use.

Root had delayed applying for his patent for nearly three years and a half after his structure went into public use, and the question at issue, on which a large amount of testimony was taken, was whether the facts in the case justified this delay.

Judge Wallace judged that they did not, and therefore decided in favor of the defendant company. This short history of the case and the points involved will, we believe, enable the reader to intelligently appreciate Judge Wallace's decision, which we find in another column.

A Lost Case.

Up to the time that Mr. Chas. Cleminshaw assumed the management of the Troy & Lansingburgh RR., the amount paid annually by the company for casualties, by reason of the gross carelessness of the car drivers, had reached a sum so appalling, that Mr. Cleminshaw saw that something had to be done without delay, to at least, reduce the amount. He, accordingly created a rule, whereby every driver was held responsible for all damage done to his car, or to other vehicles where blame could rightly be attributed to him. The result proved the wisdom of the rule: barely an accident occurring for a long time. One day, however, through the most culpable neglect of all reasonable precautions the driver of one of the cars collided with a carriage, damaging it to such an extent that $50.00 was required to repair it. The driver was advanced the necessary amount by the paymaster, with the understanding that he was to repay same by instalments from his weekly salary. This he did, and shortly after the last instalment had been paid, he repeated the same thing, whereupon he was discharged from the company's employ. A few weeks after his discharge he brought suit against the company to recover the amount ($50.00) he had reimbursed the company for the previous disaster. The suit came before a justice of the peace in Cohoes, and was decided against the R.R. Co. Appeal was had to the county court, whereupon, the decision of the lower court was reversed, and a verdict rendered for the R.R. Co. The plaintiff then took the case to General Term, where, after considerable arguments, pro and con, the decision of the county court was reversed, and that of the justice sustained.

The company profited by its experience and amended the rule so that all drivers are now "personally and individually" responsible for all accidents, without any financial aid from the Co.

As we go to press, news reaches us that the United States Circuit Court for the Southern District of New York has just rendered a decision in the case of the Electrical Accumulator Company vs. The Julien Electric Company for infringement of storage battery patents. The Electrical Accumulator Company sued the defendant on four patents. One patent, the complainant abandoned during the trial; two others are decided to be invalid. Two claims only of the fourth patent were in controversy. One of these claims, it was held, the defendant does not infringe; the other claim the court holds is invalid as it stands, and can only be sustained when limited by a disclaimer to a device which the defendant does not use.

The Thomson-Houston Electric company has just been awarded a contract for the equipment of the electric railway from Rochester, N. Y., to Charlotte. The contract is to be completed by the 1st of June. There will be sixteen cars, eight of which will be closed and eight open. The seats will face one way, with an aisle in the center. Each car will be equipped with two 15-h. p. Thomson-Houston motors, and will be lighted by five electric lamps. The power station will be located near the Central railroad crossing and will be equipped with two 100-h. p. engines and two 80-h. p. Thomson-Houston generators.

Important Decision.

U. S. Circuit Court,

SOUTHERN DISTRICT OF NEW YORK.

Root vs. The 3rd Av. R.R. Co. } *Decision of Judge Wallace.*

The complainant sues for infringement of Letters Patent granted to him August 1, 1882, (No. 262,162) for "an improvement in the construction of cable railroads." His application for the patent was filed September 3, 1881.

The California Street Railroad, a cable railway in the city of San Francisco, was built by the patentee, completed and went into regular operation prior to April 11, 1878, and as constructed embodied the invention described in the patent in suit. The defendants insist that this is a public use of the patented invention more than two years prior to the patentee's application for his patent and consequently invalidates the patent. The complainant contends that this was an experimental use of the invention, and that the application was filed within two years after the patentee became satisfied that the invention was a practical success.

It is conceded that the road as built embodied the invention of the patent, that Mr. Root had complete charge of the construction of the road and built it for the projectors, and that it has been operated ever since April, 1878, as built without any changes or modifications in plan or details. The evidence is, that in the early part of 1876 the projectors obtained a franchise to lay and operate a cable railway in California street, one of the public thoroughfares of the city of San Francisco. In the expectation of being employed as the consulting engineer to build the road, the complainant investigated the subject of cable roads and matured the invention in controversy between May and September, 1876. In September, 1876, he disclosed the invention to the projectors; between that time and January, 1877, made a model of it; and in February, 1877, laid down an experimental section of the cable railway, embodying the invention, in the yard of the Central Pacific Railway Company in San Francisco. His invention was adopted by the projectors, and work was commenced upon the structure in July, 1877. The road cost, with the equipment, $418,000. It was about two miles in length, and the road bed and tunnel construction cost about $225,000. From April 9, 1878, the structure has been in regular successful use as a street railway, carrying passengers for pay. Up to the time when the complainant made application for the patent in suit and until 1883 the complainant was superintendent of the road.

In explanation of his delay in making the application for patent, the complainant testifies that he did not wish to patent the invention if the structure proved weak or undesirable; and he did not feel sufficiently certain of the durability and general practicability until the year 1881; that there was no way but by trial in a public street, through a long period of time, to determine to what extent the moving of cars and the street traffic over a rail connected to iron work, without the intervention of any wood, would effect the durability of the structure, or to what extent changes of temperature and the effect of water and rust, would tend to separate the iron work from the concrete in which it was imbedded; and that while he believed there was more than an even chance of its proving a durable and desirable structure he had some doubts in his own mind, and was influenced also by the doubts expressed by others in whose judgment he had confidence. He admits that he never expressed these doubts to the projectors, either while discussing with them the features of his invention, or while the road was being built, or while he remained its superintendent and after it was completed. In answer to a question whether he had any doubts of the durability of the structure after the road was completed, he states that in the Spring of 1879, while making an extension of the railway some parts of the structure were exposed, and he then saw some indications of the loosening of the yokes in the concrete, and "had some little fear at that time" that trouble might arise in this respect.

Manifestly the complainant received a consideration for devising and consenting to the use of an invention which was designed to be a complete, permanent structure, which was to cost a large sum of money, and which he knew would not meet the expectation of those who had employed him unless it should prove to be in all respects a practically operative and reasonably durable one. If he had entertained any serious doubts of its adequacy for the purpose for which it was intended it would seem that he would not have recommended it in view of the considerable sum it was to cost. At all events, he did not treat it as an experimental thing, but allowed it to be appropriated as a complete and perfect invention, fit to be used practically, and just as it was, until it should wear out or until it should demonstrate its own unsuitableness. He turned it over to the owners without reserving any future control over it, and knowing that except as a subordinate he would not be permitted to make any changes in it by way of experiment; and at the time he had no present expectation of making any material changes in it. He never made or suggested a change in it after it went into use, and never made an examination with a view of seeing whether it was defective or could be improved in any particular.

In Smith & Griggs Manufacturing Co. *vs.* Sprague (123 U. S. 249), it was held that when it is clearly established that there was a public use of the invention by the inventor, or for more than two years prior to his application for a patent for it, the burden is on him to show by convincing proof that the use was not a public use in the sense of the statute, but that it was for the purpose of perfecting an incomplete invention by tests and experiments. And in defining the distinction between a public and an experimental use, the Court in that case used the following language: "A use by the inventor for the purpose of testing the machine, in order by experiment to devise additional means for perfecting the success of its operation, is admissible; and where, as an incident to such use, the product of its operation is disposed of by sale, such profit from its use does not change its character, but where its use is mainly for the purpose of trade and profit; and the experiment is merely incidental to that, the principal and not the incident must give character to the use. The thing implied as excepted out of the prohibition of the statute is a use which may be properly characterized as substantially for the purposes of experiment. Where the substantial use is not for that purpose, but is otherwise public, and for more than two years prior to the application, it comes within the prohibition."

Tested by the rule thus stated, the proofs do not show a use substantially for experiment, but show such a public use of the invention as must defeat the patent. The facts are in marked contrast with those in the case of the Elizabeth *vs.* Pavement Co., 97 U. S. 126. There the use was solely for experiment. In the language of the opinion in that case, "Nicholson wished to experiment his pavement. He believed it to be a good thing, but he was not sure; and the only mode in which he could test it was to place a specimen of it in a public roadway. He did this at his own expense, and with the consent of the owners of the road. He wanted to know whether his pavement would stand and whether it would resist decay. Its character for durability could not be ascertained without its being subjected to use for a considerable time. He subjected it to such use, in good faith, for the simple purpose of ascertaining whether it was what he claimed it to be."

A decree ordered, dismissing bill with costs.

Inexperienced Gripman.

An engineer writing to the Chicago *News*, says: "I would state a few plain facts, as a marine and locomotive engineer of twenty-eight years' experience. I claim to know the requirements of a man that has to handle a combination of levers attached to a marine or locomotive engine. The gripman (as you call him on the cable cars) has to exercise more acute judgment of distance, speed, handling levers, track obstruction in one day on the grip car than a locomotive engineer would in a month; yet no one connected with the railroad would think of putting a man of five or fourteen days' experience on a locomotive to make a run. The fact of the matter is, it is a miracle that there are not more accidents."

Tramways of the United Kingdom in 1887-8.

"SOME THOROUGHLY SUCCESSFULLY MECHANICAL MOTOR" WANTED.

In England tramway cars must not attempt to carry more than a stipulated number of passengers at a time; while the street cars of the United States have always "room for one more." But the chief hindrance to success over there, according to *The Railway Record* (London), is the want of a better motor. It says:

In the year ending June 30, only 18 miles were added to the tramway system of the United Kingdom. It is, indeed, strange that with so many advantages over railways, tramways have not secured a higher place in the confidence of investors. Until, however, some thoroughly successfully mechanical motor can be generally approved and adopted, by which the present high rate of working, averaging 78 per cent. for the United Kingdom, can be reduced, no great change in this respect can be expected. It is, however, but fair to state that within the past few years there has been a considerable increase in the number of motors in use, the total having risen from 207 in 1884 to 484 in 1887, and 514 last year. A more costly type has apparently been adopted latterly, the average price per locomotive having risen from £576 in 1884 to £667 in 1887, and £686 in the last returns. Cars of a more expensive type have also been bought, the price averaging now £188, or £22 more than four years ago. The paid up capital of the tramway companies of this country now amounts to £13,691,000, or equal to £15,144 per mile. On this amount the companies earned only £620,865 of net profit, or equal to about 4½ per cent., which is about ¼ per cent. higher than the corresponding return secured by the railway companies for 1887. It must, however, be remembered that the paid up capital of the railway companies is equal to £41,600 per mile, as compared with £15,144, as above stated, for the tramway companies. Of the total paid up 73 per cent. is share capital, and 27 per cent. consists of loans and debentures, the proportions in the case of our railways being 75 per cent. of shares, and 25 per cent. of debenture capital.

On tramways open for traffic, the outlay is equal to £11,614, which is £347 higher than in 1887, whilst the falling off in the building of extensions is suggested by the fact that the capital spent on lines still in course of construction was in June last only £44, against £71 per mile at the corresponding period of the previous year. An unsatisfactory feature of the return is the heavy increase in legal and Parliamentary expenses charged to capital. That the total should increase each year was, of course, to be expected, but that the rate per mile should have risen, from only £730 in 1884 to £807 last year, is not at all satisfactory, this item being a most unprofitable burden on net receipts. Taking the total expenditure, we find that whilst in 1885 the capital outlay was equal to £14,613, the figure last year was £15,194 per mile, the increase being to a large extent accounted for by the greater strength and solidity required in the lines now being built for locomotives. It will be noticed that the cost of horses has fallen from £32 in 1884 to £31 in 1887, and £30 last year. This is due, no doubt, to the depression in agriculture which has caused many farmers to part with horses which in better times they would not have sold.

The following table summarises the capital accounts of the tramways of the United Kingdom for the years ending June, 1888, 1887, 1884:

	1888.	1887.	1884.
Length of lines	904	886	752
Capital authorized—Shares	£13,080,469	£12,656,799	£11,689,000
" " per mile	14,469	14,286	15,500
Loans and debentures	5,303,385	5,246,111	4,561,000
" " per mile	5,865	5,921	6,100
TOTAL AUTHORIZED	18,383,854	17,902,910	16,250,000
" " per mile	18,383	20,207	21,600
Capital paid up—Shares	9,958,040	9,375,950	8,114,000
" " per mile	11,015	10,593	10,800
Loans and debentures	3,732,624	3,531,430	2,894 000
" " per mile	4,129	3,986	3,800
TOTAL PAID UP	13,690,664	12,907,380	11,008,000
" " per mile	15,144	14,569	14,600
Capital expended on lines open	10,499,093	9,982,918	8,173,000
" " " per mile	11,614	11,267	10.868
Lines construc ing	39,841	63,280	355,000
" " per mile	44	71	47
On horses	787,455	781,808	663,000
" per horse	30	31	32
On locomotives	352,741	323,056	119,000
" " per locomotive	686	667	576
Cars	658 117	639,054	505,000
" per car	188	187	166
Legal and Parliamentary	729,756	705,880	549,000
" " per mile	807	797	730
Other expenses	668,882	627,697	620,000
" per mile	740	708	824
TOTAL CAPITAL EXPENDED	13,735,685	13,123,723	10,990,000
" " per mile	15,194	14,812	14,613
Number of horses	25,832	25,501	21,784
Number of locomotives	514	484	207
Number of cars	3,501	3,494	3,038

In comparing the results of the working of the tramways for the year ending June last with the corresponding returns of the previous twelve months, it must be remembered that in the latter period the companies secured a considerable amount of traffic in connection with the jubilee celebrations, and also that the weather in 1887 was exceptionally fine, whilst the first six months of 1888 were exceptionally wet and cold. These circumstances explain the fact that, whilst in the last year the mileage increased by eighteen miles, the passenger receipts were £11,400 less. In the other three sources of revenue—viz.: parcels and mails, animals and goods, and miscellaneous items, there is an improvement, so that the total receipts are only £6,000 less. Whilst the receipts have thus been lower, the heavy snowstorms which occurred in the early part of 1888 and the higher price of fodder for the horses have increased the expenditure by £33,000—the rate of working being seventy-eight against seventy-six per cent.—leaving the net receipts £39,000 below those of the previous year, and lower than those of 1885. The receipts and expenses for the past two years and 1885 are summarized in the following table:

	1888.	1887.	1885
Miles open	904	886	811
RECEIPTS—Passengers	£2,701.002	£2,712,455	£2,540,895
" " per mile	2,988	3,062	3,133
" Parcels and mails	12,720	11,796	4,986
" " per mile	14	13	6
" Animals and goods	9,552	8,596	7,545
" " per mile	11	10	9
" All other sources	73.025	69,477	60,012
" " per mile	80	78	74
" Total	2,796,299	2 802,324	2,618,408
" " per mile	3,091	3,163	3,222
EXPENDITURE	2,175 434	2,142,402	1,975,579
" per cent.	78	76	76
" per mile	2,406	2,418	2,436
NET RECEIPTS	620,865	659,922	637,339
" per mile	687	745	786
" per cent.	22	24	24

On the twenty-five leading systems there are only eight which earn over £100,000, the North Metropolitan heading the list with £364,000, or equal to £8.600 per mile. The London Tramways company secured £266,000, or £14,026 per mile, this return per mile being the best reported. The London Street Tramway company comes next in regard to mileage receipts with £9,162, although its total revenue is below that of several other lines. Outside the metropolis, the largest revenues reported are £251,000, or £6,132 per mile, by the Liverpool Corporation system; £232,000, or £3,800 per mile, by the Manchester Carriage company; £212,000, or £7,270 per mile, by the Glasgow Corporation; £16,000, or £3,519 per mile, by the Dublin United, and £101,000, or £3,872 per mile, by the Birmingham Central. The rate of working, it will be seen from the subjoined figures, varies considerably with the local conditions:—

	Mileage.		Gross receipts. Amount.		Gross receipts. Per mile.		Net receipts per mile.		Expenses per cent.	
	1888	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.	1887.
Belfast	15	15	£50 536		£3,369		£1,013	£ 896	68	72
Birkenhead	8	8	11,448		1,431		12	141	99	92
Birmingham Central	26¼	26¼	100,660		3,872		1,016	750	74	82
Cardiff	6	6	2,541		8,590		208	267	94	90
Dublin United	33	33	116,127		3,519		802	955	77	74
Edinburgh Street	18	18	86,304		4,795		1,700	1,915	66	62
Glasgow Corporation	30	30	212,133		7,270		1,285	1,409	82	79
Gateshead & District	6½	6½	8,681		1,417		479	287	67	78
Hull Street	9¼	9¼	16,491		1,832		158	243	91	87
Leeds	14¾	14¾	43,719		3,123		775	741	75	75
Leicester	8¾	8¾	29,618		3,294		530	883	84	84
Liverpool Corporation	41¼	41¼	251,430		6,132		1,864	1,825	78	78
London	19½	19½	266,502		14,026		3,978	3,094	79	77
London Street	12	12	109,943		9,162		1,318	1,841	86	78
Manchester Bury	3¾	3¾	33,864		999		129	113	89	89
Manchester Carriage	61	61	232,697		3,815		977	908	74	75
North London	10	10	15,436		1,543		249	249	84	84
North Metropolitan	40¼	40¼	345,881		8,647		2 341	2,197	78	78
North Stafford	7	7	15,733		2,247		824	915	63	56
Nottingham	10½	10½	25,493		2,549		502	405	80	84
Portsmouth	12	12	35,150		2,929		174	4	94	100
South Stafford	22¾	22¾	19,217		873		109	143	87	82
Sunderland	6¼	6¼	11,132		1,855		598	950	68	64
Vale of Clyde			15,332		2,176		628	648	71	73

1889 promises more street railway construction than was ever yet undertaken.

OBITUARY.

WALTER A. JONES.

Once more the STREET RAILWAY GAZETTE has the sad duty to perform in recording the death of another well known street railway man, one who, but recently joined the great majority, one whose life was indeed an active one; whose name was almost a household world in the busy marts of commerce; whose life was devoted to the furthering of the interests in which he was enlisted, and o'er whose cold body we fain would exclaim, "Pax vobiscum."

Walter A. Jones, born about 40 years ago, in the then village of Troy, when his childhood days had passed, became a student of the Fort Edward Institute. When only 15 years of age the dangers that threatened his country impelled him to forsake his educational career to enlist in its service. He served as bugler in Company K, 20th N. Y. Cavalry, of the Army of the James, attached to Kautz's cavalry division, and upon more than one occasion took an active part in its engagements. At the close of the war Mr. Jones resumed his collegiate course at Fort Edward, and there graduated with distinction. He then entered the employ of the car works that his father was conducting, where his excellent judgment and business ability soon manifested themselves to such an extent that, in the winter of '79, branch shops were established in Schenectady, which, eventually, became a stock company with him as president, as often happens in notable enterprises, business became very dull after a few years, and the constant reverses of fortune necessitated a discontinuance of operations. However, with but small loss of time, the operation of the works in West Troy was resumed, with the building of street cars, and the same has continued steadily ever since.

Mr. Jones was a man of excellent character; an acquaintance once made with him soon ripened into friendship. He was persevering and ambitious. Obstacles that would have deterred older and more experienced men seemed, with him, to act as an incentive to push forward the more. Few men had attained the distinction that was his in a short lifetime. His death will cause a void in the circle of energetic young business men of the country that will be marked for a long time to come. His disposition was cordial to all men; to his kindred and friends he was endeared by gentle love that predominates in a heart of true affection that singles out the true from the false with a desire to do equal justice to every one. Mr. Jones is survived by a wife and two brothers, Richard W. of San Francisco, and John H. of West Troy. The latter paid unremitting attention to his afflicted brother during his illness, rendering all possible aid in the hope of prolonging his life. Mr. Jones was a member of Post Kane, G. A. R., and in matters pertaining to the veterans' interest was much devoted. He represented the post in the state encampment, and could have received numerous honors from his comrades, but business demands for his time and a natural inclination to avoid the prominence of public life, caused him to decline many favors offered. It is, indeed, with unfeigned regret that we realize that Walter Jones has passed away from us all, and his death will cause a gap in the ranks of the members' delegates to the annual conventions of the Am. St. Ry. Assn., that will be hard to fill.

FRANK S. PARROTT.

MR. FRANK S. PARROTT, of the Parrott Varnish Company, of Bridgeport, Conn., and a prominent member of social and mercantile circles in that city, died of pneumonia at the home of his father on the 30th of January. He was in his 29th year, unmarried, and gave every promise of rising to prominence in the business world. He held the rank of colonel upon the staff of Governor Bulkeley, and the funeral services upon the 2d of last month were attended by the governor and entire staff and a very large number of personal friends and associates.

Old England, slow as a rule to take up anything out of the ordinary routine, is now fully alive to the fact that rapid transit pays.

Street Railway News.

DOMESTIC.

ALABAMA.

Jacksonville—An important meeting of the stockholders of the Jacksonville Mining and Manufacturing company was held here Feb. 12 to ratify the action of the board of directors in their donation of one-fourth the lots of said company for the building of a dummy line from Jacksonville to Anniston. After thoroughly discussing the cost and the benefits to be derived from such a contribution, the stockholders, by a unanimous vote, ratified the action of the board of directors, and thus offer a contribution of 160 acres of valuable real estate inside the incorporate limits of Jacksonville toward the building of the dummy line from Jacksonville to Anniston. This is a liberal contribution on the part of this company, and it is now believed that Jacksonville and Anniston will soon be brought much closer together.

Selma—The street railway and dummy line here is to have four cars and a new engine added to its present equipment.

CALIFORNIA.

San Diego—Mr. Geo. W. Howard, late superintendent of the San Diego street car company and the San Diego and Coronado ferry company, was recently presented with a beautiful solitaire diamond ring by his late employees, and his wife, Mrs. Howard, with a beautiful gold bracelet set with diamonds, as a souvenir of their regard for him.

San Francisco—Theodore Meetz has petitioned for a franchise for a street railway on Park street, between Santa Clara and Encinal avenues. It is the extension of a road for which a franchise has already been granted.

The franchise for a cable road on Fourteenth street, from Washington to Clay street, Clay to Eighth, and Eighth to Washington, has been approved.

Mayor Pond has vetoed the Pine street cable franchise bill.

The Omnibus Railroad Co. is building the cable line on Post street. The excavation for the engine house on Broderick street, between Fell and Oak has begun.

The California Street Cable Railroad company has installed in its building, corner of California and Larkin streets, an electric light plant consisting of a Westinghouse Jr. engine of 10 h. p. running 400 revolutions, which drives a Ball dynamo 1600 revolutions, capable of furnishing 150 lights of 16 candles power. They have 10 stationary lamps outside and 45 inside the building, besides two lamps of 100 candle power each, which are movable, for repairing cable, etc., on the roadway, using 75′ of wire.

Los Angeles—The barn of the Kuhrts horse car line was burned down Feb. 15; loss estimated at $2,000.

When the Los Angeles cable system is completed according to articles of incorporation, it will have 65 miles of track laid.

National City—The street car line here is becoming a paying investment.

COLORADO.

Denver—A big real estate deal has been consummated here, involving a sum of over $350,000, with $40,000 additional for the building of a rapid transit line. Messrs. Moore, J. G. Benklem, S. F. Butters, C. J. Sage, E. R. Barton, O. R. Burchard, Merritt and Groumand, J. B. Shepard and others are interested. Construction on the line will be commenced at once.

Work will be at once commenced on the cable line on Sixteenth, Seventeenth and Larimer streets, extensions of the city cable company. Contracts for the construction have been awarded to Christie & Lowe, of Omaha, and James Sillis, of Kansas City. The road is to be ready for operation within the next five months. The company will furnish all of the material used in the construction.

We understand that the University Street Railway company's line, which is to leave the cable line at Alameda avenue and South Broadway, and run east and thence south to University Park, will probably adopt the Sprague electric system.

The proposed extension of the branch of the Denver Tramway company's cable system two miles south from Alameda avenue, was lately made a certainty by the signature of the necessary papers by W. G. Evans, secretary of the company. The fare will be 5 cents to or from any portion of the line in the business center of the city.

The Denver City Cable Railway company has let its contracts for the engines and machinery which it proposes to use in operating its lines in this city. Babcock, Wilcox & Co., of New York, have received the contract for the boiler, which is of huge dimensions and known as the Walker tubular non-explosive boiler. It will be placed in three batteries, with smoke consuming, fireproof settings. A large brick smoke stack will be erected, 170 feet high. Two engines of the Wright pattern will be used, having jointly a 1,200 to 1,400 H. P. The driving machinery comes from Poole & Hunt, now Robert Poole & Son, Baltimore, Maryland, and has the capacity to accommodate six cable lines. It is supplied with overhanging drums, which is an appliance in connection with the friction clutches, enabling any one cable line to be stopped separately without interfering with the balance. The company has begun distributing materials in the shape of rails and yokes, and expect to begin laying the tracks in two weeks from date. The foundation for the power house is completed; the carpenters have already begun the wood work. The brick work will be started next week. The contracts call for the completion of the entire plant by June 1. The street contracts are to be finished August 1.

The work of extending the company's lines on Champa, Stout and California streets is progressing rapidly, notwithstanding the frozen condition of the ground. The Champa street line to Grant avenue on Nineteenth street will be ready for the cars in a few days, and work on the Stout and California street lines has progressed as far east as Twenty-sixth street. The force of men employed in the work has lately been largely increased, and it is expected to have all the lines ready for travel within the next ten days. The company's horse car line on California street is now completed as far east as Downing avenue, and cars running thereon. The cars on the Welton street line will then be taken off, and work begun upon the construction of the Denver City Cable company's cable line, which it is now definitely settled will be extended east on Twenty-ninth avenue for a considerable distance—probably as far as Cook's addition, at least.

DISTRICT COLUMBIA.

Washington—The report of the receipts and disbursements of the Washington and Georgetown Railroad company for the year 1887, was laid before the House yesterday. The receipts were $651,322.61, which, together with $29,616.35 coming over from the preceding year, makes a total of $680,938.96. The disbursements were $590,946.36, leaving a balance Dec. 31, 1887, of $89,992.57. The law incorporating the road requires an annual report to Congress.

GEORGIA.

Covington—The annual meeting of the Covington and Oxford Street Railroad was held Feb. 13, all of the stock except fifteen shares being represented.

The report of the board of directors developed the following facts, to-wit: The line from here to the Georgia railroad depot was opened for passenger travel July 9, 1888, and for the transportation of freight, September 4, 1888; and the line from the depot to Oxford was opened for passenger travel October 8, 1888, and for the transportation of freight January 1, 1889. The gross receipts have been nearly twice as much as the operating expenses of the road, and the net earnings amount to $804.95. As the road has been in operation only seven months, if it continues its present rate of earnings it will net over 10 per cent. on the cost of construction, which was $15,940.00. The following officers were elected for the ensuing year, to-wit: President, W. C. Clark, board of directors, J. M. Pace, D. A. Thompson, J. A. Stewart, J. F. Henderson, J. T. Corley, J. W. Brown and Morgan Callaway.

Macon—The New York syndicate has not yet decided whether or not to buy the Macon street railway and dummy line and consolidate the two roads. The syndicate offered Major Brandsford, of Nashville, $65,000 for the street railway, but he would only give an option at $85,000, a price the syndicate considered too high, though it may yet agree to the figures. If the consolidation is not made, the dummy line company will bond its road and make decided improvements and extend the line.

ILLINOIS.

Joliet—The stockholders of the Reynolds & Henry Construction Co. have elected the following officers: President, Jacob A. Henry; vice-president and general manager, Benjamin Reynolds; secretary and treasurer, Geo. M. Dilley; directors, J. A. Henry, George M. Dilley, Benjamin Reynolds, C. J. Reynolds, J. W. Folk. Mr. Reynolds is a member of the firm of E. P. Reynolds & Co., of Rock Island. The company has commenced to lay the material along the line of the street railway track, and if the frost will permit, track laying will begin at once.

INDIANA.

Indianapolis—The Citizens Street Railroad company has ordered 25 open cars for summer use.

Supt. Shafer is very favorable to electricity, and it is possible that it may soon be substituted for the present motive power here.

IOWA.

Davenport—According to an exchange "the Davenport electric motor railway pays 70 per cent. on the capital stock, and it costs 30 per cent. less to operate than when horses were used."

Dubuque—It is expected that before summer comes electric cars will be running in this city on the Eighth street electric railway.

Sioux City—The foundation for the cable line power-house is completed. Some idea of the substantial nature of the structure is given in the fact that it extends thirty feet below and above the surface.

The Sioux City Street Railway company's headquarters are now located on the second floor of the Chamber of Commerce building, and President Peavey will have office quarters there hereafter.

The Highland motor line will be equipped with another large motor of the same capacity as the present large one, also three more summer and three new winter cars.

KANSAS.

Kansas City—It is stated that the Tenth street cable line will, upon the completion of its line to Eighth and Wyandotte, reach the union depot over the L company's tunnel line.

We understand that this arrangement was agreed upon at the time the Tenth street company petitioned the council for a franchise over Tenth street from Main to Wyandotte streets and north to Eighth. It is a very well known fact that the Tenth street people have been seeking a western outlet while the L company has been wanting to reach the East side, and in the event of the passage of the franchise ordinance by the council the scheme will be consummated as soon as the connection can be made.

The elevated company is making some valuable improvements to the system in Kansas City, Kan. A new line is now being built from the western terminus of the Riverview cable to the terminus of the Brighton Hill and Chelsea Park line at Chelsea. The grading for this line is almost completed and the tracts will be laid early in the spring. The company will then have a loop of its magnificent system in Kansas City, Kan., and an effort will probably be made to change the charter of the Riverview cable so that it can be operated by a motor line. This will give the public the choice of two routes to Chelsea park.

It has been announced that the L company will begin work early in the spring upon the construction of the branch line from the main line at Riverview to Armourdale. This is considered a valuable line and its construction will add strength to the elevated company's system.

Wichita—Thirteen gentlemen from that city visited Omaha last month for the purpose of inspecting the street railway systems there.

One of the Thomson-Houston motors in use on the electric railway here has a copper brush

that has been in continuous use for 65 days, during which time the car covered a distance of 4,3 o miles. This is, we believe, the longest time that a motor brush has been in continuous use, and speaks the highest praise for the one used by the Thomson-Houston company.

MANITOBA.

Winnipeg—The Winnipeg street car company is considering the advisability of running the street cars by either cable or electricity, in place of horses, as now used.

MASSACHUSETTS.

Boston — The Thomson-Houston Electric company, after difficulties without number, succeeded in opening up and equipping with the overhead system three miles of road, extending from Bowdoin square to Harvard square, Cambridge. The line is working splendidly and will probably be extended to Arlington in the spring.

Quincy—The Quincy Street railway held a special meeting to consider the proposition of the leasing of their road by the Boston and Quincy Street railway. The directors of the former were instructed to lease the road for 99 years, on these terms, 4 per cent. for first four years, 4½ per cent. for the next four, and 5 per cent. for the remainder of the 99 years. It is thought, however, that the Quincy and Boston road will not take the lease under those terms.

MICHIGAN.

Detroit—John H. Fry, manager of the Detroit City railway, has kept an account of the losses and gains from the first month's operation of the night service on Michigan, Jefferson, Woodward and Gratiot avenues. The service went into effect January 1 and the average daily number of passengers carried was as follows: Michigan avenue line, 62; Jefferson avenue, 22; Gratiot avenue, 28; Woodward avenue, 45.

"The average returns to the company from these fares, on account of passes and the discount of six tickets for twenty-five cents," said Mr. Fry, "were not over four cents a passenger, or $6.28 a day. On the expense side of the account this service necessitated the employment of four conductors at $1.75 a day each; four drivers at $1.62 each, and two extra teams of horses, besides lights, fuel, wear and tear and so forth." So it will be seen that the service is maintained at a considerable loss to the company.

Nine additional double cars will be placed on the Trumbull avenue line and the bobtails withdrawn.

Kalamazoo— Indications point to the adoption of electricity as a motive power on the street car line here.

MISSOURI.

St. Louis— We understand that Messrs. Scullin, Green and Lightner may consolidate their lines under one management and change from horse to motor traction in the near future. The three interests embrace what are known as the Mound City, the White line, Blue line and Yellow line; the three lines on Washington avenue—the Benton and Bellefontaine, and the two Lindell lines, and the two on Fourth street —People's, Tower Grove and the Lafayette.

The bill relating to street railway car fares introduced by Maj. James C. McGinnis in the Senate repeals section 4 of the act of 1869, which requires street car passengers to get on and off at the rear platform of street cars. The introduction of cable cars run in trains makes a compliance with this section difficult and inconvenient. Since the passage of the law in question, the charter has been adopted in St. Louis, which gives to the Municipal Assembly the power to regulate street railway fares, etc., when such regulation is not contrary to existing laws. The repeal of the section will leave the matter to be regulated by the Municipal Assembly in accordance with the changed condition of things brought about by the introduction of grip cars.

Kansas City — Track laying on the Union Cable company's Fourth Street line from Forrest Ave. to Oak street has been completed, as also the brick work on the power house on Highland and Third street. It is expected that the line will be in full operation this month.

An effort is being made to compel the East Fifth Street Dummy line to abandon the use of steam, and substitute electricity or animal traction, as provided for in its charter, or cease operating the road.

The Kansas City Circle railway received its articles of incorporation from the secretary of state at Jefferson City. The capital stock is $600,000 and the incorporators are E. F. Rogers, L. G. A. Copley, William B. Knight and George C. Starkwater. It is the intention of the incorporators to build a line twenty-five miles in length, opening up new coal fields in the near vicinity of Kansas City. The exact route has not yet been decided upon.

The Kansas City Cable company have had plans prepared for and will order a steam launch from an eastern firm, to be used on the lake at Troost cable park.

The contract has been awarded for the construction of the Holmes Cable line. E. Saxon will build it and will begin work on the new line within a few days. The yokes are now being distributed, the power house is completed and most of the material is on the ground. It is intended to have the line in operation within two months. Twenty-four cars have been ordered for the new line.

The Metropolitan Street Railway company of this city has contracted with the Thomson-Houston Electric Co. for the equipment of four and one-half miles of track, with five cars.

One of the immediate results of the sweeping decision rendered by Judge Wallace in the now famous case of Root vs. Third Ave. R. R. Co., was the acceptance by the Metropolitan Street Railway Co., of Kansas City, of what has long been known as the loop franchise.

The acceptance of this franchise means more for Kansas City than a cable road on Main and Delaware streets. Within the next three months more miles of cable road will be commenced and under construction than at any time within the last three years. The Washington street line, the West side line, and the Independence avenue extension of the Kansas City cable company's line now building will be rushed to completion, and the conversion of the Broadway street railway into a cable road is a work that will probably be begun this summer. The building of these and other lines will involve the expenditure within the next eighteen months of more than one million dollars.

The following is the text of the formal acceptance of the franchise on Feb. 15th:

"The metropolitan street railway company, by C. F. Morse, its duly authorized president, hereby accepts the provisions, stipulations and conditions of an ordinance of the City of Kansas, No. 45,113, entitled 'An ordinance to amend an ordinance entitled "'An ordinance authorizing the Corrigan Consolidated street railway company to construct and operate a cable or electric railway on parts of Eighteenth street and Main street, being No. 32,252, approved January 30, 1886," approved February 5, 1889,' and said company hereby agrees faithfully to comply with all the terms and provisions of said ordinance."

Done for said company at Kansas City, Mo., February 15. C. F. Morse, President.
R. J. McCarty, Secretary.

The form of the above acceptance is all right and is hereby approved, February 15.
R. W. Quarles, City Counselor.

Upon the approval of the acceptance by Mr. Quarles the company deposited with the city clerk a certified check for $10,000 as a guarantee that the conditions of the ordinance as accepted would be faithfully complied with.

The estimates and plans for the construction of the loop line loop have been ready for some time, and work will commence as soon as the material can be got on the ground. The ordinance requires that the road be completed within six months, but cars will probably be running on the track by July. Trains will be run from Eighteenth street around the loop, with transfers at Fifth and Twelfth streets, and the equipment of the road will be as fine as on any cable line in the country.

The Kansas City cable company, now that the question of cable patents is settled, will commence work upon its Washington Street line. It has now about $200,000 worth of material distributed along the route, and the road will probably be completed by June 1. The building of the Washington street road will necessarily compel the Metropolitan company to convert its present Broadway horse car line into a cable road and this will involve the expenditure of several hundred thousands of dollars and will give the West side equal if not superior, cable railway accommodations to those now enjoyed by the East side. Other cable lines that are projected and which will undoubtedly be built in the near future, are the Fifth street and Vine street roads, streets now controlled by dummy lines, which, however, would have been built long ago had not the troublesome and expensive patents been standing in the way and blocking the enterprises. Millions of money would have been expended in the construction of cable railways here had it not been for the monopoly of patents enjoyed by the National Cable company, but now that their validity is no longer in doubt, capitalists will invest their money in the construction of additional cable railways, and within a short space of years the horse car and dummy line will give way to the cable system.

The Kansas City and Independence Rapid Transit Railway, which was organized about three months ago, with a paid up capital stock of $1,000,000, has purchased for $700,000 what is known as the Winner dummy line:—the following history of the road will prove of interest: "The line was built in 1886 by Mr. W. E. Winner to develop a tract of land 1,900 acres in extent, which he had purchased along the line between this city and Independence. Soon after the road was built Mr. Winner sold at a great advance, a large part of the land, which had been subdivided and platted. Later he sold a tract of 1,400 acres for $1,000,000 to a syndicate composed of New Hampshire capitalists. After the sale of this tract Mr. Winner had left only the property now known as Washington park and he has negotiations now pending for its sale to the new company. The road is nine and a half miles long and connects in Kansas City with the Ninth, Twelfth, and Fifteenth street cable lines. It is entirely free of debt, has been a splendid investment, the earnings of the past month being one hundred per cent. greater than for the corresponding month of last year. Its value as an investment is also enhanced as it is the connecting line between Kansas City and Independence, now a town of over 6,000 inhabitants, and still rapidly growing.

The line will be double tracked from Independence to the Kansas City terminus and stations built at Ninth, Twelfth and Fifteenth streets, and the road improved in every way.

The president of the Kansas City and Independence Rapid Transit Railway is Mr. W. H. Holmes, Mr. W. A. Bunker is the vice-president, D. B. Holmes, secretary, and Thomas F. Fry, auditor.

NEBRASKA.

Lincoln—The Standard Street Railway company has built and is now operating about three miles of road between Twenty-seventh street and the Wesleyan university. A doubt existing as to the legality of the old franchise, it was thought best to settle the matter before the road is extended to the heart of the city. This is to be done, it is claimed, early in the spring.

Omaha— The horse railway company here has petitioned the council for the right to erect poles and overhead wires along its lines, with a view of adopting electricity as a motive power.

The check system has been adopted on the electric motor line. Checks are given those who pay for the entire trip, including passage across the bridge. The check system was adopted to prevent the loss of bridge fare, as many parties would board the cars in the city, contribute but a nickel and ride to the west end of the line.

The Thomson-Houston Electric company has secured an order from the Omaha Motor Railway company for the equipment of 7½ miles of track, with 20 cars.

The lines of the Omaha Motor company and the Omaha and Council Bluffs Railway and Bridge company will connect, and as both these lines are equipped with the Thomson-Houston company's railway apparatus, that company will then have a total trackage for the two systems of about 17 miles and operating 44 cars.

NEW JERSEY.

Elizabeth—The Elizabeth and Newark Horse Railway company has been experimenting with

the improved Connelly motor, and are more than favorably impressed with its operation.

Camden—John Hood, who has been superintendent of the Camden Horse Railway since it started in 1866, has retired. The employees gave him a gold-headed cane. We understand that this road will double its tracks on Market street and substitute electricity for horses, as soon as possible.

NEW HAMPSHIRE.

Dover—Mrs. Mary Dow, the president of the Dover, New Hampshire, street railway, reports an eleven per cent. dividend, advanced wages, improved service and a surplus in the treasury of the company, as the result of her first year's management of that corporation. This record of success in a novel field for woman's efforts, may be taken as proof presumptive that Mrs. Dow did not regard her work to lie exclusively in the manipulation of the market for alleged fifty-dollar shares on which ten dollars of cash is actually paid in.

NEW YORK.

Buffalo—Col. Henry C. Watson was on a trip to Boston and New York lately. He is anxious to secure for his system of street railways a more rapid form of transit than that afforded by animals. It is highly probable that electricity will be finally adopted.

A street indicator has been experimented with upon the cars here with favorable results.

Cohoes—The Waterford and Cohoes Street Railway company recently elected : Directors, Thomas Breslin, William M. White, George Campbell, T. V. Munson, T. A. Knickerbacker, J. J. Dunlap, A. J. Griffin, John Loughlin, William Burton, J. W. Himes, C. C. Ormsby, George Neil, F. B. Peck.

New Hartford—The trustees of the corporation of New Hartford granted a franchise to the New Hartford & Washington Mills Street Railroad company to lay its track the entire length of South street, in that village, in the center of the street, under the provisions of the State laws applicable thereto, and also the following terms and conditions :

First. That such road be of the standard gauge.

Second. That the rails of such road be flat rails with outside bearing.

Third. That such rails be laid upon stringers placed upon bedded cross-ties.

Fourth. That the top of said rails shall conform to the present grade of said street.

Fifth. That, should the grade of the said street be hereafter changed, said company shall make the said track or rails to conform to such new grade.

Sixth. That the space between such rails, and for the width of two feet outside of said rails, be paved with selected cobble stones, and such pavement to be kept in permanent repair thereafter by said company.

Seventh. That in the event of said street being hereafter paved with other than cobble stones, that said company will replace said cobble pavement with the same pavement so laid in said street.

Eighth. That said company shall not suffer or permit snow removed from its said tracks to accumulate in said streets to the hindrance or delay of safe and easy passage over said street.

Ninth. That this authority may be revoked whenever the said company fail to comply with the aforesaid conditions.

Rochester — The Thomson-Houston Electric Co. has secured the contract for the equipment of the new railway from this city to Charlotte, to be completed by June 1st.

Troy— The Troy & Lansingburg Railroad company will adopt electricity as a motive power in the near future. The overhead system will be used.

West Troy—The new managers of the Watervliet Turnpike and Railway company have in contemplation improvements for the road between West Troy and Albany. It is proposed to macadamize the road from the north end of Albany to West Troy. The directors are also considering plans for more rapid locomotion. Cable and electric systems have been talked of, but no definite action has been taken.

NEVADA.

Reno—Representative H. H. Beck has petitioned the assembly for the right to build a street railway here.

OHIO.

Toledo—A wealthy syndicate of Chicago capitalists, consisting of J. M. Gamble, C. P. Newberry, John B. Carson, T. E. Adams, A. J. Cooper, and others, have secured control of the entire street railway interests here, and intend to transform the system into a first class metropolitan street railway. We understand that the syndicate paid about $1,150,000 for the road and its equipment. The Connelly motor will be adopted.

OREGON.

Eugene City—T. J. Smith has been elected President of the new street railroad here, now in course of construction. The line is to be in operation by June 10th.

PENNSYLVANIA.

Allentown—The syndicate of New York capitalists who recently purchased the franchise of the Allentown Passenger Railway company, are making arrangements to extend the lines through several streets of the city, but councils have not yet passed the ordinance relative to the laying of rails. Considerable opposition has been manifested to the laying of T rails, and councils have been petitioned to compel the use of groove or flange rails. A special committee recently appointed by councils to visit various cities to gather information regarding the government of street railways, reported against the T rail. The company contends that the flange rail is impracticable where the streets are not paved, as is the case in Philadelphia.

Philadelphia — The Northeastern elevated railroad bill was passed in select council by a vote 17 to 10.

An application from the Union Passenger Railway company to extend its tracks on Poplar street, west, from Twenty-ninth street to Pennsylvania avenue, at Fairmount Park, was made and laid over for more definite information.

Pittsburg—Mr. Geo. J. Whitney, of the Central Traction Co. of this city, states that the road will cost less by $20,000 a mile than the Pittsburg Traction, and expresses the opinion that the stock ought, in course of time, to sell at par.

The Federal Street and Pleasant Valley road reports 2,112,104 passengers carried during the past year; the expenses of operating the road were $71,813.69, and the receipts at $96,402.10. The dividends declared amounted to $18,000. The liabilities of the company are given as follows: Capital stock, $100,000; bonds, $75,000; unclaimed dividends, $405.78; coupon account, $246.52; right of way, $37,429.51; surplus, $37,455.93; total, $250,537.74.

The Pittsburg Traction company reports the following for 1888: Number of passengers carried, 2,800,889; expense of operating the road, $93,364.97; receipts, $178,536.97. The payments were: For construction, $848,644.03; equipment, $64,532.85; interest, $18,495.55. The statement of the road's liabilities is as follows: Capital stock, less $1,000,000 installments unpaid, $1,500,000; first mortgage bonds, $500,000; Pittsburg, Oakland and East Liberty bonds assumed, $15,000; constructive debt, $457,662.69; dividends declared, but not yet paid, $100,000; surplus, $15,906.90. Total, $2,588,569.59.

The People's Park Railway reports as follows: Number of passengers carried, 838,130; running expenses, $44,583.97; receipts, $37,716. Its liabilities are: Capital stock, $100,000; bonds, $100,000; due corporations, $59,011.65; total $259,011.65.

The St. Clair Incline company, in its statement, shows the number of passengers carried during 1888, 125,026; running expenses, $7,080.75; receipts, $8,460.97. Its assets are given at $901.75; cash on hand and liabilities as nothing but an unadjusted construction account. The total unfunded debt of the concern is $67,000.

The following officers have been elected for the Underground Cable Co. for the ensuing year: George Westinghouse, Jr., was chosen as president; C. H. Jackson, vice president; John H. Dalzell, treasurer; J. W. Marsh, secretary, and Elmer L. White, auditor and assistant treasurer.

We understand that the Second Avenue line of this city will test the merits of the storage battery system in the near future.

The McKeesport street car line is to be extended over the bridge to Duquesne at once.

It is reported on substantial authority that cable conduits are to be laid on the Sixth street bridge. This seems to indicate that a cable line to Alleghany and Manchester is to be built by the company which now controls the horse-car line using the bridge. It is said that the officials of the road are now having calculations made on the cost of altering the structure for the purpose named.

The Citizen's Traction company is now placing bells on its cars, which will constantly ring while the cars are in motion. They are similar to those in use on the Pittsburg Traction road.

Reading—At a meeting of the stockholders of the City Passenger Railway company the recent purchase of the Perkiomen Avenue line was ratified. It was resolved to issue $50,000 of additional stock and to mortgage the road for $100,000.

Scranton—Every street car in the city is run by electricity and all are giving excellent results.

TENNESSEE.

Nashville — Nashville is making very much the same argument in favor of Chicago ownership of its street railways as that made here. The *Herald* hopes that "the Northern syndicate having an option on part or all of the Nashville street railway systems will purchase them. This would insure the running of all the lines under one management and doubtless the institution of the transfer system so that a person could ride from one part of the city to another for 5 cents, which means considerable to a poor man. It will also benefit Nashville from a financial point of view, as our roads will be run by foreign capital, while the home capital now invested in them will seek other investments and aid in building up more enterprises."

TEXAS.

Dallas—The Ervay street car line resumed operations to-day.

UTAH.

Salt Lake City—A petition from the Street Railway company to the city council for a right of way over First street, Third street, Sixth street and East street, from the eastern to the western terminus of said streets, and also on Wall street, Young street, Pearl street, Green street, East street, Second East street, Fifth East street, Sixth East street and Seventh East street, from the northern to the southern terminus of said streets. That it is not the intention of the company to build or construct in all these streets at once, but it is their intention to do so when the traffic thereupon will justify the necessary expenditure. The matter was discussed to some length, but it was thought that it would be better to allot them street by street as their needs should require, and not give them in a lump more than they could use for twenty years.

A petition was also presented from the City Railroad company praying for the right to use comparatively noiseless steam motors, to be operated at a speed of six miles per hour in the business portion of the city and ten in the suburbs. Permission to do this was accorded, subject to an ordinance to be drawn up by the council later on.

The Street Railway company has abandoned for the present its track south on Eighth street, a turn-table having been put in at that place. The city is changing the gauge of the rails below that point for the gravel train.

WASHINGTON TERRITORY.

Spokane Falls — The Spokane Falls Street Railway company runs four cars and carries an average of 12,000 passengers a month.

WEST VIRGINIA.

Wheeling—A strike on the electric street car line of Wheeling resulted in the men getting $1.90 for twelve hours' work, being an advance of fifteen cents a day.

The City Council has decided to give the owners of the street railway all the time they want to complete the road.

WISCONSIN.

Milwaukee—One of the lines here is being operated by storage batteries furnished by the Woodward Electric company, of Detroit.

The cable on John A. Hinsey's road has not "materialized," but is promised in the spring, after they see how the same kind of cable works at Newark.

Oshkosh—Supt. Root, of the Eau Claire street railway, says the company will have completed all arrangements to operate the road by electric power as early as July 1.

The street cars are heated with stoves, with which the citizens are much pleased.

WYOMING.

Cheyenne—The Cheyenne Street Railway company has been granted, by Congress, the right of way across the Fort Russell military reservation.

FOREIGN.

BRITISH COLUMBIA.

Victoria—Thirty-eight thousand dollars of the stock in the Electric Street Railway company of this city have been subscribed.

CANADA.

Montreal—The city surveyor has entered an action against the street railway company for "having neglected to place the sides of their rails in a safe condition to the public on Notre Dame street, between Place d'Armes Square and McGill street."

Quebec—The Quebec Street Railway is to be extended at once.

ENGLAND.

Bristol—In its "local retrospect" for 1888 the *Bristol Times and Mirror* says: "Early in the year the Rupert-street section of the tramway line from the Drawbridge to Horfield was opened. Our readers will remember, although the line for the extension had been laid for a considerable time, yet the public were deprived of its advantages for various reasons; but it is encouraging to note that it has now become a valuable feeder to the splendid system of trams we have throughout the city. While writing on this subject, we may also mention that the past year records the holding of the first meeting under the new Act of the amalgamated Tramways and Carriage Companies—an amalgamation which, we believe, has proved a great boon to the public generally. Certainly we have a service of trams unequalled in the kingdom, and our cabs and hansoms are to be compared with any in the Metropolis or in the largest of our provincial towns. The returns of the company, we must add, have enormously increased since the amalgamation."

[British "amalgamation" is synonymous with American "consolidation."]

The increase on the receipts of the Bristol Tramway Carriage company for the past six months amounts to £3,229. This is undoubtedly largely traceable to the extension of the system of penny fares, which is now in operation over the whole system. It has been found that on several of the sections running through the working class population the re-arrangement of fares has answered admirably, whilst in others where the passengers' situation in life does not necessitate that close looking after the pennies, the receipts have not increased in as satisfactory a manner. This shows that the penny fare does not necessarily mean increased profit everywhere, but a company dealing with the passenger carrying of a large city like Bristol must be content to accept the average return all round, and looked at from this point of view the total receipts appear to be in every way satisfactory.

London—At a recent meeting of the North London Tramways Company, in the course of his reply to some remarks, the chairman said he hoped eventually electric cars would be adopted and that this would eventuate a dividend. It is assuring when we find directorates looking into this question of electric traction, and we hope that his surmise will be found.

Liverpool—The Liverpool Tramway Company has determined to abandon the use of horses on its roads as soon as possible and adopt electric or mechanical traction.

New Enterprises.

CALIFORNIA.

Auburn—An electric railway will be built here at an early date. W. R. Arthur is interested.

Colton—The Colton & San Bernardino Railway Co. has adopted the Connolly motor. Will buy two or three new cars, and build another mile of track during the year. The company now operates three and a half miles of track (standard gauge), using "T" rails fifteen pounds to the yard.

Los Angeles—The Cable Road Co. has filed articles of incorporation. Stock, $2,500,000. I. W. Hellman, C. Forman, J. F. Crank, et al.

Sacramento—The Central Electric Railway Co., of this city, will build its line within the next six months. Storage batteries will be used.

CANADA.

London—The Street Railway Co. is in the market for five or six new cars, the same number of omnibusses, and will extend its track this summer (standard gauge).

Ottawa—The Ottawa Street Railway will build one mile of new track, and buy four new cars this spring.

COLORADO.

Denver—Villa Park will have a cable line before the summer is over.

CONNECTICUT.

Middleton—The Middleton Horse Railway Co. intends to double track its main line.

Naugatuck—We understand that Naugatuck and Waterbury will soon be connected by an electric railway.

DAKOTA.

Huron—The Huron City Railway will build three or four miles of track and probably adopt electricity. No system has yet been decided upon. This company is operating nearly three miles of road, has four cars, and uses a "T" rail sixteen pounds to the yard.

DISTRICT COLUMBIA.

Anacosta—The Anacosta and Potomac River Railway Co., operating nearly three miles of road, will extend its line six miles, in the near future.

Washington—The Rock Creek Railway Co., at Washington, D. C., contemplate building an electric railroad at least three miles long, and will soon commence work. They have probably not purchased machinery yet. Capital stock is $60,000. George Truesdell is president.

It is proposed to extend the Tenallytown electric road to Rockville, Md.

GEORGIA.

Atlanta—At last the Gate City is to have rapid transit—at least a part of it is—and no doubt all the various companies here will "electrify" their lines in the near future. Some time ago the East Atlanta Land Co., through its president, Mr. Hurt, made a close investigation of the various systems of electric propulsion, the result of which was the closing of a contract with Mr. H. E. W. Palmer, of the Thomson-Houston Electric Co., for the equipment of the line with the latter company's apparatus.

ILLINOIS

Alton—The Alton Improvement Association is looking for some kind of a satisfactory independent motor. It will build a couple of miles of track this spring.

Chicago—The Van Depoele Electric Company, of this city has recently placed upon the market a new dynamo of special design for the charging of storage batteries.

The Salisbury Electric Car Motor Co., located at Chicago, has been chartered for the manufacture and sale of electric motors; capital stock, $250,000; incorporators, Wilber S. Salisbury, William Armstrong, and Cyrus A. Vosburgh.

The West Chicago Street Railroad Co. has purchased the ground for the intended new tunnel under the river. It is located 125 feet north of VanBuren street, and extends from Franklin to Clinton, a distance of 1,650 feet. The new tunnel is to be 30 feet wide, a width 10 feet greater than that of the LaSalle street tunnel. Complete right of way has been secured. The tunnel will be built by the West Chicago Street Railway company and leased to the Chicago West Division Street Railway company for a term of years. Approximate estimates place the cost of the undertaking at from $1,300,000 to $1,500,000. It will be the finest tunnel ever built under the Chicago river. Work will be commenced as soon as the contracts are let and the plans perfected — probably early in the spring.

Jacksonville—An electric railway will probably be operating here in the near future. Mr. W. S. Hood, of Jacksonville (Ill.), is interested.

Joliet—We understand that there is a field here for capitalists in the construction of an electrical railway.

Springfield—The Englewood and South Park Street Railroad company has been incorporated; capital stock, $200,000; to construct and operate a street railroad in Cook county; incorporators, Edward O. Russell, Hilburt Dunlevy and William H. Allen.

The Lake, Hyde Park and Calumet Street Railway company, of Englewood, has been incorporated; capital, $500,000, to construct a horse and dummy railroad; incorporators, J. S. Kendall, Jefferson Hodgkins and G. G. Ogden.

Sterling—An electric railway will probably be built here soon.

INDIANA.

Brazil—A Street Railway is projected here.

Crawfordsville—A Street Railway will probably be built here at an early date.

Elkhart—The storage battery (Woodward) is to be used on seven miles of road which is to be built here.

Greencastle—The Greencastle Street Railway Co. is desirous of finding a purchaser for its bonds. Over 3,000 feet of additional track will be laid, ("T" and tram rail twenty and thirty-three pounds) and will buy two twelve foot cars; the road is at present two and a half miles in length, standard gauge; operating three cars.

IOWA.

Davenport—The Davenport Central Railway Co. (standard gauge), using tram and "T" rail twenty-seven pounds, will build one mile of single and one and a half miles of double track this spring, and will buy larger dynamos and two more motor cars. The Sprague overhead system is used.

Centreville—The Peoples Street Railway Co. will build one-half mile of track twenty pound "T" rail is now used, and buy one new car this spring, gauge 3′ 8″.

Des Moines—The town council of North Des-Moines has granted the electric railroad the right to use Clarkson street.

Sioux City—Two new street Railways are projected in this vicinity.

The Highland motor line will be equipped with another large motor of the same capacity as the present large one, also three more summer and three new winter cars.

Sioux Falls—The Sioux Falls Street Railway Co., using tram and "T" rail thirty pounds to the yard, standard gauge, will extend two miles, and buy two more cars this summer.

Washington—A Street Railway is projected at this place.

KANSAS.

Abilene—The Abilene Street Railway Co. will probably extend its tracks nearly two miles this spring and adopt electric traction.

Amourdale—Work is to be begun at once for the electric railway.

Emporia—The Street Railway company here will extend its tracks in the spring.

Hutchison—The Hutchison Street Railway Co. will build another fifty miles of track (4′ 6″ gauge, twenty pounds "T" rail), this spring. The company expects to adopt some improved motive power.

Kansas City—The stockholders of the West side electric railway held a meeting in Kansas City, Kan., yesterday morning and initiated arrangements for the construction of the road from Thirteenth street to Minnesota avenue, north to Chestnut street, west to Fifteenth and north to the Quindaro boulevard, thence in a northwardly direction to the Moore place.

The return line will run from the Moore place to the Quindaro boulevard, thence to Cobb's place, thence in a southeasterly direction to Edgerton place; thence south two blocks; thence to Third street and Minnesota avenue. It is the intention to begin work at once on the prelimi-

nary survey. State and city franchises have already been obtained for part of the line, and the franchise for the other part will be secured as soon as the survey is completed. The company claims to have plenty of money on hand to build the line. It is also its intention to supply electric light.

MacPherson—The MacPherson Street Railway will build a mile of new track and equip it next summer.

Stronj City—The Consolidated Street Railroad Co. is in the market for one car.

Wichita—The Wichita and Suburban Railway Co. will adopt electricity and build six miles of additional track ("T" and tram rail twenty-eight, thirty and thirty-five pounds is now used.)

KENTUCKY.

Ashland—We understand that the Ashland Electric Light & Power Co. will probably increase its capacity for the purpose of furnishing power to run the electric railway that is to be built to Cattlesburg at an early date.

LOUISIANA.

New Orleans—The New Orleans Electric Light and Power Company are to equip a short electric road.

MAINE.

Mt. Desert—The Mt. Desert & Eastern Shore Land Co. has granted concessions to an electric railway company to run a line through its property.

Waterville—An electric railway will be built here at once.

MASSACHUSETTS.

Dorchester—A street car line running from Field's Corners to Franklin Park via Westville, Bowdoin and Harvard streets is projected.

Holbrook—Messrs. J. J. Crawford, W. F. Gleason, J. G. Belcher, E. N. Thayer, E. E. Holbrook and others, are interested in the formation of the electric street railway company here; capitalized at $30,000.

A company has been organized for the purpose of building a street railroad in this town for either a horse or an electric road to run from the Braintree line via Franklyn street to the Holbrook line, and from the Old Colony station on Union street to the Weymouth and Abington lines. The board of directors are: E. N. Thayer, W. F. Gleason, E. E. Holbrook, Eugene Snell, G. T. Wilde, R. P. Chandler, W. E. White, J. W. Belcher, John Crawford.

Hyde Park—It is reported that an electric railway is to be constructed at this point.

Lawrence—A movement is on foot to organize a company for the purpose of connecting Haverhill, Lowell and this city by an electric railway.

Marthas Vineyard—The Marthas Vineyard Street Railway has organized and will operate an electric system.

Randolph.—A company has been organized here to run a street railway from West corner to the Avon line, and from the square in Randolph to the Holbrook station. The board of directors are: J. W. Belcher, J. B. Thayer, Royal Turner, J. J. Crawford, A. J. Gove, C. G. Hathaway, E. N. Thayer and W. F. Gleason.

MICHIGAN.

Bay City.—A double track, three miles in length, will be built by the street railway company on 1st street from Washington avenue to the new Michigan Central depot this spring.

Negaunee—The water developed by the falls a few miles above here, is to be utilized for the purpose of generating electricity sufficient to run an electric railway, which will be built from this place to Ishpeming.

MINNESOTA.

Mankato—The Mankato Street Railway Co. will extend its tracks over two miles. It now operates over three and a half miles of track, uses a steel train rail of twenty-seven pounds to the yard (gauge 3′ 6.″)

Stillwater—An electric road will probably soon be built from here to Oldtown.

MISSISSIPPI.

Vicksburg.—Capt. T. M. Smeads, of the street railway company, is figuring upon the extension of the line and the adoption of electricity as a motive power.

MONTANA.

Butte City—The Butte City Railway Co. will extend its tracks one and a half miles, and buy four cars during the summer.

MISSOURI.

St. Louis—A company has been organized to re-construct the Broadway line from the new and old Manchester road to the city limits. Capital stock, $50,000; motive power to be electricity. The overhead wire system will be adopted as soon as the Bellefontaine Street Railway Co. obtains permission to erect poles, etc.

The incorporators of the Electric Railway company, the bill for which passed the council, are D. D Bates, S. J. Fisher, Chas. Suter, Maurice Prendeville, D. S. Bentley and George F. Branham.

NEBRASKA.

Hastings—The Citizens' Street Car company is getting material on the ground preparatory to building switches and an additional mile of track as soon as the ground is in condition.

Kearney—The Kearney Electric Railway Co. has been capitalized for $100,000, the officers of the company being G. W. Frank, Pres.; H. Watson, Vice Pres.; C. M. Rice, Sec.; Geo. R. Sherwood, Treas.

Lincoln—The South Beatrice Street Railway Co. has been incorporated. The capital stock is $20,000 and the incorporators are Warren Cole, W. D. Nichols, N. N. Brumback, J. S. Grable, J. T. Beauer, S. S. Green, S. K. Davis and A. L. Green.

The North Lincoln Street Railway company is making preparations to begin work on their line early in the spring. The officers expect to build about two miles of road, running through Lincoln Heights addition and to Grandview park. When completed this line will connect with the Rapid Transit road at the woolen mills. The projectors of the new road are G. E. Bigelow, L. C. Humphrey and D. L. Brace.

Omaha—The Omaha Horse Railway company and the cable tramway company will probably consolidate, under the name of the Omaha Street Car company, and issue bonds of $2,000,000 to $2,500,000.

Ponca—The Ponca Street Railway Co. has filed articles of incorporation.

NEW JERSEY.

Elizabeth—Elizabeth is to have a new street railway, to be run by electricity. The proposed line will run through Cherry street, traverse the northern, northwestern and western suburbs of the city to Fourth avenue, and will resemble a belt line in its operations.

Jersey City—Arrangements have been made to organize a company with a capital of $600,000 to build an elevated cable railway from the New Jersey Central Railroad ferry, Jersey City, to West Side avenue, through Fairmount, Fairview and Jewett avenues.

NEW YORK.

New York City—The commissioners of public parks have decided to build a street railway through the 86th street transverse park road. The Johnson grooved rail will be used. They expect to have the track laid and the cars running early in the summer.

The Second avenue and Fourth avenue railway companies have signified a desire to avail themselves of the privileges of the park track.

OHIO.

Cincinnati.—As seen in another column, Walnut Hills will probably have another cable road pretty soon.

Youngstown—The street railway company here, which has been operating bob-tail cars on a narrow gauge track and on tri-weekly time for the past fifteen years, has disposed of its interests to Jas. Parmelee and others of Cleveland, who will probably double track the road, make it of standard gauge, and extend it to Hazleton, a distance of two miles, and adopt electric motive power.

OREGON.

Portland—The Willemette Railway Co., operating nearly five miles 3″ 6″ gauge "T" and flat rail, will extend its tracks over four miles, and probably adopt electric traction.

The Hamilton Avenue Street Railway is projected.

The Transcontinental Street Railroad Co. will build one mile of track and purchase a number of cars this summer. It uses some "T" rails, and some of the Market street pattern, twenty-five and thirty pounds to the yard, 3′ 6″ gauge.

Salem—A street railroad is to be built here, on Commercial street to North Salem. Work will begin at once.

PENNSYLVANIA.

Altoona—S. C. Baker is heading a wealthy syndicate for the purpose of constructing an electric railway at this point. It is proposed to run the line well into the suburbs, with a view to their development. If the scheme is operated upon practically the same basis as that of the Elyton Land Co. in Birmingham, Ala., in the case of the Highland avenue road there, where the line was run around its property and the company sold every alternate lot along the route, then the success of this enterprise may be regarded as already assured.

Catasauqua—We should not be surprised if an electric railway was built from this point to Allentown this spring.

Easton—This road, operating about seven miles of track (five feet two and a half gauge), may extend its track about a couple of miles this summer.

Erie—The City Passenger Railway Co. will probably build nearly ten miles of road this spring (electrical).

Harrisburg—Electricity will be substituted for animal traction on the lines of the Harrisburg Street Railway Co. here.

Lake Winola—An electric railway will be in operation here by midsummer.

TENNESSEE.

Chattanooga.—Application has been made for a charter for an electric railroad from this city to the famous battlefield of Chickamauga. It will be ten miles long, will be operated by electricity as a motive power, and cost $200,000. Among the incorporators are three Massachusetts capitalists.

TEXAS.

Fort Worth—The North Side Street Railway Co., of this city, will spend from $60,000 to $70,000 in electrifying its road.

A contract has been made with the Detroit Electrical Works, of Detroit, Mich., by the Fort Worth Land and Street Railway company for the electrical equipment of about fifteen miles of its system.

VIRGINIA.

Danville—Steam will be substituted for water power for operating the electric plant of the street railway company at this point.

Roanoke—An electric street railway will be in operation here at an early date.

WASHINGTON TERRITORY.

Olympia—The Olympia Land Co., stocked at $40,000, has been incorporated. Incorporators: N. S. Perter, L. Y. Abbott, T. C. Van Ephs, B. F. Hartsook et al.; will build street railways, telephone and telegraph lines and deal in real estate.

Seattle—The Seattle Electric Railway and Power Co. (Thomson-Houston system) operating three and a half miles of single and one and one-fourth miles of double track, using "T" flat and girder rails, twenty-five, thirty-five and thirty-eight pounds to the yard; will build a mile extension, buy new cars and motors, and is in the market for an engine and boiler.

Sehome—The Bellingham Bay Street Railway Co., capital stock, $25,000, has been incorporated. Trustees, D. R. Huston, P. D. McKellar and Jonas Gise. Its objects are to construct street railways, telegraph and telephone lines, gas and electric works.

Spokane Falls—The Spokane Street Railway Co., operating six miles of track, "T" rails of twenty and thirty pounds, will build six miles of track this summer.

Tacoma—Street cars are already proposed to run from the water front to connect the towns on Bellingham bay.

WISCONSIN.

Eau Claire—The Eau Claire Street Railway Co., using side and centre bearing rails, will build one and a half miles of track.

Fond du Lac.—H. Burkholder, of Chicago, on behalf of New York and Chicago parties, has purchased the franchise for a street railroad here. Construction will be commenced as soon as the frost is out of the ground, and four miles will be in operation by June 1st. The street car barn will be located at the end of the 4th street branch, near the city limits. The line will be double tracked on Main street. Eight single-horse cars, provided with fare boxes, will be used, cars running at ten-minute intervals.

Patents.

The following is a complete list of such patents as relate to street-railway interests, issued since our February number, especially prepared for the STREET RAILWAY GAZETTE by J. C. Higdon, Attorney for Patents and Trade-Marks, Room 29 St. Cloud building; opposite the U. S. Patent Office, Washington, D. C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

Issue of February 12, 1889.

397,637. Car Axle Box, J. C. French, Concord, N. H.
397,755. Cable Grip, F. Schelp, Jr., St. Louis, Mo.
397,611. Tension Appliance for Traction Cables, W. Phenix, Chicago, Ill.
397,765. Car-Brake and Starter, P. Weilbach, Copenhagen, Denmark
397,658. Street-Car Motor, B. R. Moore and C. D. Montayne, Kansas City, Kan.
397,677. Car Wheel and Bearing, J. S. Williams, Beaver Dam, Ky.
397,857. Apparatus for Heating Cars by Electricity, R. M. Hunter, Philadelphia, Pa.
397,740. Starting and Draft Mechanism for Street Cars, F. C. McDonald, New York, N.Y.
397,773. Regulating Switch for Electric Motors, H. H. Blades, Detroit, Mich.
397,601. Fare Register, Railway Register Co., Chicago, Ill.
397,602. Fare Register, Railway Register Co, Chicago, Ill.
397,603. Fare Register, Railway Register Co., Chicago Ill.
397,519. Elevated Railway, R. F. Robison, Kansas City, Kan.
397,880. Electrical Railway Gate, Electric Railway Gate Co., Baltimore, Md.
397,610. Automatic Switch for Cable Railways, W. Phenix, Chicago, Ill.
397,875. Overhead Line for Electric Railways, Sprague Electric Railway and Motor Co., New York, N. Y.

Issue of February 19, 1889.

397,901. Axle Lubricator, W. O. Dunbar, Altoona, Pa.
398,285. Gong Bell, Sargent & Co., New Haven, Conn.
398,206. Cable or Railway Crossing, F. G. Weir, Cincinnati, O.
398,257. Slack Adjuster for Car Brakes, C. C. Higham, Rome, N. Y.
397,898. Street Car Heating Apparatus, L. K. Curlett, Chicago, Ill.
397,947. Street Car, E. E. and W. S. Taylor, Newport, R. I.
398,207. Driving Mechanism for Cars, United States Machine Co., Jersey City, N. J.
398,105. Slot-Rail Switch, Weir Frog Co., Cincinnati, Ohio.
398,106. Cable-Railway Crossing, F. C. Weir, Cincinnati, Ohio.
398,169. Automatic Railway Switch, J. W. Leslie, Everett, Mass.
398,200. Cable-Railway Switch, Weir Frog Co., Cincinnati, Ohio.
398,364. Pneumatic Railway Switch, M. Wuerpel, St. Louis, Mo.
398,204. Street Railway Switch, F. C. Weir, Cincinnati, Ohio.
398,294. Cable Railway System, C. J. VanDepoele, Lynn, Mass.

Issue of February 26, 1889.

398,472. Car-Heating Apparatus, Safety Car-Heating and Lighting Co., of New Jersey.
398,723. Car Motor, T. W. Heermans, Chicago, Ill.
398,499. Railway Car-Motor, I. Robbins, Camden, N. J.
398,438. Car Starter, J. H. Palmer, Rockaway, N. J.
398,594. Street Car, W. G. Ellis, Amesbury, Mass.
398,590. Means for Mounting the Grip on Cable Railway Cars, C. Ehnborn, Island City, N. Y.
398,369. Cable Railway, P. F. Barr, St. Paul, Minn.
398,662. Electric Railway, S. H. Short, Columbus, Ohio.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents :

Expire During the Present Month.

124,327. Apparatus for Propelling Street Cars, Bull & Bloomfield.
124,318. Safety Step for Cars, Beckwith & Clark.
124,297. Portable Fare-Box, J. W. Prendergrast.
124,581. Car Brake, J. W. Jacobs.
124,551. Propelling Cars, A. R. Critfield.
124,618. Axle Lubricator, T. H. Paul.
124,662. Car Starter, C. B. Broadwell.
124,839. Ticket-Box for Conductors, N. B. Lyman.
124,646. Rail Chair, J. C. Wands.
125,046. Car Axle, J. W. Hard.
125,049. Car Starter, C. M. Hinckley.
125,088. Portable Fare-Box, J. C. Schooley.
124,793. Car Heater, C. F. Pike.

An Important Transfer.

The secretary of the Cincinnati Corrugating Co. writes us some further particulars in regard to the recent purchase by his company of the machinery, good-will, books, etc., of the iron roofing firm of Caldwell & Co. The latter was established in Cincinnati over 30 years ago, being the oldest concern in this line in the west, and among the oldest in the whole country. They were engaged principally in the manufacture and sale of the outcalt patent, elastic joint iron roofing, for which they held a very substantial trade, one that stayed with them for years, and until the death of the senior member of the firm, which took place a few months ago. Some of the oldest work alluded to in the corrugating company's well-known circular, "Life of an Iron Roof," was of the outcalt pattent, and was put on by this firm.

Horse Car Etiquette in the Fatherland.

From an exchange we clip the following, to the veracity of which American pilgrims in Germany can vouch :

"Official horse car etiquette in Germany is quite different from official horse car etiquette in America. The German horse car conductor is polite. When a passenger boards or leaves the car the conductor touches his hat and says 'Good day.' When he collects a fare he attracts the passenger's attention by saying 'please.' If on a nasty day or late at night the passenger give a tip of one cent the conductor smiles broadly, touches his hat and bows. A recent article says : 'The German conductor is phenomenally patient with foreigners who do not understand the system of graded fares which prevails in Germany. If an American buys a two cent ticket for a five-cent ride, he invariably refuses to buy a five-cent ticket when the conductor explains the mistake to him. The American always says he will buy a three-cent ticket in addition to his two cent ticket, but will never buy a new five-cent ticket, by which he would lose two cents' worth of ride. The American explains his position in bad German, and the conductor replies in good German. Consequently, neither one understands the other, and all sorts of complications arise. But the conductor rarely loses his temper. He quietly pleads, points to the rules, and appeals to the other passengers for the corroboration of his statements, until the American gets tired and pays. Nearly every American tourist in Germany has had this experience on horse cars. Few have seen the conductors at all ruffled in temper during the long incidental explanations and arguments. A German horse car conductor smiles good naturedly at all the babies in the car, chucks each one under the chin when he collects the mother's fare, and holds a guarding hand close to each little back when the mother alights. His collar and cuffs are clean. His uniform is never ragged or greasy, nor are his boots unblacked. In fact, a German horse car conductor is generally so mannerly, clean, and well dressed that he is a bit of a prince among the women of his class of society.'"

Electrical Advance in the South.

Among the many cities which are coming into prominence in the Southern States and attracting attention all over the country, there is none probably in which the application of electricity for industrial purposes has received greater attention and been more extensively applied than in Asheville, N. C. We gave a description in a recent issue of this paper of the successful opening of the electric railway installed by the Sprague Electric Railway & Motor Co., of New York, which connects the city of Asheville with the railroad depot, distant about a couple of miles. Ever since the opening of this road, which has been running very successfully and to the satisfaction of the officers of the road, as well as the citizens of Asheville.

ANENT the boom in the adoption of electricity as a motive power for street cars, an exchange says : "Is this new stride in locomotion destined to revolutionize city travel as the steamboat did navigation? Is the electric car destined to cease to be a wonder, and become familiar to all? As the handsome car, filled with its human freight, reaches up its slender arm, lightly touching with its hand the wire that looks like a spider's silken thread, it spins away, over grade and around curves, obedient to the slightest gesture of the motor man, who knows not what force he commands. Wonderful, indeed, and sometimes frightful, seems this unseen power that lightly wafts the tons of weight along, but obedient and submissive is it to him who has read its laws. It is powerful, but to serve."

The Connecticut Legislature has granted the petition of the Thomson-Houston Electric Company to increase its capital stock to fifteen million dollars. Mr. William J. Clark, of Hartford, Conn., one of the company's agents, deserves great credit for the energy and ability he manifested before the Legislature in behalf of the interests of his company. Mr. Clark received valuable assistance from Mr. B. S. Simmons, one of the promoters of the Danielson (Conn.) Electric Light company.

An exchange says: "The fact that there are seven or eight times as many electric roads as cable roads in course of construction, shows that there must be some success about them somewhere. Cable roads for heavy grades have not been equalled, but electric roads are the most successful street railroads for grades up to 10 per cent. that have ever been built."

The report of the Rochester City and Brighton railway company for the quarter ending December 31, 1888, shows that the gross earnings for operating were $121,195.77, as compared with $111,487.35, in 1887; operating expenses, $95,098.15, as against $90,243.88; net income for the quarter, $12,048.62, as against $9,530.97 in 1887.

The Sprague company is now equipping snow-plows, to be operated by powerful electric motors. It is estimated that these electrical plows will clear the tracks quicker than an ordinary plow drawn by a dozen horses, so that no snow, however deep, will be able to stop the running of the cars.

The following is the report of the 42d and Grand Street Ferry Railroad Co., (New York City), for the quarter ending December 31, last year :

	1888.	1887.
Gross earnings,	$97,994 80	$96,172.04
Operating expenses,	62,169 18	60,990.92
Net earnings,	$35,825 62	$35,181.12
Other income,	1,140.44	866.84
Gross income,	$36,966 06	$36,047.96
Fixed charges,	12,101.95	12,757.43
Net income,	$24,864.11	$23,290.53
Cash on hand,	34,947 07	8,310.44
Profit and loss, surplus,	20,798.62	30,324.04

Personals.

GEN. J. S. CASEMENT, of Painesville, O., of the street railways in Erie, Pa., and Akron, O., was at the Gilsey House, New York, last month. Gen. Casement contemplates equipping the cars on his Erie line with the new Sprague "Boston" motor, using the overhead system.

COL. VALENTINE, president of the Valentine Varnish company and treasurer of The John Stephenson company, has been quite sick with pneumonia.

MR. FISHER, of the well known firm of Pomeroy & Fisher (whose partner, Mr. Pomeroy, we well remember as one of the exhibitors at the Washington convention), will visit the Paris exposition towards the end of July. We regret to have to record that Mr. Pomeroy has been on the sick list lately.

A. W. CHADBOURNE and Wm. Hazelton, of the firm of Chadbourne, Hazelton & Co., Philapelphia, agents for the Sprague company, were met in Boston and New York the latter end of last month.

MAJOR H. C. EVANS, of the Johnson company, was last heard of in the northern part of New York state. Early in February he was seen in Newport, R. I.

JOHN A. BRILL, vice president of the J. G. Brill Co. has returned from Europe and was met at the St. James Hotel, New York, last month.

MR. TOM. L. JOHNSON, president of the Brooklyn Railway company, Cleveland, O , was a guest at the St. James, New York, in February.

MR. A. J. Moxham was in New York early in February.

FRANK J. SPRAGUE, of the Sprague Electric Railway and Motor company, will probably visit Europe during the summer if his many duties will permit of so long an absence.

H. MCL. HARDING, of the Sprague company, visited Kansas City and Chicago during the past month.

W. A. STADELMAN, of the firm of Chadbourne, Hazelton & Co., visited New York last month. When in Philadelphia the editor of the GAZETTE had the pleasure of inspecting the isolated electric light plant installed by Mr. Stadelman for the purpose of lighting his home at Bala, Pa., and a very perfect and complete plant it is. Thirty-three storage battery cells of 200 amp. hours are used, stored by electricity generated by means of a 60-light dynamo. running 1200 revolutions, and a 6-h. p. Westinghouse automatic engine running 500 revolutions. He has, in addition to the above, a small 2-arc light machine, and when all the lights, both arc and incandescent, are turned on, the house presents a most brilliant appearance. (Permit us, Bro. Stadelman, to congratulate you upon your private enterprise and to thank you for many courtesies rendered during our recent eastern trip.—ED.)

WM. WHARTON, JR., was in Newport about the middle of February.

CHARLES L. PULLMAN was met "on the street" in New York last month.

J. B. ORMAN, President of the Pueblo Street Railway Co., was met in Denver lately.

JAS. M. GAMBLE, who engineered the deal culminating in the purchase of the street car interests in Toledo, is a young man, but one of the best known of Chicago's enterprising citizens. His grandparents came to Chicago in 1827 and lived in old Fort Dearborn during the early days. James began his career when 12 years old as a messenger in one of the principal banks in this city at a salary of $10 per month. He has accumulated wealth by his energy and enterprise, and his career is a subject of pride to his many friends. Mr. Gamble is not yet 35 years of age and is the youngest self-made millionaire in the west. He is the joint owner with Mr. C P. Newberry of the Palace hotel on the North side, the chamber of commerce in Cleveland, and many other valuable pieces of property in Chicago and elsewhere.

OF MR. C. B. HOLMES, the *Herald* of Chicago says :—

Any one who has seen C. B. Holmes drive his rig through the streets can well believe that he is in favor of rapid transit. Mr. Holmes is president of the South Side cable road, and is one of the most expert drivers in town. He can get through bigger crowds and smaller holes with his rig than almost any one else in town. He used to drive an old buggy which was sturdy enough to rip the driving wheel off of a locomotive in a collision, and it was pulled by a spanking team. When the State street road was in course of construction he used to get in that old buggy and drive along the torn-up street, going over hills of concrete, mountains of iron, and billows of mud, like a ship in a heavy sea. And he has never had an accident. Now he drives his lively team to a little inclosed carriage like a doctor's rig, and the way he escapes collisions and gets over the ground is a caution. He drives as he works—on the jump.

Book Reviews.

Scribner's Magazine for March contains articles on a great variety of subjects, from the practical questions of the Railway Mail Service to the subtilties of Economy in Mental Work. Thomas L. James, Postmaster-General in Garfield's cabinet, writes of the "Railway Mail Service" with sympathy and appreciation of the faithful work done, and from the full knowledge given him by his long practical experience in positions of authority. "The Master of Ballantrae," Robert Louis Stevenson's exciting romance, has now reached an important crisis in the development of the plot. The End Paper, which is a feature of the magazine, is this month contributed by Henry James, who writes "An Animated Conversation" (in dialogue form) between several Englishmen and Americans who casually meet in a London hotel. William F. Apthorp, the musical critic, describes some of the most important of "Wagner's Heroes and Heroines." Under the title "A German Rome," Professor W. B. Scott describes the little known German city of Treves, which was the capital of a large part of the Roman world for more than a century. William McKendree Bangs writes a short story, with an ingenious plot, entitled "Extenuating Circumstances." Thomas A. Janvier, an acknowledged authority on Mexico, contributes a bundle of curious superstitions and folk-tales which he has collected from odd characters.

ECONOMIC VALUE OF ELECTRIC LIGHT AND POWER. By A. R. Foote, Cincinnati, O. Cincinnati: Robert Clarke & Co., 1889.

The object of the author is, manifestly, to be of service to those who are interested in obtaining state or municipal legislation; to those who are, or about to become, interested in electric central stations, and desire to increase their facilities until they realize the full possibilities of their opportunity; also, to manufacturers, to assist them in opening new fields for the use of their apparatus.

The book can scarcely be considered a technical work; it is historical in character, with a glance at the men and the appliances that are receiving present attention.

An appendix gives mechanical and electrical terms, explained in untechnical language.

THE TECHNO-CHEMICAL RECEIPT BOOK: Containing several thousand receipts, covering the latest, most important and most useful discoveries in chemical technology, and their practical application in the arts and the industries. Edited chiefly from the German of Drs. Winckler, Elsner, Heintze, Mierzinski, Jacobsen, Koller and Heinzerling. With additions by William T. Brannt, graduate of the Royal Agricultural College of Eldena, Prussia, and William H. Wahl, Ph.D. (Heid.), Secretary of the Franklin Institute, Philadelphia; author of "Galvanoplastic Manipulations." Illustrated by seventy-eight engravings. PHILADELPHIA: HENRY CAREY BAIRD & CO., INDUSTRIAL PUBLISHERS, BOOKSELLERS AND IMPORTERS, 810 WALNUT STREET. London: Sampson Low, Marston, Searle & Rivington, Crown Buildings, 188 Fleet Street. 1888. Price, $2.00. *Sent by mail free of postage to any part in the world.*

This is a well bound and neatly printed book of 495 pages; size of page, 7¼x5 inches.

No book of this character can be compiled without a vast amount of mental labor. Consultation, reference, research, practical knowledge and experiment have all to be exercised in order to render the information reliable and positively useful.

It is quite easy to collect recipes and formula, and to put them in a book form, but unless they are correct and accurate the book, naturally, loses confidence and sale at the same time. We like the way in which this book has been written and arranged. The reason why and the wherefore, —are often explained for adopting certain preparations or methods. The results are in many cases also given. For instance in speaking of "*Aluminium Alloys*," "*Aluminium Bronzes*," "*Aluminium Alloy for Soldering Aluminium*," "*Silver and Aluminium*," "*Gold and Aluminium*," etc., etc , we are told;—"*Roger* claims that the presence of aluminium in steel makes it very hard, and gives to it the properties of "Wootz," or Indian steel. When steel contains but 0.008 per cent. of aluminium, the articles manufactured from it, when etched with sulphuric acid, will show wavy lines like "Damascus steel."

Business Mention.

MCHOSE & LYON, of Dayton, Ohio are turning out over 15 tons per day of yokes, for Mr. Yerkes' line.

O. W. MEYSENBURG & Co. have been awarded the contract to supply the yokes, track and slot rail bolts for the Holmes Cable Railway company, in Kansas City.

FRASER & CHALMERS, of Chicago, have secured the contract from the West Side Cable company for the motive power for the Milwaukee avenue line. There will be two engines, each of 1,000 horse-power, for each of the two stations.

RAILWAY REGISTER MANUFACTURING CO.—About the largest contract ever made by the Railway Register Manufacturing Co. of Buffalo, has recently been closed by its general manager, Mr. F d. Beadle, through whom an order has been placed for twenty-five hundred bell punches for use by the West End Railway company, of Boston. In Mr. Longstreet's opinion, where more than one rate of fare is charged, the bell punch can be used to better advantage and give bhtter results than stationary registers.

AT the annual meeting of the Railway Register Manufacturing Co. recently held in Buffalo, N. Y., Col. H. M. Watson was elected president, vice James McCredie, deceased.

LEONARD & IZARD, electrical engineers and contractors of this city, have secured the contract for the construction of the electric railway which is to be put in at Atlantic City. The system is that of the Sprague company, and the road will be between three and four miles in length, with curves at each end. The road will be owned by the Pennsylvania Railroad company and will be used by them for summer travel. It will have the best of equipment throughout.

THE carbon brush now adopted by the Thomson-Houston Co. is not an experiment. It has proved beyond question that it is superior to any brush in use on any system now in operation. These brushes are only used in connection with Thomson-Houston apparatus and their use is fully protected by letters patent owned by that company.

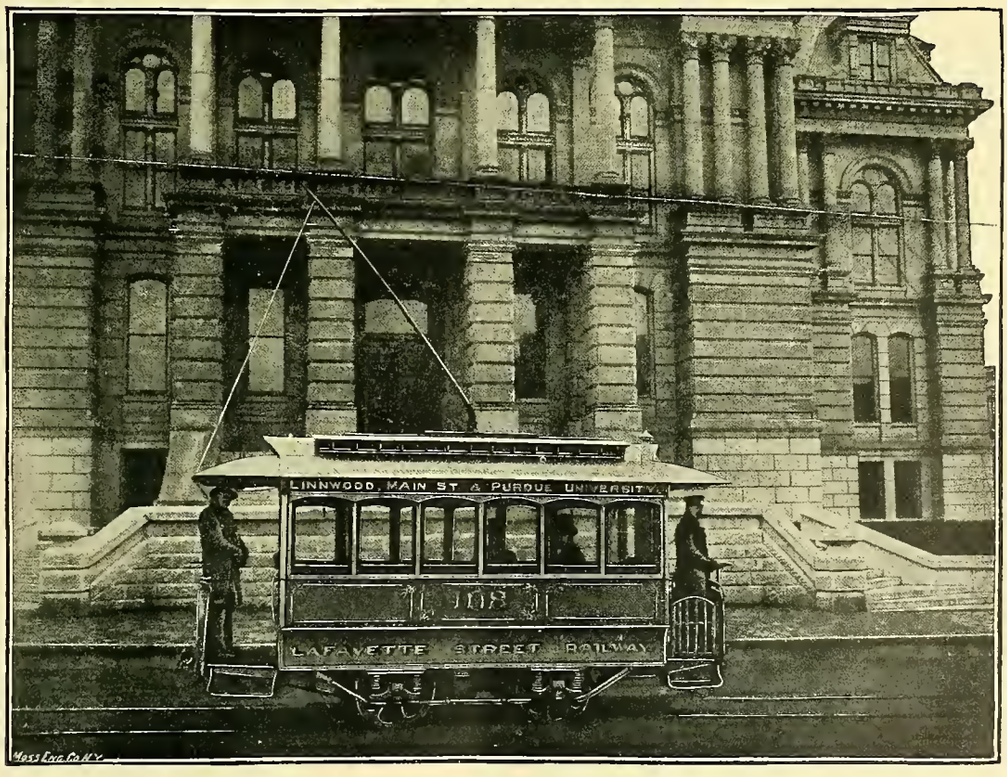
ONE of the strong points of the style of roofing manufactured by the Cincinnati Corrugating Co., is that there are no nails exposed to the weather. However, the firm in question labored under the great disadvantage of not being able to obtain the steel sheets, now available for work of this kind.

SINCE our last issue the Thomson-Houston Electric company reports the following contracts for equipment: Newton Circuit Line, Newton, Mass.; Rochester Electric Railway company, Rochester, N. Y.; Colerain Ave. Street Railway, Cincinnati, O.; Vine Street Railway, Kansas City, Mo.; Metropolitan Street Railway, Kansas City, Mo.; Omaha Motor Railway company, Omaha, Neb., aggregating fifty-two cars and nearly twenty miles of line.

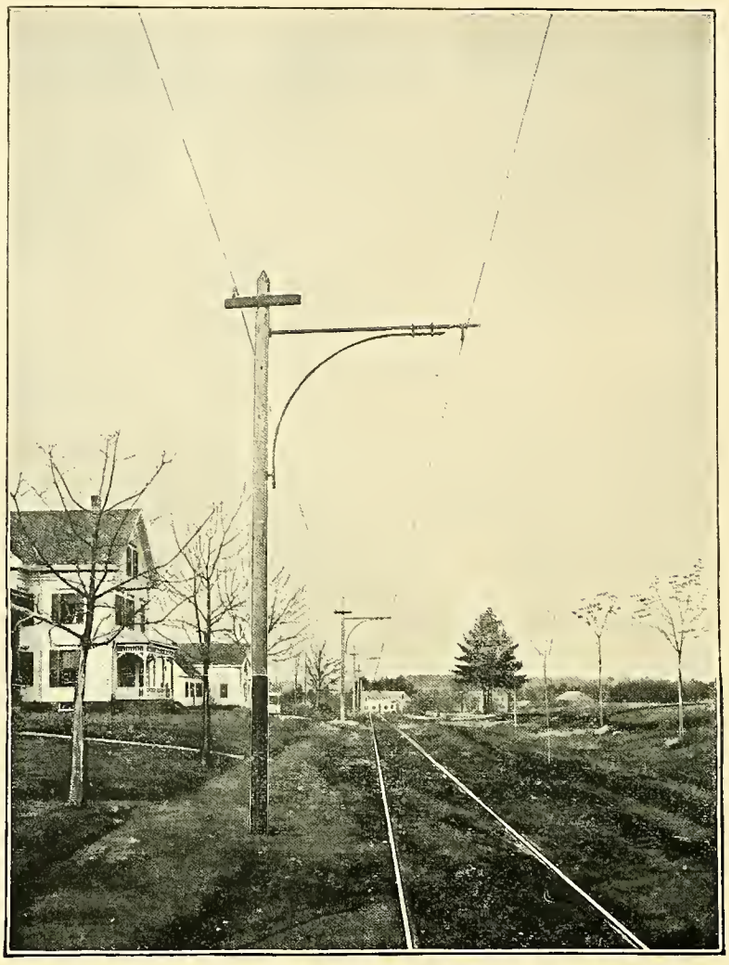
THE following is quoted from a letter written by Mr. W. S. Wales, president of the Third Ward Railway company, Syracuse, N. Y., to the Thomson-Houston Electric Co., in Boston:

"We have given a trial of both the copper and carbon brushes, and are now using exclusively the carbons, as we consider them much more satisfactory, serviceable and economical, preventing a large wear on the commutators."

Sprague Electric Railway in Boston, Mass.

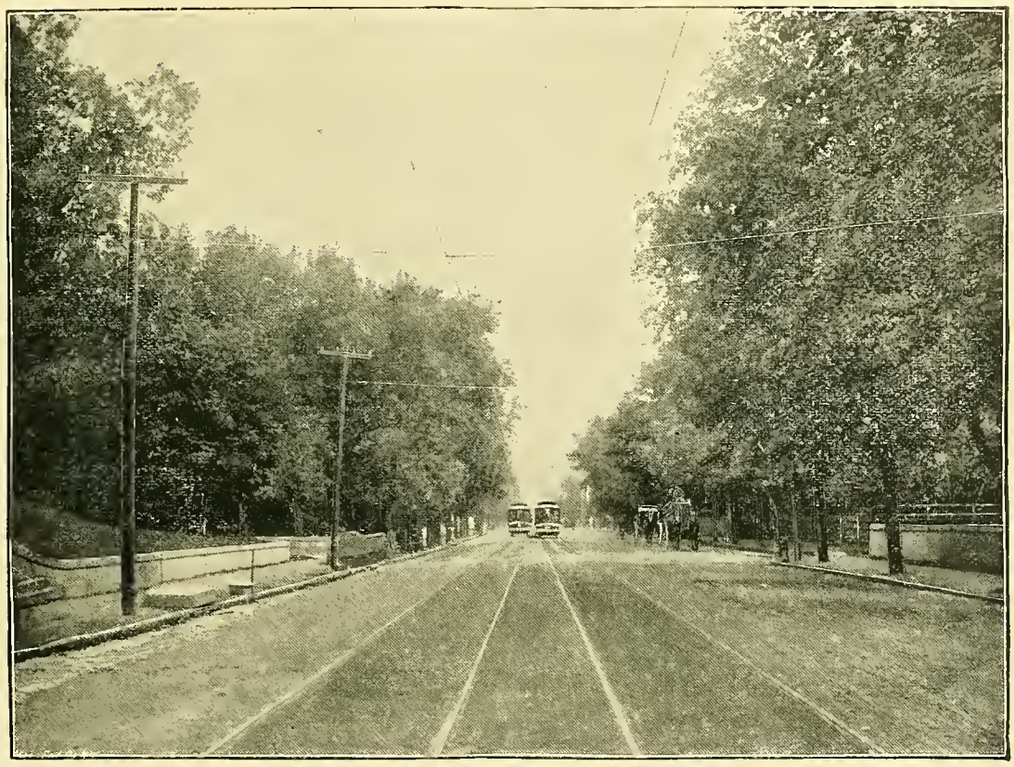


The Sprague Electric Railway in Lafayette, Ind.

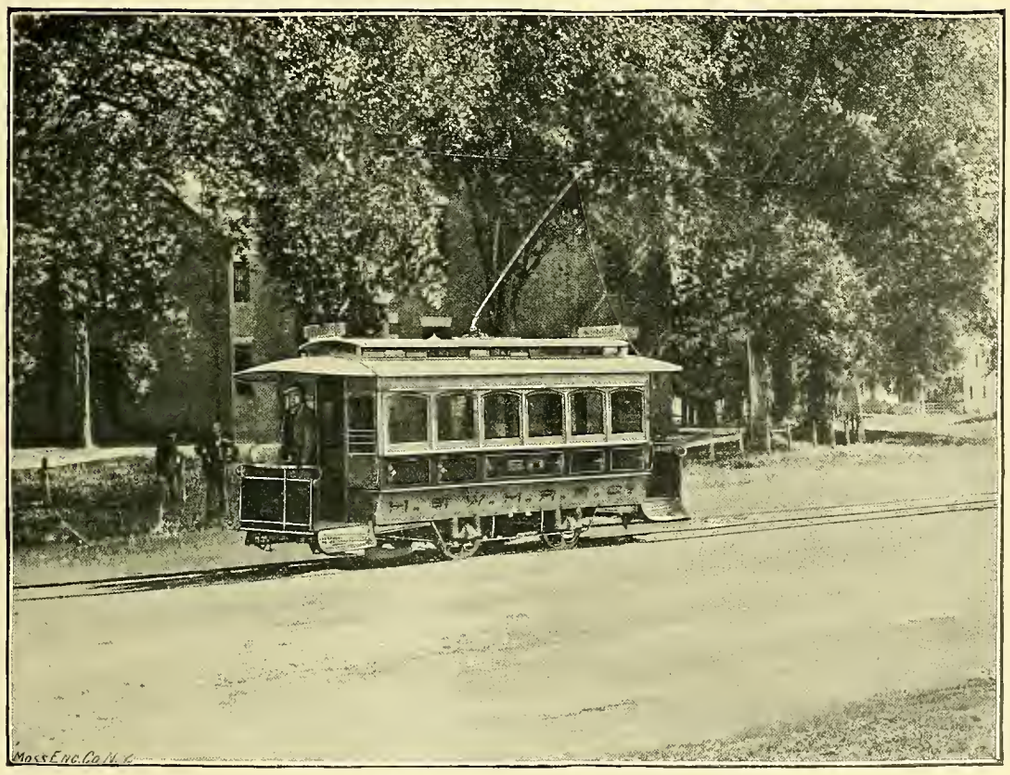


Bracket Support on East Side Sprague Electric Railway in Brockton, Mass.

Four Sprague Cars Bunched on East Side Electric Railway, Brockton, Mass.



SPRAGUE ELECTRIC RAILWAY, DAVENPORT, IOWA.



SPRAGUE OVERHEAD SYSTEM IN HARTFORD, CONN.

Sprague Electric Cars, Reading, Pa., Passing Each Other.

Wilmington City Electric Railway, with Sprague Car in Operation.

The Street Railway Gazette.

VOL. IV. APRIL, 1889. No. 4

Buffalo Street Railways—Their Inception, Progress and History.

Twenty-eight years ago some public spirited citizens of Buffalo, believing that the rapidly increasing population of the city demanded means of transit more rapid and convenient than those given by the lumbering stages then operating, and which had been in existence since 1835, conceived the idea of starting a street railway. Just who was the first to suggest the feasibility of the scheme is not a matter of record, but to the late Stephen V. R. Watson, whose picture adorns the tickets used on the Buffalo lines, belongs the credit of organizing the first street railway enterprise in Buffalo. His indefatigable and untiring energy, backed up by the Hon. E. G. Spaulding, who placed a large amount of his abundant capital in the scheme, perfected the organization known to-day as the Buffalo Street Railway Co. It was capitalized at $100,000 and its officers were: President, S. V. R. Watson; vice president, G. R. Wilson; secretary, C. T. Coit; treasurer, A. J. Rich; managing director, Walter Carey; superintendent, C. W. Miller. Ground was broken for the original May street line on May 19, 1860, and cars were operating therein on June 11th. The Niagara street line was opened June 23d of the same year, and the Main street line extended to Cold Spring on July 14th.

The roadbed as then constructed would be a curiosity to the engineer of to-day. Cast iron rails, each about 10 feet long, were laid upon the pavement, or in the dust, without stringers, bolted together end to end, and kept from spreading by frequent cross rods. A gauge of 4 feet, 10 inches, was adopted. Four years later the Genesee line was opened, and in 1873 the Exchange street line, which same year first saw the introduction of the bell punch. The opening of the William street line to East Buffalo, and that of the Michigan street line, from the docks to Goodell street, followed the next year, and twelve months later this latter was opened as a through line to Ohio and Main streets.

Four years after this the Main street line was opened to the park, and in 1880 the Virginia street line, together with the through line from Black Rock via Connecticut and Allen streets, to Cold Spring were in operation. Extensions to the system followed rapidly, the Allen street line being opened in '82, the Emslie street, Jefferson street and Jersey street belt lines being constructed in '84, the Carlton street, Broadway, Ferry and Chenango street lines in '85 the West avenue line the following year, and the Broadway line extended to Williamsville road in '87. Last year saw the Forest avenue, Jersey and Baynes street and the Jefferson street lines all open to the park

Col. Henry M. Watson first became officially identified with the Buffalo St. Railway Co. in 1868, when he succeeded Secretary Coit. Upon the death of his illustrious father, Mr. S. V. R. Watson, the executive control of the affairs of the corporation passed into his hands, and in June, 1881, he was duly elected to the presidency of the company, which important office he has held to the present time.

Simultaneously with the formation of the Buffalo Street Railway Co., the Niagara Street Railway Co. was incorporated and capitalized at $80,000, but, after a brief and profitless struggle to build up a paying traffic, transferred its Black Rock line to its cotemporary and went into liquidation.

The East Side Street Railway Co. was organized in 1874, with a capital stock of $100,000. Its original officers were: Joseph Churchyard, president; Alexander Brush, vice president; and Henry M. Watson, secretary and treasurer. Upon the resignation of Mr. Churchyard, in '79,

COL. H. M. WATSON, PRESIDENT BUFFALO STREET RAILWAY CO.

he was succeeded by Mr. S. V. R. Watson, who, however, died the following year, when the presidency passed into the hands of Mr. Samuel S. Spaulding.

From the time that Col. Watson assumed his present position he commenced to extend operations in every direction, and to spare no effort to improve the quality of the service in every particular; the old cars have been retired and replaced by those second to none in the country; a better grade of horses has been procured, and the old road construction entirely replaced. The conductors have been neatly uniformed and the fares considerably reduced. The system now embraces some 60 miles of track, over which two years ago, and with only 200 cars in operation, over 10,000,000 passengers were carried.

Col. Watson is an earnest advocate of quick transit, and we well remember his giving orders for cars equipped with storage batteries, at the Philadelphia convention. He has also experimented with the Eleison motor, which was imported from England for that purpose. The question of the adoption of some system or other of electrical propulsion is still under the consideration of the Buffalo Street Railway Co., and since our last issue Col. Watson has visited Boston, New York and other cities on a tour of inspection of electric propulsion as applied to interurban service. In conjunction with Messrs. H. H. Littell, J. R. Rugg, Walter Jones and Frank Longstreet, Col. Watson was one of the founders of the A. S. R. A. The only convention he ever failed to attend was that of last year, when he was laid up in Boston, with what it was feared would prove a fatal attack of peritonitis. Without a doubt he could have been president of this association as far back as the St. Louis convention, but, for reasons best known to himself, he has, thus far, discouraged all action tending to his election to that important office. Unless, however, indications count for nothing, it would not surprise us to see Col Watson wielding the gavel of the A. S. R. A. in the near future, and, should he do so, the honor thus conferred upon him, will certainly have been well earned.

OF Gen. P. A. B. Widener, the street railway magnate of Philadelphia, New York and Chicago, the N. Y. *World* says: "His face is a familiar one on the boulevard, but the form which strode beside him on Broadway yesterday is much more rarely seen in this city. In Philadelphia, however, they are seldom seen apart. Besides being bosom friends, they are business partners. The other man is William L. Elkins. He is portly, broad-shouldered, gray-haired and gray-mustached. He is a total abstainer, but much outdoor exercise has made his face deeply florid. He began his business career as a small dealer in butter and eggs, and for a while conducted his affairs in this city. To-day he owns, it is said, more land than any man in this country. He has long been a powerful director in the Standard Oil Company, and it is his quiet boast that he has expended $10,000,000 for that corporation without ever having an audit made of his accounts. His fortune, in fact, had its beginning when he was a prospector in the oil regions. He is also an influential director in the Pennsylvania Railroad Company. He honestly admits that he does not know how much money he is worth, but the amount is not less than $10,000,000. He takes an active part in the conduct of the gigantic railway system which he and Widener control, and he feels absolutely assured that he will have a cable humming beneath the surface of Broadway before many days. Upon the strength of this belief an effort will be made to bull Metropolitan Railway stock to 200"

Tramway Rails, Connections, Etc.

(*Continued from page 47 in March issue.*)

Tramways de Vienne.

This line has one and two-horse cars which will transport passengers as follows: 2-horse cars, winter cars, inside, 18; outside, 15; saloon cars, inside, 18; outside, 19; summer cars, inside, 18; outside, 21; 1-horse cars, winter, inside, 12; outside, 14; saloon car, inside, 14; outside, 14; summer car, inside, 12; outside, 19.

B. Fare is collected by the conductor. Commutation tickets, as well as ten-trip tickets, are sold at the central office and in certain other places. Inspectors as "verifiers" are charged with supervision of the ticket business of conductors, as they are either attached to a certain line or, at their own volition, can enter any passing car whenever they feel so disposed. These inspectors examine and verify the transfer tickets presented at the second and third car. In our system there are special tickets for trips of different prices according to our tariff. These tickets are of various colors or printed in different colored inks—red, black, etc. The coupons are numbered 1 to 40,000; this we designate as a series, and the tickets are bound in books of 100 to 200 each. All books of the same series have a large letter in the centre. This letter varies every day and makes the controlling of the transfer ticket account very easy. We cause to be printed at one time 25 letters, *i. e.*, 1,000,000 copies of each kind of coupons. The coupons which are delivered to each conductor are noted in a stub book, the copy of which is delivered him for his use during that day. The coupons remaining on hand at the close of the day's accounts are sent to the central office, which uses them up until the bookfull is exhausted or becomes so small in size that it can be officially destroyed with but small loss. Each ticket delivered on the cars is only good for that one trip.

In addition to that ticket we have: 1st. Commutation tickets good for one month and for six months, with privilege of riding as often as the purchaser wishes to during that period (*a*) on certain branch lines and (*b*) on the whole system. 2d. Tickets on branch lines, allowing two trips per day, going and returning, not transferable and only valid at certain designated trips. 3d. Certain weekly commutation tickets, good until 7 o'clock, a. m., only on the branch of Ring. 4th. A weekly ticket, good for a daily round trip on a certain line. The weekly tickets are only good for six consecutive days. In addition, we have two species of commutation tickets, one good for the suburbs to the city and another to the interior of Vienna; these tickets are in packages of ten and are good for a daily trip. The conductor receives these as ordinary tickets.

C. In our horse railway system, on all our line 132.75 m. per minute.

D. Two hundred and eighty-nine metres.

Nouvelle Société des Tramway de Vienne.

A. The general make-up of a train is one locomotive and two cars, seating 20 to 28 passengers. These cars are of two kinds: 1st. Mixed cars, either moved by horse or steam power, consisting of open cars weighing 2400 kilos. and closed cars of 2700 to 3050 kilos. 2d. Steam cars, exclusively used with locomotives; weight, 3660 kilos. The greatest number that enter into the composition of a train is limited to four by order of the authorities, and really, our motive power, the condition and topography of the road and the number of passengers we daily carry, would not allow us to increase the number. Generally the length of the train is governed by the passenger travel.

B. Our steam cars are manned by an engineer and fireman for the locomotive and a guard for each car; the guard in the last car acts as the chief of the train. The fare is received by these guards. When travel is heavy we have collectors at the different ends of the roads. This part of the business is supervised by inspectors who exercise surveillance in the matter of the trips and receipts. Sundays and holidays certain agents of the company are added to the inspector force. Our system of tickets is now undergoing a change, however, of which we will advise you later.

C. The usual speed of trains is from 9 to 10 kilom. in the populated part of the city and 14 to 15 kilogrammes in the open country.

Snow Broom for Use on Electric Railways.

Anticipating the usual New England winter, the Thomson-Houston company designed a snow broom (shown in the accompanying cut) for use on the Cambridge Division of the West End Street Railway. The truck, which is of the Brill type, (J. G. Brill Company, Philadelphia, Pa.) and has a five foot wheel base, is equipped with a 30 h. p. motor geared to drive the truck at a speed of 12 miles per hour. The snow broom is 30 in. in diameter and set at an angle of 45 degrees. It is driven by a stationary motor of 20 h. p. at a speed of 100 revolutions per minute. Only two men are required to operate the broom, the brake and controlling mechanism being placed in such a position as to render it an easy matter. The broom was used for the first time during the snow storm which visited Boston Sunday, March 31, and worked admirably, and it was also tested by placing bricks and boards in front of it, and the way these were brushed aside to a distance of four or five feet from the track, leaves no doubt of the ability of this appliance to cope successfully with heavy storms. The company has also built a much larger machine, with 36 inch wheels and fitted with two brooms and a scraper, which will be able to deal with the severest storms.

Permanent International Tramway Union.

BRUSSELS, March 12, 1889.

To Editor Street Railway Gazette, Chicago, Ill.:

We submit you the following questions, to be considered at the general convention of the Permanent International Tramway Union, at Milan, Italy, August 29, 30 and 31 of this year.

A. RELATIVE TO ANIMAL TRACTION.

First Question.

1. What breed of horses have given the best results in your enterprise and why have you concluded to prefer them to others?

2. Between what ages do you work them and what are the special conditions of nourishment and what work are they best adapted for?

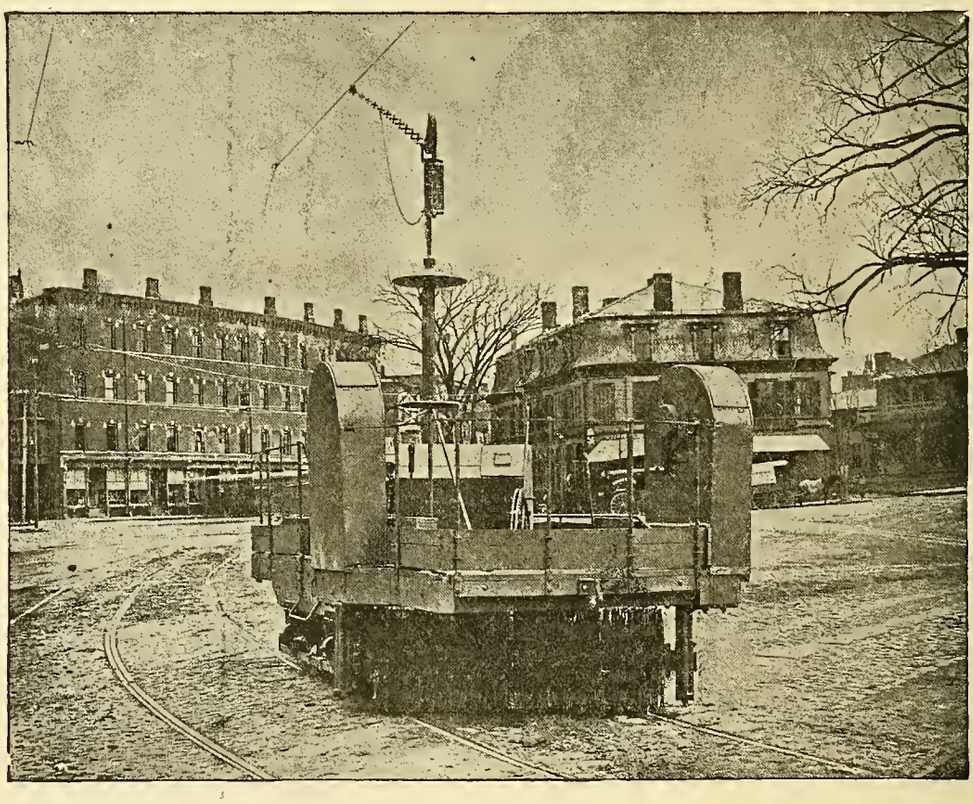
3. How long do you consider these horses fit for service? What is the average purchase price at the place of production — also where you are located?

Second Question.

1. Describe the system of horse-shoes you employ in your enterprise — in summer—in winter.

a. The average weight of the fore and hind shoes.

b. The outside width and thickness of their several parts.



SNOW BROOM FOR USE ON ELECTRIC RAILWAYS.

The Thomson-Houston Electric System.

Of the Thomson-Houston electric road, which is in operation at Omaha and Council Bluffs, and over the new public bridge connecting the two cities, T. J. Evans, General Manager of the Omaha and Council Bluffs Railway and Bridge company writes:

"Our company is running 20 cars 12 hours on five tons of slack, cost $1.14 per ton. We drive our cars with 200 horse-power dynamo and 250 horse-power engine, and can run perhaps as many more cars on the same power. Our engine and boilers are not half so large as those in use at the Omaha cable works. Our expenses per car are not more than half of that of the cable at Omaha. I have devoted one year to electrical propulsion for cars, in examinations of the various systems and roads, noting defects, and constructing our line. I have no hesitancy in stating that all failures of electrical roads, as well as cable, are mechanical. I am perfectly familiar with both systems of railways and have no interest in either, and I would rather invest my money in an electrical railway than a cable, unless in a large city where travel is concentrated."

c. The peculiarities of your shoeing for frosty seasons.

2. What are the advantages and disadvantages of the systems you employ.

The members answering this question are requested to prepare a small collection of horse shoes (new and used), as well as the screws and frost nails they employ. The collection should be sent for purposes of illustration, and will be exposed at Milan in the hall where the general convention assembles.

B. RELATIVE TO MECHANICAL TRACTION.

Third Question.

1. What special means of security have you adopted in your enterprise?

Do you employ watchmen at fixed points on your line?

When passing the thickly settled part of your city does a special employe precede your cars.

2. Have you adopted these measures because you deem them necessary, or on account of police regulations?

Mention the requirements of these regulations.

Fourth Question.

1. Of how many cars is your usual train composed? What is the seating capacity of each

car? In case of heavy passenger travel how many cars do you attach in one train? By what considerations (motive power, grade, police regulations, etc.,) is the number of cars composing a train limited?

2. What is the usual speed of your trains?

a. In the thickly settled parts of the city?

b. In the open country?

By what considerations (motive power, grade, police, etc.,) do you govern the greatest speed of your trains?

Certain points in this question have been discussed at the general convention at Brussels. Nevertheless, in view of the comparatively few companies which have treated upon the subject we invite the companies who operate mechanical traction tramways to reply thereto in as exhaustive manner as possible.

Fifth Question.

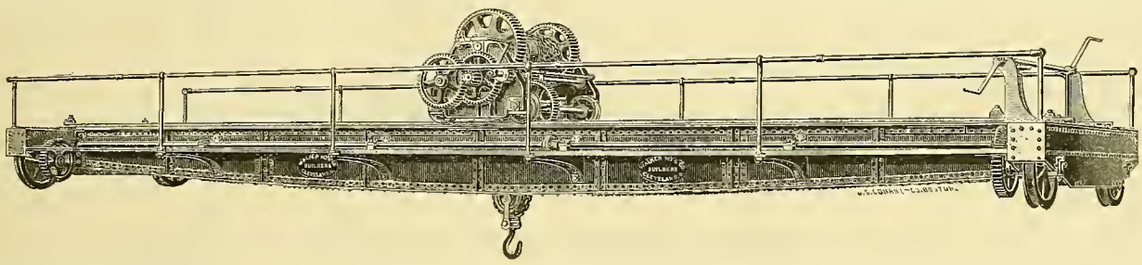
A. What mechanical motor do you employ at present for traction in your city?

1. If you employ steam motors mention:

a. The diameter of cylinders;
b. The piston stroke;
c. The diameter of the wheels;
d. The tread of the wheels;
e. Heating surface;
f. Steam pressure;
g. Boiler and fire box capacity;
h. Weight of motor when empty and when in service;
i. Amount of fuel used on motor trains;
k. Peculiarity in construction of smoke stack;
l. Means to suppress smoke and condensation of exhaust steam;
m. System of brakes;
n. Kind of fuel;
o. Power of the traction;
p. Crew needed to manage same.

2. Describe what motors of other systems you employ.

B. What is the development in your suburban trains?



C. State the grade in your road, the minimum lines of curves and greatest deflection in your line.

D. What are the advantages and disadvantages of the motors you employ, and what are the improvements that you would consider desirable?

Sixth Question.

What coupling devices do you use?

1. Between locomotives and cars;
2. Between cars.

C. QUESTIONS OF GENERAL INTEREST.

Seventh Question.

What are the causes of the jars that take place on entering curves?

What course is necessary, both as regards construction of the cars and road, to avoid these jars?

We would earnestly request you to send your replies by May 15, the very latest, to M. Nonnenberg, Secrétaire Général de l'Union, 49 Rue du Vautour Bruxelles

F. NONNENBERG, *Sec.* G. MICHELET, *Pres.*

Improved Rope Drive Power Traveling Crane.

The large cut, shown herein, represents an Improved Rope Drive Power Traveling Crane of 12 tons capacity, 52 ft. 8½ in. span, recently built* for Ranken & Fritsch Foundry and Machine Co., of St. Louis, Mo.

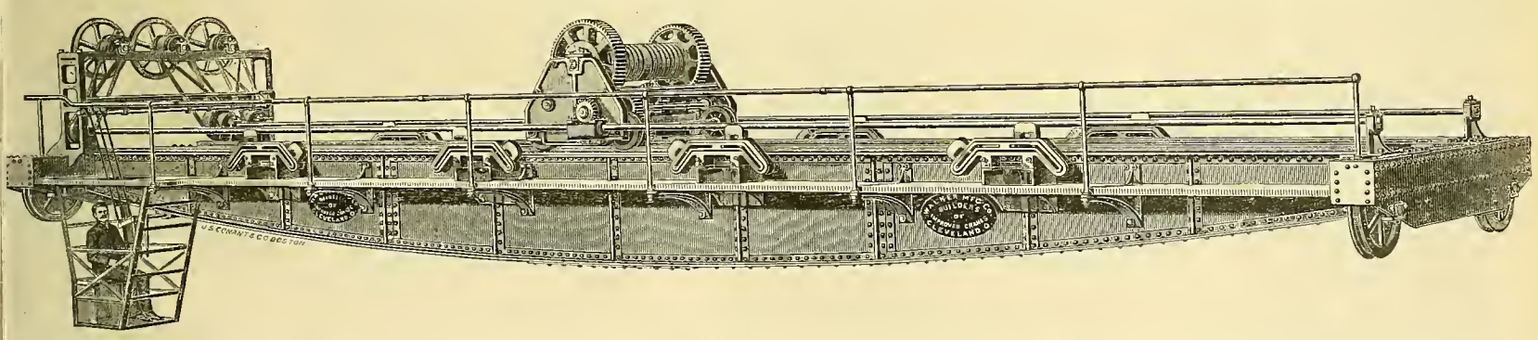
The main cross and end girders forming bridge are made of steel plates, re-inforced by steel angle and tee irons, all thoroughly riveted and secured together. The main truck wheels supporting the bridge are of cast iron with chilled rims, secured to steel axles supported in bronze bearings. The longitudinal traverse of this crane is effected by means of a cross shaft connected by spur gearing with the axles of a pair of the truck wheels, in connection with the driving mechanism located at one end of the bridge.

The trolley carrying the hoisting mechanism is supported on low steel rails secured to top of main girders, and consists of heavy cast iron sides mounted on cast iron wheels having chilled rims which are secured to steel axles operating in bronze bearings. The cross traverse is effected through a cross shaft supported in improved tumbler bearings, which are secured to main cross girder, the shaft having feather seats throughout its length, and, on which, a steel worm is carried, which engages with a worm wheel having a phosphor bronze rim, this wheel being secured to a shaft on the trolley, having connection through spur gearing with the axle of one pair of the truck wheels of trolley. The hoisting mechanism consists of a heavy cast iron barrel with right and left hand spiral groove for the chain, which admits of the block ascending and descending perpendicularly, thus maintaining an equally distributed load on each of the two main cross girders. The barrel is secured to a steel spindle supported in bronze bearings, and is operated by spur gearing in connection with worm gearing similar to that already described, and arranged with slow and fast speeds, with clutches connected together so that one movement disconnects one set of gears while connecting the other. The barrel is also fitted with a rachet and pawl as an additional safeguard.

The driving mechanism is located at one end of the bridge. On the ends of the three upper or driving shafts of same, rope pulleys are secured which are driven by an endless rope; from these shafts open and cross belts convey power for manipulation of crane.

The crane has a platform with handrailing along one side of the main girder, and also has a cage on the same side at one end of the bridge in which the operator sits and commands a view of the entire shop and crane. The seat in this cage is a tool box, in which all necessary tools may be kept. The three operating levers, giving six motions to the crane, three of which may be in operation at the same time, are conveniently located for operator.

*Walker Manufacturing Co., Cleveland, O.



The smaller cut shows a crane of 12-ton capacity, 42 ft. 6 in. span, of the same type as the one just described with the exception of omission of the rope driving mechanism, same being operated by hand by means of cranks; which is shown in smaller illustration. This crane was located so as to be accessible to all parts of the massive machinery in the power house of the St. Louis Cable and Western Co., which was also furnished by the same parties.

CORRESPONDENCE.

Our Kansas Letter.

At last, after many months of work, the Topeka Rapid Transit company has successfully applied electricity to its rolling stock, giving the patient mule and the steam motor, it is to be hoped, a permanent "lay off." For some time the company has been experimenting with the motors and machinery in a quiet way, not caring to make a public exhibition until everything was just right. On the morning of April 2nd four motors were filled with about 100 invited guests, and the cars moved off without a hitch, soon attaining a speed of eight miles an hour. The two heavy grades that occur in the track were easily overcome, the violent jerkings of the steam motor being missed. The ride to Oakland, a suburb of Topeka, was soon accomplished. This is a town of 1,500 people, and owes its advancement to the Rapid Transit company, which is chiefly interested there. On the return trip, the cars were stopped at the power house, where the plant was inspected. The building has a frontage of 100 feet, and a depth of 85 feet, and part of it is two stories high. The entire structure is of brick; at the rear of the building is a massive brick chimney, 125 feet high. The power used to generate the electricity consists of two engines of the Corliss type, built by E. P. Allis & Co., of Milwaukee, Wis., subject to a special order by L. H. McIntire, the mechanical engineer, who has designed and overseen the construction of the entire plant. The combined power of the two engines is 900 horse power; a battery of five steel boilers supplies the steam for the engines. At this station are five dynamos, which generate the electric fluid. The outgoing current runs through an overhead wire, and returns through the rails. The overhead wire is 7-8 copper, and suspended 16 feet above the rails. The motors used on the cars are each of ten horse power; the company only has a part of its line in operation as yet, but ere long will have over 20 miles.

The North Topeka, Silver Lake & Rossville Rapid Transit road has changed hands again, having been sold to Judge Evans for $2,000. Taft & Co., of Chicago, who held the company's notes, have since purchased the entire business to protect themselves. The amount paid was $500. The road is for sale.

The Riverside & Suburban Electric Railway Co., of Wichita, will soon be ready for business. Six cars will be in operation. JAYHAWKER

TOPEKA, KAN., April 5, 1889.

Rapid Transit for Chicago.

By H. A. Stoltenberg, C. E.

Much has been both said and written regarding what is known as rapid transit, and franchises already given to two companies for the construction of elevated railways cannot but cause the citizens of Chicago to look with anxious eyes for the outcome of these seemingly disinterested efforts for their accommodation and the city's welfare. In view of the immense growth of the city it is an open question as to whether or not any of the proposed systems of elevated transit are really suitable to fulfill all the requirements that such growth will demand; likewise is it of equal importance who shall conduct enterprises and projects of such importance to the city and pertaining so intimately to the common weal.

Fig. 1.

History knows of no other city in which almost a million inhabitants have sprung up within a little over half a century from its incorporation; and it is, therefore, but natural that its citizens should point with pride to a growth so unprecedented and, at the same time, use the utmost care in the adoption of any innovation that may, in any way, directly or indirectly, affect the interests of the city proper or its citizens.

As a general rule, past experiences should indicate proper methods for the future, and, for this reason, if for no other, the thought suggests itself, that the future growth should be taken into consideration in all undertakings that may affect so seriously the present and future value of property. And, if this is true in the case of individual enterprises, it is evident that even greater care should be taken in coming to a decision as to which of the many methods suggested for elevated transit should be adopted, as any mistakes, once made in that direction, are exceedingly difficult and sometimes wholly impossible to rectify. Assuming this hypothesis to be correct, we should take into consideration the annual percentage of increase in the city's growth and development, before deciding which method of rapid transit is best adapted for the fulfillment of all requirements, as also the reason for the phenomenally rapid growth of the city in a comparatively short period of time.

The geographical location of the city of Chicago makes it only natural that it should have been selected by the trunk lines of railway as the main distributing point for the great Northwest, and its favorable location on Lake Michigan makes it the natural gate of commerce between the immense wheat fields of the Northwest and the eastern markets.

For these reasons it is but fair to premise that the growth and development of the city is permanent and steady, rather than the effect of a mere temporary boom. Accordingly it will be nearly correct to assume, if only for the sake of argument, that the future development of the city will be in proportion to that in the past, at least until the time comes when all the Western states and territories shall have become thoroughly settled and their resources ready for the Eastern markets. If this is so, and allowing that most of the suburbs of Chicago become a part of the city, as their annexation is merely a question of time, the census of the future should be about as follows:

YEAR.	POPULATION.
1910	2,500,000
1930	4,400,000
1950	6,700,000
1970	9,500,000

It is safe to say, however, that the increase will be much dependent upon the attitude of the administration as regards accommodations for the citizens and their business interests; therefore, is it of the greatest importance that the means of transportation from the business center to the residences within the limits of the future city, should be properly and duly considered.

Some form of rapid transit, still more rapid than that at present accorded, is, to-day, demanded, and within a short time will, undoubtedly, become an absolute necessity, and we know of no way by which this can be attained except by means of either elevated or underground railways, similar in many respects to those now operating in other cities.

Owing to the course of the Chicago river through the city, it is evident that elevated roads similar in construction to those in New York would be illy adapted to the purpose, as it would be practically impossible to maintain a regular, disinterrupted service, for the reason here given. If elevated roads, operating from the West or North sides, only carried passengers to or from the river, they would be left just where an elevated railway should be of the greatest avail, as they would then still be exposed to the present bridge troubles; and this alone would justify a condemnation of the adoption of a system similar to the New York structure, while the expense of building new bridges and their approaches between the streets, would be another objection, and, undoubtedly, the shipping would be put to such inconvenience and trouble that it would not hesitate to give Chicago a wide berth, whenever possible.

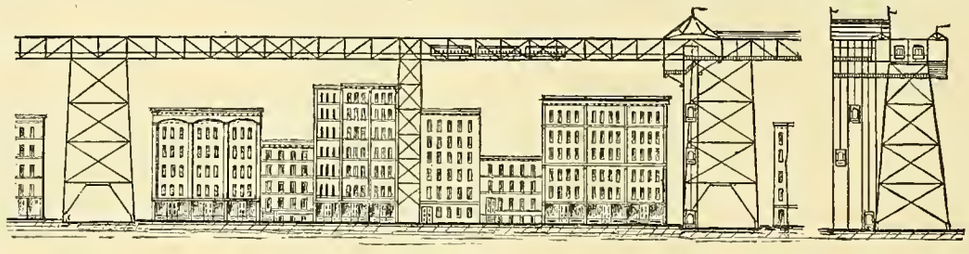


Fig. 2. Fig. 3.

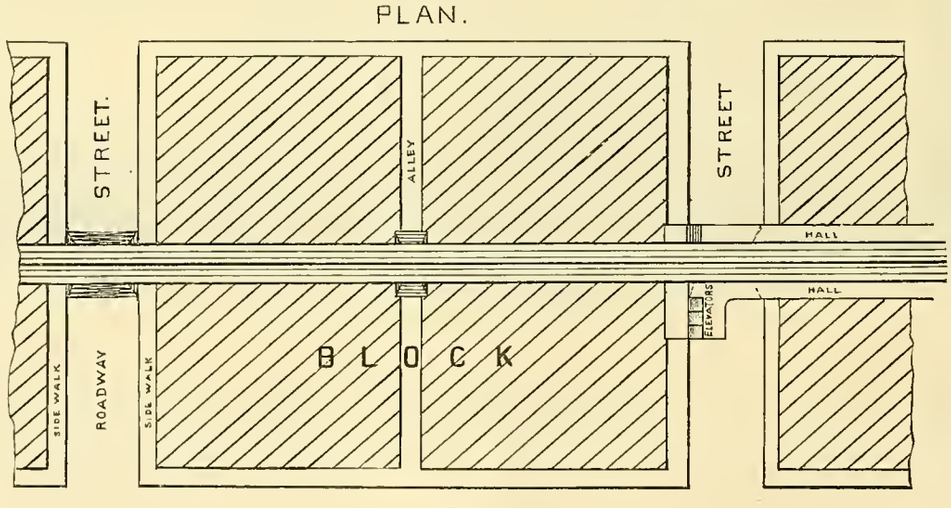


Fig. 4.

Another most serious objection to the adoption of any of these systems of elevated roads, is that, in less than forty years from now, we should have them in nearly all streets running through the center of the city, similar to the present horse-car lines, and it is a well known fact that the street through which an elevated road passes loses its aspect as a business thoroughfare to a great extent, owing to the noise, smoke and dirt that this brings about, and, for similar reasons, is also the means of rendering the same unfit for residence purposes. These disadvantages have shown themselves so plainly in New York City, that the systems in use there are publicly denounced and preached against, their present utility and financial success notwithstanding.

In this respect the projected elevated alley roads would be somewhat better, running through the block, as their name implies, in the alleys, as the disadvantages of street obstruction in this case would be removed. A franchise has already been granted for an alley road on the South side, but the removal of costly buildings and the consequent extraordinary heavy expense of securing the right of way, together with the slow process of condemnation suits will, undoubtedly, combine to postpone the construction of this road to the remote future.

But even this last mentioned system would require swing bridges for the West and North sides, and a regular thoroughfare, or a rapid transit, becomes absolutely impossible where the road dependent upon, and interrupted by, such structures as these.

A perfect system of reliable rapid transit can only exist where the entire road is constructed in one disinterrupted whole, for only then can the different sections of the city receive direct communication with their center and between each other.

This could be theoretically obtained by underground railroads, as a depth of the road of about sixty feet underground would avoid the river, and, of course, the objectionable street obstructions do not exist in this case. But the travel through such long tunnels is so exceedingly unpleasant and unhealthy that in London, England, where a complete net of underground railroads is in operation, the old fashioned surface omnibus is preferred, even for long distances. The moisture in the atmosphere in a long tunnel located far below the surface of the water, cannot be sufficiently ventilated even by the best known appliances. Suppose the tunnels, after having been run under the river, were raised, and brought to an open surface entrance, as on Vanderbilt avenue, New York, then the sewers alone would cause so much trouble that open cuts would be entirely out of the question.

When this system is, however, favorably considered for the city of New York, we must bear in mind that the conditions there are, likewise, vastly different. New York is located on a long island, running north and south, ten miles long, and two miles wide, separated on the east side from Long Island by the East River, and, on the west side from the continent, by the North, or Hudson, River.

A direct connection on the east with Long

Island and on the west with the continent is therefore of immense importance for New York. The bridging of the East River, 1,600 to 3,000 feet wide, and, more so, of the Hudson River, from 3,000 to 5,000 feet wide, for this purpose, is far too expensive a project to contemplate, and such projects would be out of the question in connection with the financial success of an elevated system.

Thus the underground railways only remain feasible for New York, if a disinterrupted connection with the east and west is insisted upon, though undesirable as the system otherwise may be.

All the before mentioned disadvantages and objections to the underground and ordinary elevated roads, can be obviated by securing elevated roads at such a height that they will permit the passage of vessels beneath them without interruption of the traffic.

The highest point that would have to be reached would be about 130 feet above the high water level of the river, or 120 feet above the level of the streets. (See Fig. 1.)

Very little noise would be apparent from the operation of an elevated railway built at such an altitude, neither would the structure darken the streets. But instead of running the road through the centre of the streets, we would suggest that the structure be carried above the roofs of the houses, and across the blocks, although, undoubtedly, no little difficulty would be experienced in securing the right of way. But we know of no other arrangement whereby an elevated railroad that will not obstruct in any way the streets nor interfere with navigation and that will at the same time transport passengers from the South or North or West sides can be successfully engineered and operated.

On account of the great danger in case of fire, and because the streets would be too much darkened by the structures, restrictions as to the maximum height of buildings will doubtless be introduced in Chicago in the near future.

The construction of elevated railroads on this principle, appears at first wild and fantastic, but on closer examination the objections relative to costs, etc., as well as danger disappear. Although the project has been carefully examined and criticised by several competent engineers, no objections have been set forth as to the practicability of the scheme.

In the northern part of New York City, the elevated roads are built at an altitude nearly suitable for Chicago, owing to the uneveness of the surface—and trains run in this case in straight lines and sharp curves, with the same safety as in the southern part of the city on the regular level. The dangers to which people are subjected, who live below such elevated roads are imaginary, as during the thirteen years of existence of the New York elevated roads, not a single serious accident has occurred there. Only once during this period has the traffic been disturbed, namely, on account of the blizzards of last March If a case like this is cited as an argument against the construction of an elevated system, it should equally apply to a surface railroad on account of snow.

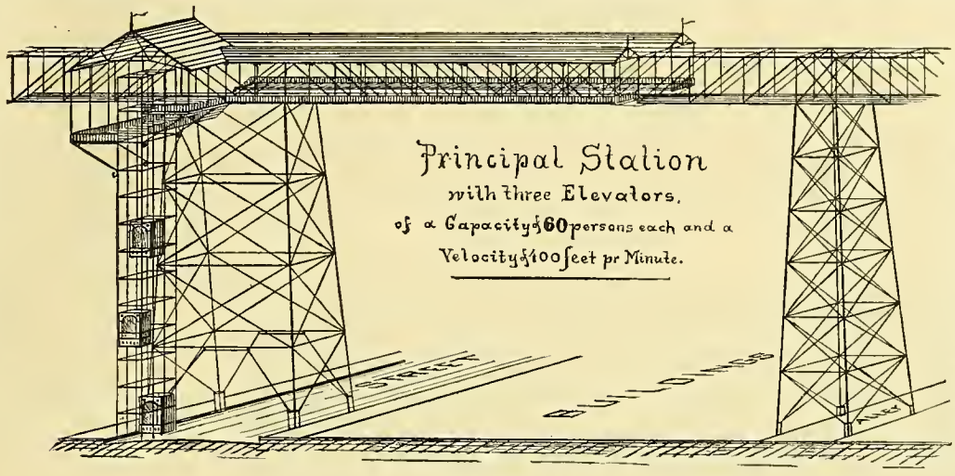


Fig. 5.

As the cars would have to run in guiding troughs or between guard rails, the danger of de railing is practically avoided. The noise can be prevented by a proper bedding of the rails, as is done in the case of the Berliner Stadtbahn, in Germany. The danger of fire could be diminished by locating water pipes on the girders.

Fig. 6.

Of course the construction of a road at this altitude on iron or steel piers, and more especially owing to the longer spans, would be quite expensive, but only in a few cases, if at all, would it be necessary to run the spans in one length over the entire block, as in most instances there would be room for intermediate piers inside the block. (See Figs. 2, 3, 4.)

It would not be necessary to run the entire road on the same level, but to provide for a belt line, to be built later on, it should be on this level from north to south between North avenue and 22d street, and west to Halsted street. Further out the height of the road might be lowered, until it reaches that of the ordinary elevated roads, i. e.: about twenty feet above the streets.

To obviate the trouble of reaching stations so high up, by tedious stairways, elevators could be constructed in and near the center of the city, in place of the ordinary stairways, which would be out of place where the road is run above the usual height, though farther out towards the city limits, and in the suburbs they would suffice. The additional cost of constructing and running elevators in place of using stairways exclusively would not affect the total cost materially, but, owing to their great convenience they would considerably increase the volume of traffic. The inconvenience of high stairways, especially for ladies, has shown itself in New York so plainly that the construction of a number of fast running elevators in substitution thereof has been gravely considered, the prevailing idea among engineers being, that the increase of traffic that would accrue from the erection of these elevators, would amply compensate for the cost of constructing and operating them. One elevator would be sufficient for each station, except in the business center, where two or more might be required. The total capacity of 15 elevators for 60 persons each, on 6 principal stations (see Fig. 5) inside the business center, making one round trip in 1½ minutes, would be 36,000 persons per hour. The New York elevated roads carried 115,000,000 passengers during the year 1886, or about 316,000 per day. This shows that a comparatively small number of elevators would be adequate even for New York City.

In the business portion of the city there should be one station to every three or four blocks, while further out one at every section and half section street would suffice. For instance, at Canal and Halsted streets, and Centre and Ashland avenues, etc.

An elevated road of this description, built as an uninterrupted whole, would enable passengers to travel in every direction unmolested by navigation and without change of car. For instance, from corner North avenue and Clark street to South Halsted street or Garfield Park, and for five cents, as a fare of only five cents for a 11 miles' ride is charged in New York. No other elevated road system can offer such advantages!

No figures will be given here relative to the value of elevated roads as a financial enterprise for the present, but if they are at all remunerative, it will surely be better to invest money in roads which have an uninterrupted connection

with the business center, than in such which only reach west and north to the river. The loss of time to reach the elevated station of the latter kind, in connection with the bridge trouble and the climbing of stairs, will make them of little value to most people living east of Western avenue and south of North avenue, for they can reach their homes or places of business equally soon and more conveniently by the surface road if properly managed. As yet, the city, west of Western avenue and north of North avenue, is not very thickly populated, and, consequently, a disconnected system of elevated roads could not secure a heavy traffic for some years to come. Ordinary elevated roads cannot be built and equipped for less than $500,000 a mile, and those independent of navigation, as proposed, would cost about $900,000 a mile, or 20 miles inside the city limits, $18,000,000 (as shown in Figure 6).

In New York, during the year 1886, 115,000,000 passengers traveled over the 32.4 miles of double track lines. The gross earnings from this mileage was $7,426,000
As againt a gross operating expense of $3,850,000
Rentals and taxes 403,000
4,253,000
Leaving the net earnings for the year $3,173,000

At a high estimate, the construction of these roads, including rolling stock, did not cost over $700,000 a mile, or the 32 4 miles $22,680,000. The net earnings of $3,173,000, therefore, represent a profit of 14 per cent. of the invested money.

In 1887, the number of passengers increased to 159,000,000, and in 1888 to about 200,000,000, which gives an idea of the enormous rate of increase of traffic, though this phenomenal increase was partly due to the reduction of fare for a few hours of the day.

The many and persistent efforts of numerous railway companies to secure franchises in Chicago justify the exertion of the most stringent precautions. In the course of time a number of these companies may erect elevated railways in the different streets and operate them for a period independent of each other. But as "In Union there is Strength," so in the regular and traditional evolution of things, they would doubtless slowly approach each other, and, finally consolidate in a powerful monopoly, and in such a way that all others would be thrown into insignificance.

This operation has been repeatedly performed in Chicago, and the various street railway companies formerly so numerous, have, during the past few years been at last reduced to but two; the indignation caused by the consolidation of gas companies is of an equally recent date, and, throughout the country, the actions of monopolies are discussed, and denounced in the highest terms, both by the public and the press at large, but without avail.

The successful operation of elevated railroads in the East, leaves the final merits of an investment of this kind entirely beyond doubt, as above indicated. Why should not this city of Chicago take a lesson from the Eastern cities, and take upon itself the construction and equipment of elevated railways? Only when planned by the administration of the city, with the interests of the public solely in view, can the enterprise be executed in accordance with the demands of the public, and only by persons taking this higher point of view, can they be constructed in such a manner that they will prove to be for the best interests of the community at large.

At the same time, the steady increase in revenue gained thereby would enable the city to meet larger expenditure in other branches of public improvements.

It has been amply proven by the erection and operation of the water works, that the city itself is capable of conducting large enterprises successfully. Not only are consumers of water supplied therewith at a comparatively low rate, but the treasury of the water department has in its possession a fund of nearly $2,000,000. Whereas the gas companies have, for years, been at war with the city, and numerous inconveniences to the public by their mismanagement have been the result, the city of Berlin furnishes its inhabitants with gas, at one-half of the Chicago prices, and the management, in spite of this, pays yearly into the city treasury a formidable sum of money.

Of course, state legislature would necessarily be required to grant to the city the privileges necessary to raise the funds for constructing elevated railways. The board of alderman in the city of New York has already laid before the legislature in Albany a proposed ordinance, granting the city the right to construct elevated or underground railways with its own funds. A principal item of the said proposed ordinance is, that money, borrowed by the city, shall pay no more than three per cent. interest. To Ex-Mayor Hewitt, the originator and principal promoter of this ordinance, has been awarded the unanimous approbation of the press, and the cheerful appreciation of the public in general.

From an exchange we clip the following:

"I met a typical Western man the other day in Mr. Thomas Lowry, of Minneapolis. He is one of the big men of the Twin Cities, and controls the street car systems of St. Paul and Minneapolis, and of Duluth as well, besides being largely interested in a number of important railroad enterprises in the Northwest. He is physically a tall, magnificent human specimen, and is brimful of that combination of energy, ability and personal kindliness which is characteristic of the West. Mr. Lowry's extended interests bring him to New York frequently. He has a host of friends here, and if any of them chance to get out into the Northwest he is apt to give them abundant and agreeable cause to remember Minneapolis. He has traveled extensively, and possessing culture, acute mental powers and a genial nature, furnishes one of the best examples of the kind of men who are the natural leaders of the great West.'

New Decorative Material for Interiors.

A new material called "Porcelaine,"* for interior decoration of street cars, and cars for steam roads, has recently been placed upon the market and our attention called to it.

Upon examination, this "Porcelaine" closely resembles marble, but is not as heavy, can be made to advantage in thinner sheets and is entirely impervious to stains or atmospheric action.

At the factory the raw material is reduced to a melted state and molded or rolled into any shapes, figures or sheets desired, then subjected to a tempering process that renders it very tough and strong.

The samples shown us represent all colors and shades, including many pretty designs in frieze, wainscoting and general decorative work. The manufacturers propose to follow many detail drawings in color and form, to furnish a product impervious and unstainable, that will not "craze" or warp, and that will withstand the motion and vibration of cars.

As an entirely new departure in decorative art this "Porcelaine" may prove of great value to car builders, on account of its cheapness and adaptability for ornamentation.

The wire rope made by Broderick and Bascom for the Citizens' road in St. Louis, has been in service now very nearly three months' longer than any other rope they used. The rope now in use on the Olive street road is running on its thirteenth month of continuous service, and has never stranded or had a break. This road runs trains of two coaches and a grip, night and morning, and the cars are nearly always crowded. Some time ago a very interesting competitive test of cable ropes took place on the line of the Cincinnati Street Railway company. Twenty-seven thousand feet of rope were spliced together and put in service, half of which, or 13,500 feet came from the Broderick and Bascom factory, and the other half from that of one of their competitors. The other rope wore out and had to be renewed three months before the St. Louis rope showed the least break. Nothing could be fairer than this test, as there was no advantage for either rope either in weather or character of service, both being used in exactly the same work at precisely the same time. On the Grand avenue line in Kansas City one of the B & B. ropes is now in service that has outlasted by 33⅓ per cent. in time the average term of five previous ropes.

*Warren Barnett & Co., 351 Rookery Building, Chicago.

The Cost of Building Cable, Electric and Horse Railways.

(Extract from advance sheets of "The Business of Building Street Railways," by W. L. S. Bayley, Chicago.)

Unless the electric people introduce some special features for electric service—and this they ought to do at once—the cost of their roads will not vary enough to warrant a distinctive classification; and estimates for five styles, including the cable, are herewith given. In regard to all lines, the best is of course the cheapest; yet the poorest, if well built, will afford good tramway transit. Later on you will, we hope, require the best electric or the giant carriers. We cannot take the responsibility of recommending an inferior construction. In any event you will observe that the cheapest costs enough to warrant great care in their construction. Remember that poor construction entails endless expense with the rolling stock.

PAVING OR FILLING.

This expense is common to all street railways, and as such might be eliminated from this paper. This large expense is swayed by local conditions more than any other. The range is from first class granite, costing, with its foundations (except in our No. 1, where you steam roll your foundations), $3.00, with 40 years of life before it, down to crushed stone at $0.50 per square yard and 12 months' life before it.

(The following approximate estimate is based upon figures for a 5 mile double-tracked road.)

NO. 1. BAYLEY'S PATENT ALL-STEEL GIRDER ELECTRIC OR HORSE RAILWAY.

198 long tons 63-lb. rail at $45,	$8,910 00
2640 combined ties and chairs at $1.50,	3,960 00
704 sets standard plates at 51½c,	362 56
Labor, including steam roller service,	1,848 00
Total for double track mile,	$15,080 56
One half,	7,540 28

NO. 2. JOHNSON'S BEST.

245.20 long tons girder "78" at $45,	$11,034 00
Labor at 60c per lineal foot,	3,168 00
3,020 oak ties at 30c,	906 00
3,020 sets steel chairs,	1,812 00
7,200 lbs. spikes,	288 00
704 sets standard plates at 51½c,	362 00
Total for double track mile,	$17,570 00
One-half,	8,785 00

NO. 3. LIGHT, BUT GOOD.

122.6 long tons girder rail at $45,	$ 5,517 00
Labor at 50c per lineal foot,	2,640 00
3,020 hemlock ties at 15c,	453 00
3,020 sets chairs at 50c,	1,510 00
7,200 lbs spike at 4c,	288 00
704 sets plates at 50c	352 00
Total for double track mile,	$10,760 00
One-half,	5,380 00

NO. 4. TRAM, BUT GOOD.

142 L. T. tram, 45 lbs. at $40,	$ 5,680 00
62 M. hemlock stringers at $10,	620 00
3,020 ½-post cedar ties at 12c,	362 40
Labor at 25c,	1,320 00
Cast knees,	600 00
Spike,	100 00
	$8,682 40
One-half,	4,341 20

An outline estimate for the construction of five miles of double track giant carrier cable railway, standard in everything.

No iron used—all steel; terra cotta lumber, waterprooled, for conduits; no cements except "Betons for subordinate service; standard paving, costing $20,000 per mile; power house; power plant; engines; boilers; sheaves; pulleys and cables Manholes between tracks, size 54", 42", 36"; catch basin on ¼ block centres, size 114", 84", 30". All this will cost $500,000. Local conditions will scale these figures either way from 10 to 15 per cent.

Two well known street railway men have been in the field in Chicago, seeking for civic honors: J. K. Lake, former superintendent of the Chicago West Division Railway, ran for alderman in the 12th Ward, but withdrew; and DeWitt C. Cregier, also once superintendent of the same road, who ran against Roche for mayor and came in the winner.

Mayoralties on the Electric System.

During a recent discussion over the proposed substitution of electric in lieu of animal traction by a southern street railway company, it was but natural that a question should arise regarding the operation of the electric system in other cities where it was being used. In order to get an impartial judgment upon this question, a telegram of the following nature was sent to the different mayors of the cities on the street car lines in which electricity had been adopted :

Oct. 26, 1888.

"Is the Sprague electric motor with overhead wires in successful operation in your city? Is it safe and satisfactory? Answer at my expense."

(Signed) FRANK A. DANIELS,
Member City Council.

This telegram was sent to the mayors of Cleveland, O., Akron, O., Carbondale, Pa., Wilkesbarre, Pa., Boston, Mass., Wilmington, Del., Harrisburg, Pa., Richmond, Va., St. Joe, Mo., Hartford, Conn.

The following answers were received :

CLEVELAND, O., Oct. 27.

Sprague motor overhead wire system now being constructed; expects to be in operation within thirty days. No running experiments yet made here. (Signed)
D. H. BABCOCK, *Mayor.*

AKRON, O., Oct. 27.

The Sprague electric motor has been in operation in this city about three weeks, and consider it safe and satisfactory. So far, our people are much pleased with it. The Sprague Co. use the overhead wires on their cars.

(Signed) L. D. SEWARD, *Mayor.*

CARBONDALE, PA., Oct. 27.

We have the Sprague electric motor by which cars are run in our streets, and have been very satisfactory to date. (Signed)
JOHN KELLY, *Mayor.*

WILKESBARRE, PA., Oct. 27.

Sprague system of overhead wires in use here; successful and very satisfactory.

(Signed) B. FULLER, *Manager.*

BOSTON, MASS., Oct. 27.

Telegram to Mayor of Boston received. Sprague system not yet fully completed. Considered safe and satisfactory.

(Signed) FRANK SEDDEN,
For Mayor of Boston.

WILMINGTON, DEL., Oct. 27.

Our cars running continuously on the Sprague system since March 5th, this year. Entirely safe and satisfactory. (Signed)
MAYOR OF WILMINGTON.

HARRISBURG, PA , Oct. 28.

The Sprague electric motor with overhead wires works safely, and is successful and satisfactory here. (Signed)
JOHN PRITCHEY, *Mayor.*

ST. JOE, MO., Oct 28.

Sprague electric motor is in successful operation here, and is very satisfactory.

(Signed) J. G. ENGLEHART, *Mayor.*

RICHMOND, VA., Oct. 29.

The Sprague system of overhead wires is not considered dangerous. The electric road gives great satisfaction. (Signed)
J. TAYLOR ELYSON, *Mayor.*

HARTFORD, CONN., Oct. 30.

Sprague system in use but a few weeks in three miles of road outside of the city.

(Signed) JOHN G. ROOT, *Mayor.*

Probably it would be difficult to find a more unanimous endorsement of the operation of any kind of machinery from all the users in the country, and this is simply additional evidence of the universal satisfaction which electrical equipments are giving all over the country.

COL. THOMAS LOWRY is about to erect a theatre in Minneapolis, upon the Davidson property recently purchased by him for $150,000.

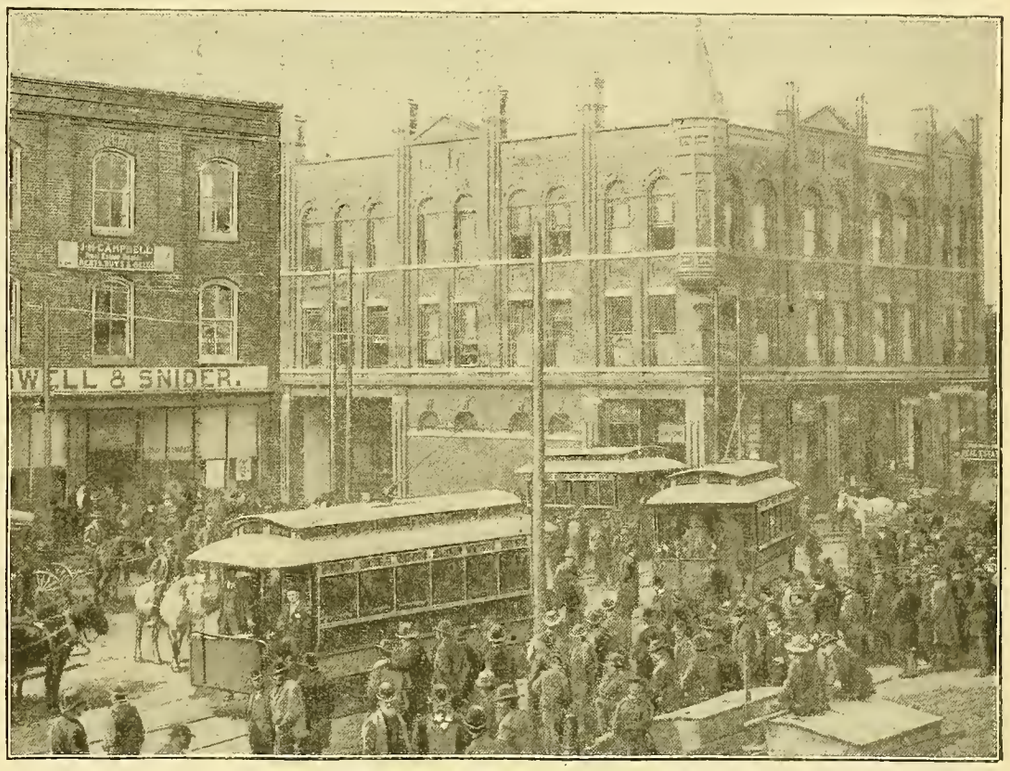
New Electric Roads.

We understand that during the last week the Sprague Electric Railway and Motor Co., closed several important contracts in railway work in New England and in the West. One of these is the Marlborough, Mass., Street Ry. Co. Part of this is double track work and part single. Before deciding upon any system to be used upon their railway, which is a new one, having never been operated before by any kind of power, the committee in charge of this visited a number of cities where electric street railways are in operation, and investigated their workings; the result of the tour of inspection was that the committee gave the contract for equipping the road to the Sprague Co., work upon which will be commenced at once. The contract calls for the regular Sprague overhead system and latest type of motors.

Electric Railway at Asheville, N. C.

The view presented in the accompanying engraving of the Sprague Electric railway at Asheville, N. C., shows three cars on this electric railway in operation upon the main street of Asheville. Besides an equipment of passenger cars this electric railway company also possesses several freight cars operated by electric motors of the Sprague type, and as this railway connects the city of Asheville with the depot of the North Carolina R. R., these freight cars have proved a convenience to the citizens of the city, as well as a source of considerable income to the managers of the road.

The regular Sprague system of wiring is used on this line, and all the overhead work is so light and small that it is difficult to discern it at all in the accompanying illustration, which is made from a photograph taken on the spot.



SPRAGUE ELECTRIC RAILWAY AT ASHEVILLE.

Another contract closed by this same company is in Wichita, Kansas, where 7½ miles and four cars will soon be running by electricity upon this system. 16 horse power improved motors will be used, and the equipment will be first class in every respect.

Another street railway to adopt electricity as a motive power for their cars is the Electric Railway company of Eau Claire, Wis. We are informed that this contract calls for the furnishing of six cars over five miles of track. The regular Sprague overhead system will be used, using a small No. 6 wire as a working conductor, no larger than an ordinary telephone wire, which is the only wire suspended over the track.

Recent Electric Railway Contracts.

The coming of spring appears to have reminded street railway men of the profit arising from increased traffic during the heated term, and all are looking to the abolition of animal power in favor of a more rapid form of transit.

The past winter has so clearly demonstrated the advantages of the adoption of electric power, that the confidence in such apparatus for street railway purposes has now been pretty thoroughly established.

A number of new contracts for electric apparatus have recently been closed by the Sprague Co., with roads that have hitherto been using horse power, among which may be mentioned Stillwater, Minn., for 6 cars : Marlborough, Mass., 2 cars ; Eau Claire, Wis., 6 cars; Wichita, Kas., 4 cars.

Other roads, have contracted for 15 horse power equipments, have since ordered the contracts changed to read the "30 horse power motors."

A correspondent in Asheville, N. C., under date of March 28, referring to the new electric road there, writes: "Regarding the electric street railway in operation here, the citizens are enthusiastic in their admiration of its perfection in design, and the exactness with which all of the details of construction have been executed by Mr. E. D. Davidson, the contractor and principal owner of the system. The curves are beautifully laid, and even the slightest bend in the street is represented in alignment of the track; the cars are large and elegant, and similar to those in use on the Broadway road, in New York, and the electrical equipment appears to be without a defect. The great triumph of the system is the manner in which they have contrived to overcome the apparently insurmountable obstacles of nature, and to glide easily, gracefully and without a jar up those steep grades, with only a "little chained lightning." The traffic is large and gratifying to those who have invested their money in the enterprise. All agree that Asheville has been particularly fortunate in having Mr. Davidson interested in an enterprise in the line of which he has had great experience, and for which he has so much genius. He conceived the idea of building the road and, with a zealous effort, soon carried his conception into execution. Mr. J. H. Barnard, also of New York, is superintendent of the road, Mr. Frank P. Lewis, of this city, and an expert in the employ of the Sprague Motor company are jointly entitled to the credit of the perfect electrical construction and equipment of the system. The fact that his company entrusted a work requiring so much expert knowledge and skill solely to him, is a recognition of his worth and attainments that gives his many friends here great pleasure."

A Criticism on a Critic.

Editor Street Railway Gazette, Chicago, Ill.

DEAR SIR:—There appeared in your March issue an article entitled "Cable Yokes," and I trust that you can find space in the columns of your valuable paper for the following criticism thereon, it may be the means of furnishing additional food for thought:

"How to obtain a *maximum strength for a minimum of material*" certainly has a metallic ring; if not of iron, then surely of silver, because capital is looking and has always looked for forests full of *maximum returns for minimum investments*. The implied doubt which I see I have failed to hide in the above, arises from a positive knowledge that only "the dull, sickening thud" sent rumbling through the fibers of what I am pleased to term that "*makeshift cast iron*;" on the advent of the Frost King—can be relied on to give a satisfactory commercial ring—while the true molecular material which, in a great measure, successfully resists the effects of frost, will quickly take the place of its less muscular parent, iron. I cannot, at this late date, see any special reason for any indorsement of so costly and commercially *dangerous a material intended for service of so delicate a nature*. The writer of the able article to which I refer should certainly know that, not within the tributaries of the great chain of lakes, or of those great rivers having their origin far to the northwest in the foot-hills of the Rockies, and practically out of the reach of the spring-ladened Shinook winds; from the Pacific, at least, as far south as Louisville, and thence to Hampton Roads, except, maybe, some protected little nook like Grand Rapids, *can cast iron be safely used within the frost line*. He must also know as a scientist that, under like conditions, steel ranks iron as *15 to 1*. Better yet, place iron in a road bed under the most favorable conditions imaginable, and steel under the most unfavorable conditions, and yet the life of steel is as *9 to 1 for that of iron*. All the yoke patterns shown in the article to which I refer, except the last, are as yet, I believe represented only by wooden models, and, as far as we have known, have never been practically tested. The writer of the article truthfully states that the *spider web braces* in cast iron or steel in the yokes of to-day *are dangerously out of place*—if they are entitled to any place—and indicate an effort to secure recognition, at the expense of solidity and long life — *by a careless arrangement of "voids."*

For some unaccountable reason the gentleman does not recommend steel for yokes, when he cannot but know that "strengths" equal, call for only 75 per cent. in weight, when steel with iron is being considered. Certain it is then that the builder of the conduit yokes, shown in the article, could retain, in an abbreviated form, the *muscular proportions of No. 4* by the use of steel. Again I quote him as saying, "A common objection to solid yokes is the claim that the continuous bond in the concrete is impossible" (or words to that effect). I am more than glad of the opportunity thus offered to say, that, as long as *common labor* is allowed to handle *that uncommon and costly material, "Portland cement"* in the open streets of a blustering city, where *the powdered silica* is taken up by the four winds and swept into yards and dwellings skirting the routes, it makes but little difference whether the *residuum clings or not*, for, as surely as the months go by, *organic oxygen* will get in its terrible work of *disintegration*, and more quickly, I believe, than the *frost pulsations* will ruin the present makeshift of a yoke. Friends of genuine "Portland Cement" may claim much, and bring expert evidence to sustain the same, but while they are illustrating their "1-2-3-4 or better" let them tell us why English casks, after a sea voyage, are invariably "coopered" on the end that is free from label or stencil? But I will not leave your readers in the dark, because I have recently made a patent application of terra cotta lumber (brick if they will understand it better) which, while cast and burnt in four sections, with locked joints, and cushioned against shocks, can be sawed like oak and nailed at will. Each section is *water-proofed by a convenient asphaltum or paving cement bath, rendering the construction of our giant carriers comparatively noiseless, impervious to frost, practically indestructible and almost costless!*

And yet, how many men belong to the conservative class, and are far too timid to act as pioneers in the use of this new material, still clinging, as they do, to the dead past? "Be careful, therefore, and have *outside and inside*" forms for the concrete that an account of stock may not develop more than 30 per cent., chargable to "profit and loss."

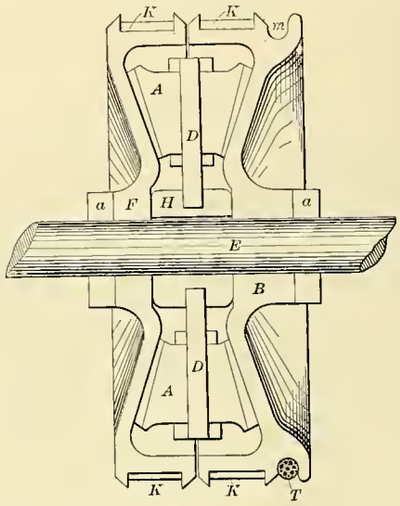


FIG. 1.

Apropos of this I quote from advance sheets of the "Business" of building cable, electric and horse railways under the caption of "inspectors, engineers, draughtsman and foremen" the following: "*Their education on your work will be costly.* Secure, if possible, good men whose education some other company has paid for, as you cannot afford to be a pioneer."

New Reversible Grip.

In the March issue of the GAZETTE a typographical error created a misunderstanding by causing what should have read "reversible grip" to read "unreversible," and in order that the inventors thereof should have their device properly presented to our readers, we have had cuts made of the same, and trust that they will aid in dispelling any misconception regarding the device in question that may have been conveyed by the inadvertent introduction of those two unfortunate letters, "un".

In the illustrations here shown, (Figure 1), "E" denotes the power shaft, which may be one of the axles of the car, upon which is loosely mounted the band wheel "B"; the inner face of the wheel is beveled and formed with a cog surface and provided with a wide circumferential flange, "e," and a circumferential groove, "m," adapted to receive the cable "T."

A band wheel, "F," is loosely mounted upon the shaft "E." This wheel is similar to the wheel "B," except that it is formed without the groove "m." "H" is a hub keyed to the shaft "E," centrally, between the wheels "F" "B," said wheels resting closely against the hub, and are held in such position by means of the collars, "a a."

Strongly secured, or cast integral with the hub "H" are two radial arms, "D," forming pivot bolts, and upon these, loosely mounted, so as to revolve thereon, are two beveled gear wheels, "A," which mesh with the internal beveled cog surfaces of the band wheels "B" and "F," as shown in figure I. "K K" represent band brakes operating the wheels "B" and "F," and being so arranged on a small shaft that when one is released the other will be applied.

"C C," Fig. 2, represent two small sheaves, supported in any suitable manner, and which may be arranged to be raised or lowered by the operator to bring the cable in contact with the large sheave "B." This operation, which may be easily effected, is, however, only necessary when changing lines. From the foregoing description, it will readily appear that, as the cable passes forward under the large wheel "B," it will give it a backward revolving motion, and since the beveled gear wheels "A" mesh into the cog surfaces of the band wheel "B" (the band wheel "F" being at this time held from revolving by its band-brake "K" being applied), the motion of the band wheel "B" will cause the gear wheels "A" to travel on the surface of the gear wheel "F," thereby causing the pivot bolts "D" to move in the same direction as the wheel "B" and thus revolve the shaft "E" in a direction opposite to that of the moving cable.

When the wheels of the car are either fastened to the shaft "E" or driven, by means of a belt or gear, from it, the shaft revolving in a backward direction will revolve the wheels in the same direction.

To obtain a forward motion of the car, apply the band brake "K" to the band wheel "B," which movement releases the brake from the band wheel "F," thereby allowing said wheel to revolve in an opposite direction. By this operation the car is brought into immediate contact with the cable and carried in the direction of its movement.

It will be seen that by this arrangement the car may be started very slowly without letting the cable slip. By a careful adjustment of the operating levers it will be observed that the starting of the car may be effected gradually and, as there will be no slipping of the cable on the sheaves, the sudden jars and jerks incidental to many grips now in use is, thereby, avoided.

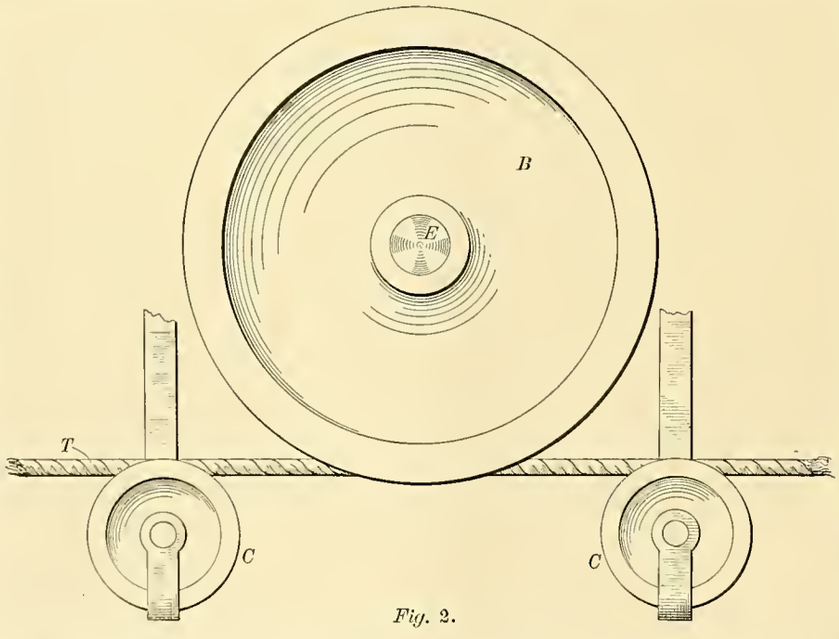


Fig. 2.

Electrical Equipments.

There is nothing so indicative of the success which has attended the electric street railway installations in this country than the repeated increase of apparatus ordered by street railway companies using the electric system.

Several roads operating under Sprague patents, have ordered extra cars, including those at St. Joseph, Missouri, Harrisburg, Pennsylvania Wilmington, Delaware, and the East Reading & Black Bear Railroad, of Reading, Pennsylvania. The Wyatt Park Electric Railway, St. Joseph, Missouri, has ordered four new cars, and the Union Passenger Electric Railway of same city four new cars, dynamo and power station apparatus.

Jumping the Fire Hose.

The illustration shows the method adopted for getting a car over the hose in case of fire. So clearly does the cut illustrate the device that any written description thereof would be superfluous. The scheme was first adopted by the Sprague Co., on its Richmond line.

An Electric Car Jumping Fire Hose Richmond, Va.

Blind Staggers.

A horse attached to a Bleecker street car, in New York city, was recently attacked with blind staggers on Broadway, and the driver, not knowing just what to do, detached it from the car. The half-crazed animal cavorted about the thoroughfare, scattering the crowd and throwing the driver down. The animal then staggered onto the sidewalk, and plunged headlong into a show window, getting badly cut across the breast and shoulders, and the blood flowed in torrents. The poor brute was, eventually, put out of its misery by a well-directed bullet.

A twenty per cent. grade is the problem the Phillipsburg & Granite (Mont.) Cable Railway Co. has to face.

Thomson-Houston System in Boston.

The method of suspending the overhead conductors on the main bridge of the Cambridge Division of the West End Railway, in Boston, under the Thomson-Houston system. The details of the automatic switch and connecting cables were illustrated in a previous issue, but trusses supported from the trusses by cone insulators, two short pieces of iron pipe, to which the main conductor is fastened, have since been placed in position. Two frogs are placed at the abutting ends of the trolley wire, which come into line when the draw swings into place, and prevent the trolley from jumping the wire when it passes from the main conductor to that on the draw. Since the road was started the operation of this part of the electrical equipment, as well as that of the remainder of the devices used in the drawbridge, and the motor cars themselves, has been of a satisfactory nature, and reflects much credit upon the system in use. It may be mentioned here that out of the first 1179 trips made by the cars but nine trips were lost, and this was simply due to lack of experience of the motor men. Such a record speaks eloquently as to the reliability of the Thomson-Houston apparatus.

The New York *World*, March 15, says: The largest judgment awarded to any of the numerous property-owners who recently sued the New York Elevated Railroad companies was granted to the Sixth Avenue Railroad company in a decision handed down by Judge Ingraham, of the special term Supreme Court. It was for $95,000 for the plaintiff's easement in Sixth avenue in front of the company's depot extended from Forty-third to Forty-fourth street, and in front of its property on the east side of Sixth avenue, from Fifty-eighth to Fifty-ninth street. Judge Ingraham said that the experts employed by the Elevated Railroad swore that the cars constantly standing on the track, the cinders, smoke and noise of the trains had a beneficial effect and tended to improve property along its line. He then instanced the fact that not one first-class apartment house or dwelling had been built along the line of the elevated road from Forty second to Fifty-ninth street since its erection; that Fifty-ninth street in the vicinity of Sixth avenue and the adjacent streets, had suffered most severely. An injunction was also granted against the Manhattan road operating its trains in front of the Sixth avenue depot, between Fifty-eighth and Fifty-ninth streets unless the judgment was paid within thirty days.

Electric Railway at St. Joseph, Mo.

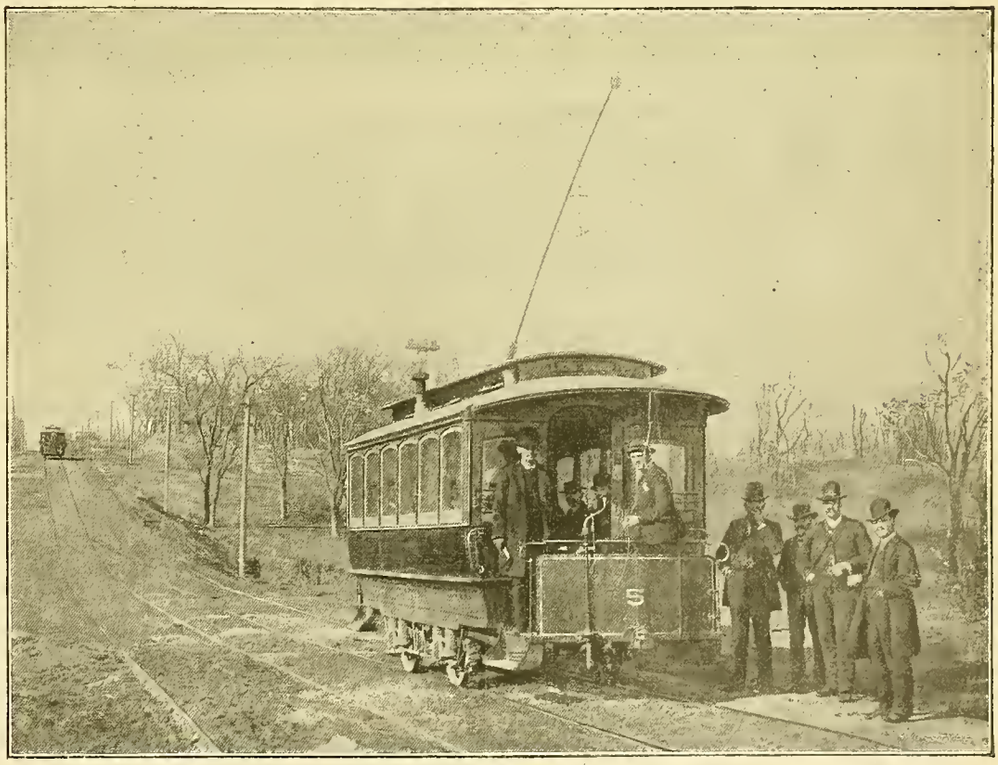
A very successful electric street railway is that in operation upon the Wyatt Park Co.'s line, in St. Joseph, Mo., a view of which is here shown.

The first electric line to be operated in St. Joseph, was the Union Passenger Railway, also equipped by the Sprague Co., and its success proved so great that the operating company ordered an additional number of cars.

This line was the first one in the country to practically demonstrate the successful operation of an electric railway in a snow storm. In the early part of this winter a blizzard from the western prairies struck St. Joseph with all its force and covered the streets in that city to the depth of from six to twelve inches, and in many places drifting badly. The telephone, telegraph, and electric light wires were borne down by the snow in all parts of the city, and trade was, for the time being, pretty badly demoralized. In spite of this general blockade in all directions, the electric railway ran uninterruptedly, and the cars plowed their way through the heavy drifts on the line with neither trouble nor stoppage, and without aid from snow plows.

The grades on the Wyatt Park Ry. are in some points on the road as high as 9 per cent., and the cars reach a speed of ten to thirteen miles an hour in the outside and suburban districts, reducing to a lower rate of speed when operating within the city proper.

St. Joseph, Mo., is coming to the front rapidly as one of the leading cities in electrical enterprise in the west. It already has two street railways operating by electricity, and a great many manufacturing industries are kept in operation by the same power, by means of stationary electric motors, operated from the regular railway circuit. It is said that the two other street railways in the city will soon be in operation upon the electric system, so that the horse shall be supplanted entirely in St. Joseph.



Wyatt Park Electric Road, St. Joseph, Mo.

Warren Barnett and Co. have a very interesting exhibition of their new "Porcelaine" at their offices, 351 Rookery, in this city.

The firm of Robert Poole & Son will, in future, be known as Robert Poole & Son Co.

The Street Railway Gazette.

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Articles and papers on subjects relating to intermural transit always appreciated; the Gazette's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways.

Important Announcements.

We take pleasure in announcing that Mr. W. L. S. Bayley, M.E., C.E., etc., has accepted the position of mechanical expert of the Gazette.

Mr. Bayley's record as engineer of Chicago City Railroad Co. in the construction of 120 miles of cable and horse roads, is so well known, that any introduction would be superfluous.

Difficult problems arising in the projection, construction or operation of cable, electric, motor or horse railways will receive close attention at our hands, and promoters of any of these enterprises will do well to correspond with us before preliminary surveys or plans are made.

The Street Railway Gazette.

Readers of the Gazette visiting the Paris Exposition of 1889, will find it on file in Group III, Class 29, No. 218, U. S. Section, in the Exposition, and visitors are cordially invited to leave their cards at its headquarters, which are in charge of Mr. George M. Bailey.

Employees Strike in Minneapolis.

As we go to press, a despatch reaches us that, in consequence of an order reducing the pay of all employees of the Minneapolis & St. Paul Street Ry. company, issued by President Thomas Lowry, a strike of the conductors and engineers of the motor line has taken place, as also of the conductors and drivers on the Fourth avenue and Lyndale avenue line. Col. Lowry urges, in justification of the order issued, that his company has been steadily losing money, and that it must retrench in order to build the new cable road.

Coincident with this intelligence, is that, on the same night upon which the offending order was issued, a clever sneak thief broke into Col. Lowry's house and secured $1,000 worth of cash and jewelry from Mrs. Lowry's room while that lady was asleep.

The unprecedented run on our March issue has depleted our files; therefore, in response to many calls from parties interested in the adoption of electricity as a motive power, do we reproduce in our April Supplement some cuts that were shown in the March Gazette.

Boiler Insurance and Street Railways.

Indications point to the fact that a method of traction, other than that afforded by animals, is liable to be almost universally adopted sooner or later: — Just what this new propelling or motor force will be, is, to some extent, problematical. The cable method has proved itself to be productive of dividends, while electricity holds its own in affording rapid transit for the passengers. Arguing, however, upon the basis of Mr. Edson's almost historical opinion, that, "a ton of coal is the best kind of storage battery," we cannot but arrive at the conclusion, that, after all, steam, in its original form of generation, is the fundamental basis of this power, force, energy, foot pounds of work, or whatever we may be pleased to term it. No steam—no generation of electric current; no current—no movement of cars operating under the principle of electrical propulsion; hence, without steam, the electrical railway is powerless. Equally so, under similar circumstances, must the cable road be lacking, as it would, the prime co efficient of force, viz.: that of steam; and, consequently, the steam boiler, a force upon which all similar motion depends, and without which, so far as present human ingenuity goes, cannot exist.

Looking from this standpoint at our various improved modern devices facilitating rapid transit, questions arise that appeal to the element of safety, safety to the officers and employees of the operating company, safety to the passengers, safety to those in charge of the steam plant, and safety to the capital invested, the inherent desire for personal protection and safety, that is omnipresent in the human mind. Beyond the least shadow of doubt, the element of danger is always present in a steam boiler, consequently, then, street railway companies, in cases where the transportation of passengers depends upon the generation of steam, owe it to their patrons and to their stockholders to provide for the inspection of the boilers in their power houses.

To this field the various steam boiler insurance companies devote their exclusive time, experience and attention, and while it would be almost ridiculous to affirm that either the Hartford, the American, the Fidelity or any other similar company can give absolute immunity from all boiler casualties, etc, yet we do not hesitate to express our belief that a frequent and thorough inspection of steam boilers used in power plants will do much to relieve the operating companies of a certain amount of responsibility in the event of explosions and, maybe, consequent loss of life.

Neither do we affirm that such inspection and insurance can possibly prevent the wear and tear to which steam boilers are naturally subjected, but experience has taught us that the inspection and supervisionary care given by these boiler insurance companies to boilers under pressure, lessens, to a great extent, the chances of liability for damages for delay or accident, and reduces the element of danger to a minimum.

Terra Cotta Lumber.

Regarding the use of what is now known as "Terra Cotta Lumber" as against that of concrete, a correspondent writes:

"Permit me to call your attention to the fact that the use of this lumber will enable one to build for 30 per cent. of the cost of concrete, the freight not considered, but if taken into account will probably reduce the per cent. item to 25, as the 'lumber' lies at the gate of all cities, and at the same time cable railways would be rendered noiseless, frostless and indestructible!

"We must not forget that organic oxygen is Nature's great destroyer, and one need not go far to see its effect upon so-called Portland cement concrete. The work of this destroyer is called 'disintegration.'

"Its affinities must be removed in order to eliminate its destructive elements. As there are no affinities for 'o-o' in terra cotta paving cement, one by its use, coupled with experienced construction, will secure all of the five essential conditions of successful cable building, to-wit:

1st. A reduction of 25 per cent in cost.
2d. A noiseless way.
3d. A frostless way.
4th. Long life to the road.
5th. 150,000 miles of life for the cable."

Municipal Conversion.

It is well known to promoters of electric railways that one of the main difficulties they have to face in introducing the overhead system, has been municipal ignorance, and consequent opposition. In view of this fact it is with pleasure we note that, at last, eight or ten mayors of as many important cities have "experienced conversion," and their emphatic endorsement of the workings of the overhead wires (particulars of which we give in another column) cannot but give the system a still further boom.

Says the Buffalo *Express*: "An old hand was breaking in a new driver on a Niagara-street car. The car was behind time, and the old driver tried hard to get the new one to let the horses go, but he persisted in using the brake to hold the team back instead of tightening the rains. 'Let the brake off,' said the old hand, 'and let 'em go. The brake is only making it harder for 'em to pull the car.' But the new man evidently could not help toying with the brake, and he kept tightening it until the car jumped and he almost went over the dashboard. 'You'll get that brake handle in the neck if you don't look, out, and then you'll let it alone' said the old driver as he yelled at the horses. The new man eyed the brake and moved over on to the off-side of his stool. It takes about four days, it is said, to break in a Canadian, and only a day to break in an Irish driver."

Observations in Dixie.

During Mr. John Stephenson's recent visit to the South he spent considerable time in examining the working of electric motor cars in Richmond, Washington (D. C.) and Baltimore, at which latter place the first practical attempt at propelling street cars by electricity was made. The road has four motor cars, three of which are in daily operation and run with regularity and little interruption, making far better time than horses, and the service is so well performed that President Perrin and Superintendent Robbins believe that their experience has practically established the general adoption of electric propulsion for street cars, and demonstrated its operative economy. Supt. Robbins has taken deep interest in developing the system, and Mr. Perrin asserts that such success was largely owing to the intelligence and enthusiasm of his superintendent.

In Richmond, where the Sprague overhead system is in operation, Mr. Stephenson had capital opportunities for acquiring information. Mr. Farrell, superintendent of motive power, arranged for a special car, with the shop foreman in charge, to go over the road, start and stop, reverse and go ahead, stop the car on its downward course without the brakes, and back up again all on the worst grades, which, according to the city surveyor, run as high as 9⅛ per cent., although some of the more severe ones have curves at the street corners. The workings of the car were satisfactory; the road was in good condition, rails dry, no frost or snow. There is a good plant at the power house which is also utilized for lighting the streets. Though the company has about forty cars in all, the business of the season only justified the use of about one-half of that number. The working force in the shops was about equal to one machinist per car, and Mr. Farrall has been bringing the establishment into a thorough practical every-day condition; professional electricians have been dispensed with, and the common shop hands have now become able to handle most of the needed repairs, etc. Some of these roads having been operated by animal traction, more weight can be given to the expressed opinion of their managers, that electrical propulsion is thoroughly practicable and infinitely more economical.

Washington, D. C., has a very nice outfit on a broad avenue with double track; unusual space between the two tracks, in which space are neat iron columns with cross arms near the top carrying the electric wires; the columns being utilized for the street lights. The Thomson-Houston system is in use here and the plant is regarded as one of the most perfect yet constructed.

The Washington road is for the purpose of developing a suburb having but few residences, but fine streets and avenues are being made, and the hills and valleys brought to desirable surface.

Street Railway News.

DOMESTIC.

(See also "New Enterprises," p. 75 to 78.)

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a vertification of each item received by them in time for each issue:)

ALABAMA.

Anniston—The Anniston, Oxford & Choccolocco Valley Railway Co., organized to build a dummy line to White Plains, twenty miles distant, has elected the following named officers: E. Locke, president; R. J. Riddle, vice-president; T. M. Draper, secretary, and C. D. Woodruff, treasurer.

The Board of Directors consists of R. J. Riddle and W. G. Ledbetter, Anniston; T. C. Hill and D. C. Cooper, Oxford; L. L. Allen and J. T. DeArmon, DeArmonville; S. N. Milligan and J. F. M. Davis, Choccolocco; C. S. Whiteside and W. C. Scarbrough, White Plains; E. Lock, Choccolocco. A sufficient amount of stock has been subscribed to justify the company's commencing the construction of the line.

Dadeville—A meeting of the business men of this place was held in the office of Hon. Thomas L. Bulger, on March 27, to consider the building of a dummy line from the Columbus and Western depot to the city. Mr. B. F. Ponder, of Opelika, met with them and agreed to take one-half the stock, and our business men readily consented to raise the rest. Mr. Ponder will have an engineer here in a few days and make the necessary surveys, when a stock company will be organized and books opened for subscription, and work begun at once.

Montgomery — The Electric Street Railroad company has sold out its property and franchise to a substantial syndicate, which will take down the overhead wires and start a regular dummy line within ninety days to run all over the city. Six dummies are to be placed on the line at once.

Oxford—A meeting of the stockholders of the new Anniston, Oxford and White Plains Dummy railway has been held and a board of directors elected. Work on the line will begin at once and be pushed to completion.

CALIFORNIA.

Gilroy City—The Gilroy City trustees recently declared a street railroad franchise, granted some time ago, to be forfeited, as the road was not begun within the time specified.

Los Angeles—The Los Angeles Cable Co. has laid about ten miles of track, and is pushing its line to completion with all possible dispatch.

The cars to be used by this company have been ordered from the Brownell & Wight Car Co., and Mr. Fred Brownell promises that they shall be beauties.

Work on the Seventh and Grand Avenue line is near enough to completion to warrant the belief that that portion of the road will be in operation within the next thirty days.

Riverside—A gas motor is to be given a thirty days' trial on the San Bernardino and Colton Street Railroad. If satisfactory it will be adopted by the Riverside and Arlington road of this city.

Sacramento—R. S. Carey states that he would change his horse railroad into an electric road as soon as he was convinced that it could be operated cheaper than at present. There are no heavy grades in Sacramento.

The San Bernardino and Colton Electric Railway, three miles long, which was built by F. D. French at the cost of $12,000, is now operating ten trains per diem each way.

San Diego—The San Diego Street Car company, operating nearly twenty miles of road has passed into the hands of a receiver.

The operation of the Seventh street horse car line here will be discontinued.

San Francisco—Thomas J. Clunie, Fisher Ames, Con O'Connor and R. P. Hastings have accepted the terms and conditions of the Pine street franchise.

Stockton—We understand that the street railroad company will probably electrify its road under the Sprague overhead system in the near future.

COLORADO.

Denver—The arrangement, whereby the West Denver cable subscription is being raised, is progressing satisfactorily. The total subscribed so far is $85,000. The line will run out West Colfax avenue to the Western division, and be of great and material advantage to that section of the city. The line will be six miles long.

CONNECTICUT.

Hartford—The railroad committee of the Legislature has had under consideration a bill providing that no horse, cable or electric railroad constructed hereafter shall cross a steam railroad at grade or vice versa. We understand that the committee originally determined to report in favor of the bill, in accordance with the general railroad policy of the State. It was, however, finally concluded that such a rigid law might be harmful at times, and it is possible that the committee will report a bill providing that such crossings may be made, if permitted by the railroad commissioners. This change will be much appreciated by East Hartford people, for the bill in its original shape would present a serious obstacle to the construction of the proposed horse railroad between Hartford and East Hartford. The situation at the Hartford end of the toll bridge is such that the steam railroad tracks cannot be lowered (on account of high water in freshets) so that the horse railroad could cross over it, while on the other hand the horse railroad could not go over the steam railroad because of the sharp grade of Morgan street at that point, and the existing level of the bridge, which could not be disturbed.

GEORGIA.

Atlanta—The Atlanta & Edgewood Street Railway company has adopted electricity as a motive power, and will operate its lines under the Thomson-Houston patents.

Athens—The street cars stopped running here some time ago, and the company passed into the hands of a receiver. Mr. Albin Dearing, of this city however, leased the road from the receiver until August 1st, when it is to be sold, and the cars started running on the 31st ult. The same cars and mules will be used for a while until better can be provided. It is probable that an effort will be made during the summer to start a dummy line here.

Columbus—There has been already considerable talk here about the extension of the lines of the Columbus Street Railway company up Hamilton avenue. An agreement has been reached between the company and the property owners along the line of the proposed extension, the result of which will be the immediate extension of the road from the present terminus to the point where the Beallwood and River roads separate, a distance of something more than five-eighths of a mile. The rails for this extension have been ordered, and the management will put a gang of hands to work at once, grading and preparing the roadbed for their reception. The cars will be running on this end of the line by May 1st at the latest.

Macon—A syndicate of St. Louis capitalists has purchased all the property of the Macon City and Suburban Street R. R. Co. The new owners will put on new cars to take the place of the old ones, which are now held in reserve for extra occasions, and, as fast as the growth of the city warrants, they will improve the property by extending the lines. It is possible also that the Gilesville line will be the first line extended, so as to give a better service to that suburb.

It is quite likely that the new company will consolidate its interests with those of the dummy line, and also that electricity may be finally adopted.

ILLINOIS.

Chicago—The Meigs Elevated Railroad company has complied with the terms of the ordinances, and deposited with the city treasurer the required amount of $100,000, and has also given bond in $500,000, for indemnity to property owners.

Col. M. H. Alberger, of the Meigs company, had many obstacles to contend with, and encountered an immense amount of opposition, but he stuck close to business and pluckily pushed his scheme through to a success.

Work on the new line will be at once commenced, all the preliminary having been made.

It is expected that a portion of the line will be in operation by July 1st.

INDIANA.

Anderson—The Anderson Street Railway company is extending the road to the suburbs of the city. As soon as the extension is completed, Anderson will have a fairly complete system of street railway.

At a recent meeting of the city council the following resolution was offered and referred for consideration :—

Resolved—"That City Attorney Taylor be instructed to prepare and provide for the repeal of all rights and privileges heretofore granted to and not accepted, and not acted upon by the Citizens' Street Railway Company and the Citizens' Street Railroad company in the city of Indianapolis."

Property owners on Illinois Street are urging the Citizens' Street Railway company, to operate electric cars ; we understand that Supt. Shaffer, however, declines to entertain the idea unless the charter of his company, which will shortly expire, is extended for 30 years.

The ordinance (passed nearly two years ago) granting a perpetual franchise to the Indianapolis Cable Street Railway Co. has been repealed.

Richmond—Mr. J. C. Shaffer, owner of the street railway, is in consultation with electric motor people, with the object of changing from horse power to that of electricity. The overhead system will probably be used. It is said that $50,000 is to be spent on the work.

KANSAS.

Topeka—The construction of the Electric Railway, under the Thomson-Houston patents, has been completed: Its 20 miles of track make it, we believe, the longest line operated by electricity in the world.

MARYLAND.

Baltimore—The "Sun" of this city is urging the adoption of a form of transit more rapid than that afforded by animal power.

MASSACHUSETTS.

Boston — The West End Street Railway Co. will probably use a heavier rail on the sections of its system over which the electric cars operate.

Upon the occasion of the recent visit of the Massachusetts State Senators to the Sprague West End road, there was such a rush of the members that there were not enough left in the capital to make a quorum of the Senate, a circumstance which has not been paralleled, it is said, for twenty-seven years.

The petition of the West End Railway Co. for the right to erect overhead wires for the operation of street cars in and around Boston has been signed by all of the best citizens. At the head of the list stands the name of Governor Ames, followed by almost every leading man in Boston, the insurance men specially favoring the scheme.

A charter has finally been taken out by the Meigs Elevated Railroad company, the document having being issued by the Secretary of State a week or two ago. The charter names include Benjamin F. Butler, Joe V. Meigs, William A. Russell, Frank Jones and other prominent men. The certificate of capital stock paid in says it has been fixed at $200,000, not less than $100,000 for each mile to be erected in Cambridge, as a part of the road contemplated in the charter; that 10 per cent. of the stock has been paid in, and that it is intended in good faith to locate, construct, maintain and operate such railway upon a route fixed in the manner prescribed by law. The officers are as follows: J. H. O'Neil, president; F. E. Gregory, treasurer; B. F. Butler, Joe V. Meigs, Henry Dobbins, John P. Wyman, jr., A. C. Drinkwater and W. S. Butler, directors.

Quincy—Track is being laid between here and Boston for the new electric railway.

The Quincy Street Railway Co. held its annual meeting on April 2. The officers elected were:

J. F. Merrill, president; F. P. Waterhouse, vice-president; F. H. Smith, clerk and treasurer. The above and Wilson Tisdale, J. E. Drake, H. E. Sheldon and J. P. Hayward, directors. It was decided to lease the road to the Quincy and Boston for 4½ per cent. for 99 years. The road carried 200,000 passengers the first seven months.

Nahant—Considerable opposition has developed among summer residents at exclusive old Nahant against the introduction there of an Electric Street Railway, and a largely signed petition was presented against its introduction there at a recent hearing on the subject. The Lynn and Boston Street Railway Co., and the Nahant Street Railway Co., both presented petitions for the right to lay tracks and operate by electricity.

Salem—The Naumkeag Street Railroad Co. (Sprague overhead system) is petitioning the Salem City Council for authority to extend its wires for the operation of street cars.

MICHIGAN.

Detroit—An exchange says as follows: A highly successful test was recently made by the Highland Park Railway Co., of Detroit, Mich., of a new car—the "Ampère," which is equipped with a storage battery supplied by the Woodward Electrical Co. of Detroit, consisting of 84 fifteen plate cells, and a Rae motor manufactured by the Detroit Electrical Works. The car made fourteen round trips, over 100 miles, and carried about 500 passengers, the average rate of speed being 12 miles per hour. In addition to running the car the battery furnished sufficient current to light two sixteen candle power incandescent electric lamps for five and one-half hours. The battery was in good condition when taken off at night and the car could be started with a full load of passengers on a level track or grade without the slightest difficulty."

Marquette—An electric railway will soon be in operation here.

MINNESOTA.

Minneapolis—The loss to the Minneapolis Street Railway company, caused by the partial destruction of their barns at Chicago avenue (as reported in the March GAZETTE), is estimated at $7,000. The feed burned was valued at $2,000, and the damage to the building is placed at $5,000. An insurance of about $30,000 was held on buildings and contents.

We understand that Col. Thomas Lowry and those interested with him in the Lake Harriet Improvement Association, propose to run a motor line from the Union depot to Cedar Lake and the Lake of the Isles and thence to Lakes Calhoun and Harriet. This would traverse somewhat the same route as that denoted by the old motor line, whose tracks were obtained by the Manitoba road. It is well known that these tracks have never been used by the road since coming in its possession, and it would not be a difficult matter for a motor line to again obtain the use of them. The new line would ensure rapid and cheap transit to Kenwood and the popular Minneapolis lakes, and would aid greatly in developing property in that portion of the city.

St. Paul—One mile of the new cable road has been laid, and work is being pushed on the superstructure of the new cable house, and the building will be ready for the machinery (which is now on its way here from Baltimore), about the middle of next month.

One thousand tons of slot and girder rails will be used in the construction of the road, and 7,000 yokes to support the rails will be placed about four feet apart. Ten cars of yokes will arrive from St. Louis this week.

Chief Engineer Clift Wise has little doubt that the cars will be running at the appointed time.

Stillwater—The contract with the Stillwater Construction and Furnishing company for the erection of the Electric Street Railway company's combined car stables and power house, has been closed. The building will have a Main street frontage of thirty feet, with a depth of 160 feet. It will be of frame, one story high, with the sides and roof cased with corrugated iron, and an ornamental brick-veneered front, having at the north side a ten-foot car door with segment head, and at the south side a double window and office entrance. The main room, 30x85 feet, will afford storage for nine cars. Back of this is the dynamo or power room, 30x45 feet, finished tastefully in oiled yellow pine. Leading from the dynamo room is the boiler room, 30x30 feet, and attached to the rear of the main building, is a coal house of 200 tons capacity. The building, exclusive of tracks for the car stable and machinery, will cost $3,000, and is to be completed ready for occupancy by April 20. Its south wall will stand just thirty feet north of the construction company's building on the east side of Main street, and on account of the character of the ground, it will be necessary to drive piling in order to obtain a secure foundation.

MISSOURI.

Kansas City—The Metropolitan Street Railway company, of this city, has turned out of its shops a miniature cable train constructed on the scale of one inch to the foot. It is complete in every little detail, and cost nearly $500. It will be used to enlighten juries in the various damage suits brought against the company.

The power of the Vine Street Dummy line, which has been in operation about six months, is to be replaced by electricity. The contracts are already let to the Thomson-Houston company to equip the road, and the time specified for it to be in operation is June 15. The Thomson-Houston company will operate the road for thirty days before it will be accepted by the Citizens' Investment company, which owns the line. Two or three lots along the road have been considered as a location for the power plant, but neither has been selected. The electric improvements will cost $50,000.

The dummy line now extends from Eighteenth street along Vine, then on Euclid avenue as far as Springfield avenue. It is about two miles long. A right of way to Ivanhoe park addition has been secured, and the owners of the road contemplate the extension of the line further south one mile.

It is desired to get this done and in operation by the time the change is made on the line operated from steam to electric power. The extension will be made if property holders south of Springfield avenue will give a bonus. The amount of this has not been definitely fixed, but the amount will be in the neighborhood of $20,000, and must be settled at once. The electric line will continue the contract made between the dummy line and the Metropolitan cable roads for a transfer system. It will pass by Troost park, and an entrance has been secured on the east side of the park where the line will have a station.

St. Louis—Mr. Peper, the president of the St. Louis Railroad company (the Broadway line), recently issued the following circular:

A majority of stockholders of the St. Louis Railroad company, having expressed a desire to have issued additional stock to the amount of $1,000,000 or more, instead of bonds and mortgage, for the purpose of providing means for change of motive power for operating said railroad, the directors of said company have concluded to offer the following resolution to be acted upon by the stockholders at the annual meeting of said company, to be held Monday, April 1, 1889:

Resolved, By the stockholders of the St. Louis Railroad company, in annual meeting assembled, that the directors of said company be and are hereby authorized to issue stock of said company to the amount of $1,000,000 or more, in their discretion, to the stockholders of said company at par, for the purpose of providing means for constructing a new motive power for said railroad.

That said stock shall be first offered at par to the stockholders of record on said first day of April, pro rata, according to their respective holdings, and in the event that any of said stockholders should not take and pay for the same, the said directors are authorized to sell and dispose of the same by public or private sale for such prices, not less than par, as in their discretion they may determine.

CHRISTIAN PEPER,
President.

MONTANA.

Phillipsburg—A franchise has been granted to the Phillipsburg and Granite Cable Railway Co., of Phillipsburg, Mont., to build and operate a cable line between Phillipsburg and Granite, a distance of three miles. Construction will be commenced by May, and the line will probably be opened in the fall. Over 20 per cent of grade has to be overcome, and the road, when completed, will be one of the best in the country.

NEBRASKA.

Nebraska City—The Nebraska City Street Car company has increased its capital stock from $15,000 to $20,000, to cover the expense of extensions to be made this season.

Omaha—Articles of the consolidation of the Omaha Cable Tramway company and the Omaha Horse Railway company into the Omaha Street Railway company, have been filed in the office of County Clerk Roche. The capital stock of the new company is put at $4,000,000 in shares of $100 each, equally divided between the stockholders of the companies. Nine stockholders are to form the board of directors for the management of the affairs of the new company. Frank Murphy, Guy C. Barton, W. W. Marsh, W. A. Smith, S. R. Johnson, C. B. Rustin, W. V. Morse, A. S. Paddock and B. F. Smith form the first board of directors. Frank Murphy is president, S. R. Johnson, vice-president, and D. H. Goodrich is secretary and treasurer.

The new company refuses to assume any of the outstanding debts of either of the constituent companies. It is especially provided that the cable tramway company shall discharge all of its floating and mortgaged indebtedness, and all claims whatsoever against it, accruing prior to Jan. 1, 1889, and deliver its property to the new company free from incumbrance. To do this the cable company will be allowed the $22,000 donation yet unpaid, and will be given $500,000 of the first issue of bonds by the new company. Another issue of $500,000 in bonds will be placed in the hands of a trustee for the purpose of relieving the outstanding obligations of the horse company. Bonds to the amount of $250,000 are to be set apart at once for the purpose of extensions and improvements. The by-laws of the cable company are adopted for the provisional government of the new company.

NEW HAMPSHIRE.

Portsmouth—The new street railroad here will use the conduit system if the city will give permission to use electricity.

NEW JERSEY.

Camden—The new management of the Camden Horse Railroad company, proposes to substitute electricity for horses as soon as possible. It is probable that the storage battery system will be adopted.

Newark—It is expected that the electric road here will be in operation before the end of the month. The construction of this road is said to have caused a rise in price of property along its line, estimated at from 15 to 20 per cent.

Paterson—The Connelly Street Railway Equipment Co. has been organized and incorporated, the stockholders being E. F. Eldredge, of New York; John S. Connelly, of Plainfield, and Geo. F. Mallen, of Fall River, Mass. Works here for the manufacture of the motor will be built at once.

NEW YORK.

Buffalo—President Henry Watson says his electric division will start at the Cold Spring barn, where the stationary power will be located, then go out Michigan street to Delavan avenue, to Delaware avenue, to Forest avenue, and to the Park; returning the same way to Linwood avenue, then down Linwood avenue to Balcom street, and back to the barn again. The idea is to run the cars with horses out to the barn, then take off the horses, and send the cars the rest of the way by the electric line. It is expected that it will be in operation by July.

Newburgh—The capital stock of the Newburgh Street Railway company has been increased from $40,000 to $100,000.

New Hartford—Some time ago the New Hartford and Washington Mills street railroad company applied for a franchise to lay its tracks in South street, New Hartford, and the trustees imposed so many conditions that the company declined to accept the franchise. The officials have now granted the application of the company in full. At a meeting of the trustees a preamble, setting forth the facts in connection with the application, and the following resolution, were adopted:—

Resolved, that the application of the New Hartford and Washington Mills street railroad company be, and the same hereby is in all things granted, and that the village of New Hartford through and by its president and board of trustees, does hereby grant unto the New Hartford and Washington Mills street railroad company, a

franchise and consent that said street surface railroad to be operated by horse power, be constructed, maintained, used and operated along, through, and upon the center of such South street in said village, with all such turnouts, turntables, connections and switches as may be necessary.

This franchise is granted on the condition that the provisions pertinent thereto of chapter 252 of the laws of 1884 be in all things complied with, except that the said railroad company shall not be required to pave or repave said street, and subject to the further terms and conditions :

1st. That such road be of the standard gauge, and the rails shall be similar in form and style to those used on Genesee street, known as the Cleveland rail, and shall be laid in an approved, proper and substantial manner on stringers or crossties.

2d. That the top of said rails shall approximately conform to the present grade of said street, and that in the event of the grade of the said street being hereafter changed, that such rails shall in like manner be made to conform to such new grade.

3d. That the said New Hartford and Washington Mills railroad company shall have the option not to operate said railroad from the 10th day of December to the 10th day of April in each and every year.

The franchise is signed by James Armstrong, president ; George W. Rice, Jerome M. Seaman, W. J. French, trustees.

New York City—Mr. P. A. B. Widener is credited with the statement that work will be begun upon the Broadway cable railway here within ninety days. Under the general railroad law of 1884 of New York, any power, except locomotive steam power, can be used in the propulsion of cars on Broadway, but the assent of one-half of the real property owners along the route must first be obtained.

An appeal to the U. S. Supreme Court has been taken by the plaintiff in the case of Hy. Root vs. Third Avenue Ry. company, in which a decision in favor of the road (given in full in the March issue of the GAZETTE) was recently rendered by Judge Wallace.

The Central Park, North and East River Railroad company will shortly have its equipment increased to the extent of an additional 20 improved summer cars.

Port Chester—The cars of the Port Chester, White Plains & Tarrytown Electric Railway company (Bentley-Knight overhead system) are to be built in New York. They are to be finished in mahogany and lighted by electricity. The company has given a contract for a stone and brick building 130 feet long, eighty-five feet deep and two stories high. It is to contain offices, two 80-horse power engines, two 80-horse power boilers, two 80-horse power dynamos and storage room for twenty-five cars.

Syracuse—The People's Street Railway company is giving its patrons excellent service, and is now running on eight minute time. The company has fifteen cars here, and another fifteen will be added, suitable for summer use.

They will be built on the same model as those in present use, and will have the same style of roof and overhead finishings. The cars will have seven seats with reversible backs. Part of these cars, according to the contract, will be here May 10, and the balance on the 25th of the month. The company has 65 horses now in the barns in South avenue, and they are being broken into service as fast as possible.

The car and horse barns in South avenue have been completed and are being painted. The company's barns in Wolf street are nearly completed. The brickwork on the car house has been finished, and the barn is nearly up. All structures will be ready for occupation within a month.

The office of the company is now in the Snow building. After May 1st it will be removed to quarters which have been provided in the building on the north side.

The conductors on the road will wear a navy blue uniform, similar to the outfit of the Central Railroad Co.'s employes. The coat will be at hree button cutaway, with the gilt letters "P.R." on the shoulders. A gilt band, with the word "Conductor," and the number, will ornament the caps. A plan to uniform the drivers is being considered but has not been determined upon. The conductors and drivers will be kept on the 12-hour limit, and each will receive $45 a month. They will have forty minutes for dinner and supper, and have every third evening to themselves after 7:30, after the road is in full operation. The southern half of the road will be in full running shape by April 1st, when one additional car will be put on. and the running time will be six minutes between cars.

Twenty men are now employed, and when the road is under full swing about 75 men will be on the company's pay roll.

Work on the northern section of the road will be commenced again on the 1st of April, and will probably be completed by June 1st, when cars will be run through to the lake.

The People's Railroad company has obtained possession of a controlling interest in the Central City Railroad company.

Troy—As predicted in the March GAZETTE, the Troy & Lansingburgh Street Railroad will be operated by electricity.

NORTH CAROLINA.

Raleigh—The cars of the Raleigh Street Railway company here will in future be operated by electricity.

OHIO.

Akron—Judge E. P. Green, in Common Pleas court has dismissed the petition of The Union Telephone Co. v. The Akron Electric Street Railway Co. The case was heard some time ago and was hotly contested by eminent attorneys from New York and Chicago. It occupied several days in its hearing as it was looked upon as a test case, similar interests being involved in many other cities of this country. The plaintiffs in their petition asked for a permanent injunction restraining the Electric Railroad Co. from extending its lines in this city, claiming that the electric current employed to run the cars was disastrous to the telephone service. Plaintiffs at once gave notice of appeal.

Cincinnati—At a recent meeting of the Board of County Commissioners, it was

Resolved—That the application of the Cincinnati Inclined Plane Railway company for the permission to use and occupy with double tracks and with the necessary appendages and appurtenances of an overhead electric street railroad system the Carthage turnpike, commencing at a point at or near its intersection with Ludlow avenue, and running thence upon and along said Carthage turnpike to its northern terminus, at or near the County Fair Grounds at Carthage, so as to enable the said company to furnish continuous, rapid and safe transportation between Fountain Square, in Cincinnati, and the village of Carthage in this county, be, and the same is hereby granted upon the following terms and conditions :

1. That said company shal' replace and restore the said portion of said turnpike in as good order and condition as they find it at its own expense.

2. That said company shall pay and save the county harmless from any and all damages for which it may be liable for any injury or inconvenience to persons or property by reason of construction or operation of said road over said portion of said turnpike, and the top of the rails must in no case project above the level of the surface of the pike.

3. The work to be done to the satisfaction of the County Engineer and County Commissioners : any differences arising between said Engineer and the company to be submitted to the County Commissioners for a fair and equitable adjustment.

4. The tracks to be laid on each side of said turnpike, leaving a clear space of twenty feet in the center of said turnpike for travel, except over the bridges or as may be otherwise ordered by the Council in the villages through which said road is located.

The center of the poles supporting lateral wires to be placed at no points except eighteen inches within the curb lines, allowing twelve feet for sidewalks, and to be located in such a manner as to cause no obstruction to vehicle or pedestrian travel now or in the future.

5. The said electric road to be constructed, completed and put in operation within twelve months from the time said company shall have acquired the legal right to so construct, excluding, however, from the computation such periods of time during which the work of construction may be delayed without any fault of said company: the work of construction must be commenced, however, within ninety days from the date of the passage of this resolution.

6. The rates of fare shall not exceed the following :—Fifteen cents cash for a single trip between Fountain Square and Carthage or Elmwood or return. Ten cents cash for a single trip between Fountain Square and St. Bernard or Ludlow Grove or return. Ten cents cash for a single trip between Zoological Garden and Carthage or Elmwood or return. Five cents cash for a single trip between the Zoological Garden and St. Bernard or Ludlow Grove or return. The said company shall, however, keep for sale upon cars tickets in packages as follows : eight tickets for one dollar : each ticket to be good for a single trip between Fountain Square and Carthage or Elmwood or return. Twelve tickets for one dollar: each ticket to be good for a single trip between the Fountain Square and St. Bernard or Ludlow Grove or return.

7. The bridge over the canal in St. Bernard to be widened in such manner and at such costs as may be agreed upon between said company and said County Commissioners; the cost, however, when agreed upon, is to be paid equally by said company and said Commissioners.

8. Said company shall pay into the County Treasury on the 1st day of January, 1891, the sum of $500 ; on the first day of January, 1892, the sum of $500; on the 1st day of January, 1893, the sum of $1,000, and $1,000 on the 1st day of January of each succeeding year, so long as the said turnpike shall remain a toll road under the charge of the said County Commissioners, said sum to be applied by said County Commissioners in making the necessary repairs to said turnpike, and if said amounts so agreed to be paid by said company be not paid when the same are due and demand made therefor by the County Commissioners, that the County Commissioners have the right summarily to stop the running, and in the event of such stoppage no liability for damages shall accrue.

9 The Cincinnati Inclined Plane Railway will, on or before April 10th, 1889, file its bond, to be approved by the County Solicitor, in the penal sum of $10,000, conditioned upon the faithful performance of this contract.

10. The County Commissioners to cause the removal of any and all telegraph and telephone poles which may interfere with the operation of said electric road.

The conditions which were prepared by Assistant County Solicitor Hertenstein, have been accepted by the railroad company and work will be begun at once.

At a recent meeting of the citizens of Walnut Hills, the following resolution was passed :

"Whereas, The Mount Adams and Eden Park Inclined Railway have secured the legislation necessary to give to the citizens of Walnut Hills increased facilities by constructing the McMillan street car line between May street and Ohio avenue, and offer to transfer passengers via the Vine street and Elm street lines, to and from the city for a single rate of fare; also, to complete branches to Norwood and O'Bryonville; also, to extend the Reading road branch of the Avondale line through West Walnut Hills at Oak street, via Home street and Lincoln avenue, to the East Hill, thereby giving an additional trunk line from the city, and change the motive power on the Eden Park line so as to make it equal in carrying capacity to that of the cable line; therefore, be it

"Resolved, That the proposition of the Mt. Adams and Eden Park Inclined Railway be, and the same is hereby indorsed, and that we extend to them our united support, and hope that the entire plan as laid out for the development of this fast-growing section will be pushed to an early completion.

"Resolved, That a copy of these resolutions be forwarded to the Board of Public Affairs as conveying the correct views of the citizens of this hill as to our requirements."

Mr. Kerper stated that if the Board of Public Affairs would grant him the privileges he would guarantee that the contract would be faithfully fulfilled. He said: "We are doing what I have promised the patrons of our lines we would do, and we are now actively and energetically preparing to build a cross town road.

"We will begin work as soon as permission is given us by the Board of Public Affairs, and if they will act at their meeting next week, I can pledge you my word that we will build the line this year. We will complete all these lines the resolution calls for this year with the exception of the Eden Park line, and I can guarantee that before the close of next year we will give you motive power over our Eden Park line."

Cleveland—President Frank De H. Robison, of the Superior Street Railroad, recently said : "Just as soon as the ordinance making Wade Park avenue free territory becomes a law, our company will prove the sincerity of the fight it has been making We propose to build the road and to open up a route to the East End for the patrons of our lines. It will be a first-class road and will be operated in the most approved way. Wade Park avenue is practically the only street over which we can reach the East End, and now that the territory is to be made free we will go ahead and extend our lines as we have insisted from the start that we would be glad to do."

Columbus—The Consolidated Street Railroad company has decided to double-track its High street line to North Columbus, also the Neil avenue line as far north as Buttles avenue.

Tiffin—The street railway of this city has been sold to Massachusetts capitalists for $25,000, and they will double track it and build other lines at once. They also bought fifty lots in Highland addition, where the ground was broken for the immense Brewer pottery, to employ 700 men, and where the Beatty glass-works, to employ 500 hands, is receiving the finishing touches. As a large rolling-mill and another large pottery have also offered to sign a contract to move here, each to employ 500 hands, the investment ought to prove a remunerative one.

OREGON.

Portland—The Portland Cable Railway Co. has filed supplementary articles of incorporation

to increase the amount of its capital stock to $300,000.

PENNSYLVANIA.

Erie—Gen. Casement will probably adopt electricity as a motive power on his line here.

Philadelphia—The following street railway companies have been notified to pave certain streets from curb to rail with eastern granite blocks as provided for by city ordinance :

Citizens', Continental, Empire, Frankford and Southwark, Germantown, Green and Coates Streets, Hestonville, Mantua and Fairmount, Lombard and South Streets, People's, Philadelphia and Gray's Ferry, Philadelphia City, Ridge Avenue, Second and Third Streets, Seventeenth and Nineteenth Streets, Thirteenth and Fifteenth streets, Union and West Philadelphia.

Reading—An order for a one car equipment has been placed by the East Reading Railway company with the Philadelphia managers of the Sprague Electric Railway and Motor company, through Chadbourne, Hazelton & Co.

RHODE ISLAND.

Newport—The stockholders of the Newport Horse Railroad company have voted an increase to its capital stock of $25,000, to meet the increased cost caused by the installation of electric motor power.

SOUTH CAROLINA.

Charleston—The Charleston Street Car company is contemplating adopting electricity as a motive power.

TENNESSEE.

Nashville—The Main Street and Lischey Avenue Street Railway company is preparing to introduce electricity as a motive power on the line if the proper arrangements can be made, application already having been made for the privilege to the City Council.

TEXAS.

Austin—Mr. Thomas Hurley, president of the Fort Worth Loan and Construction company, has purchased the Austin Street Railway system in the city, paying for the same $12,000. He will change it to a broad gauge at once, and make it an electric railway, such as is used in New York.

The syndicate which recently purchased the Street Railway system and franchise here for $116,000, proposes to extend the system by lines belting the city, operated by electricity.

Fort Worth—The West Fort Worth Street Railway company will probably adopt electricity on its line.

Houston—The Chicago syndicate has acquired control of the property of the Houston Street Railway company, and will operate the line by electricity.

Paris—The Paris Street Railway company contemplates the extension of its lines and may adopt electricity.

UTAH.

Salt Lake City—The Salt Lake City Street Railway company has decided to operate five miles of its line on some electric system, and has purchased a site for its power plant, in which two 250 horse power dynamos will be used. It is believed that ten cars (recently purchased from the Twenty-third street line in New York) will be in operation by the middle of May.

VIRGINIA.

Roanoke—The Roanoke Street Railroad company has started work on its dummy line to Salem. The whole system, when completed, will embrace nearly twenty miles of track.

WASHINGTON TERRITORY.

Port Townsend—The Port Townsend trustees have granted a franchise for the motor road and the contracts have been let for both motors and cars.

Seattle—The Seattle Electric Railway (Thomson-Houston system) and Power company has ordered additional cars at a cost of $7,500. There will be fifteen cars in operation.

The Seattle Electric Railway and Power company has begun to build the Cedar street extension of its line, and it is thought that it will take about sixty days to complete it.

The Front Street Cable road is now in operation ; it is 8,250 feet long, single, or 16,500 double track, and cost in the neighborhood of $341,500. The road is provided with electric wire, placed alongside the cable, and connected with an alarm bell at the engine house. In cases of accident the conductor can go to one of the manholes, which are located every twenty-four feet, and, by manipulating the wire signal to the engine house, so that the cable may be stopped in a few seconds after an accident occurs. (We believe that Mr. Geo. B. Kerper, of Cincinnati, O., has a somewhat similar arrangement.)

WEST VIRGINIA.

Parkersburg—The projected electric road of the Parkersburg Street Railroad company will, undoubtedly, be built in the spring.

WISCONSIN.

La Crosse—The construction of an electric railway between this city and Onalaska is no longer problematical, negotiations to that end having been completed.

Menasha—The Menasha & Neenah Street Railroad company has ordered ten new twenty-two foot cars, and will adopt an independent motor.

FOREIGN.

ARGENTINE REPUBLIC.

Buenos Ayres—The Buenos Ayres tramways hauled 19,986,419 passengers last year, and their cars ran 2,877,626 miles.

Additional stables and car sheds are to be built at Barracas.

BELGIUM.

Brussels—The Julien storage battery system is used on six cars here and is working well.

DENMARK.

Copenhagen—Last year the Norrebro Tramway company's earnings amounted to £18,500, and the expenditure to £13,500, leaving a profit of £5,000, being equal to 15 per cent. interest on the capital invested. The reserve funds amount to £2,000.

EGYPT.

Cairo—The Egyptian government has decided upon the construction of two street car lines in the city of Cairo, and one from the great bridge on the Nile to the pyramids of Gizeh and the railroad depot of Bulak-Dakrur. The Minister of Public Works has advertised for proposals, which close April 15th.

ENGLAND.

Liverpool—Proposals have been made to the Liverpool Tramways company to install an electrical system, without expense, over two miles of the road, agreeing to restore the line if the company is not satisfied with the result.

Notice of motion has been given in the House of Commons that the bill, empowering the construction of a subway between Piccadilly and Holborn-circus for electrical trains, be read a second time.

The Metropolitan Railway bill empowering the company to use electricity as a motive power, and to enable it to run over the Aylesbury and Buckingham Railway company, passed the Examiner upon Standing Orders in the House of Commons on March 11th.

FRANCE.

Bordeaux—The Bordeaux Tramways and Omnibus Co. has declared a dividend of 5s. per share, making, with that paid in August, a total distribution for the year of 5 per cent. on the preference and 4 per cent. on the ordinary shares. The sum of £1,000 is to be placed to the reserve and £3,320 to the depreciation funds.

Paris—An electric car is now being operated by the Compagnie Generale des Omnibus, on the line running through L'Avenue de la Grande-Armee and between La Place de L'etoile and La Port Maillot. It was built by Phillipart Frères, of this city. The motor, which is of the Siemens' type, is carried on the front platform and runs about 1,200 revolutions per minute. It drives, in the first place, an intermediate shaft by means of an endless band. The driven pulley is keyed to this intermediate shaft, but drives it and a sleeve riding loose on the axle through a differential gear, as in any ordinary tricycle, so that the sleeve and the axle can rotate independently. A chain pinion on the sleeve and another on the axle drive the two hind wheels of the vehicle, which can rotate independently of each other. This arrangement of differential gearing much facilitates the passage of the vehicle round curves and decreases the wear and tear. The speed of the car is regulated by altering, by means of a switch, the grouping of the accumulators, and four different speeds can be obtained. The car is lighted electrically by means of six incandescent lamps of ten candle power. The driving wheels revolve independently of each other, and can be run at a different speed in rounding curves. The weight of the car (itemized) is estimated as follows :

Car	7,700 lbs.
Battery	3,300 lbs.
Motor, pulleys, gearing, etc.	1,650 lbs.
Passengers (full load)	7,700 lbs.
Total	20,350 lbs.

[The car, like most Parisian cars, has seats on the roof and carries fifty passengers.—Ed.]

GERMANY.

Berlin—During a violent thunderstorm a shaft of lightning, after having entered a bakery and causing havoc and destruction, crashed through the show windows and struck a passing car of the Berliner Pferdeeisenbahn Gesellschaft, breaking several windows and causing general consternation among the passengers. Fortunately no one was injured.

Braunschweig—At a meeting of the Braunschweigische Strassenbahn Gesellschaft it was decided to pay a dividend of five per cent for the last year.

Bremen—The Bremerhavener Strassenbahn has declared an annual dividend of 4½ per cent.

Breslau—According to the annual report for 1888, the Breslauer Strassen Eisenbahn Gesellschaft transported 7,241,647 passengers over its lines. This does not include commuting patrons and holders of free passes. The earnings for the same period were 810,594 marks. The commutation ticket department alone turned in 59,770 marks. As in 1883 this branch only yielded a revenue of 20,172.23 marks, the growing popularity of this mode of traveling is evident.

Cassel—The Casseler Strassenbahn Gesellschaft place their February earnings at 5,191 marks. The annual meeting was held March 25.

Coblenz—An annual dividend of 5 per cent. has been declared by the Coblenzer-Strassenbahn. The annual meeting took place March 21.

Crefeld—The February statement of the Crefeld-Uerdinger Localbahn shows a light business, only footing up 14,657 mks.

Dresden—The February business has been very satisfactory with the Dresdener Strassenbahnen. The total value of fares collected amounts to 116,265 mks. and represents 746,005 passengers.

Frankfurt—A dividend of 10 per cent. has been declared by the Frankfurter Trambahn Gesellschaft against 9 per cent. last year.

Gratz—The annual meeting of the Gratzer Tramway Gesellschaft will take place May 11.

Hamburg—The Hamburg, Altona & Northwestern Tramway Co. transported in February 393,927 passengers, an increase of 83,781 over the corresponding month of last year. The receipts were 43,894 marks against 34,545 marks.

The annual report of the Grosse Hamburg Altonær-Strassenbahn Gesellschaft, just submitted, shows a loss of 70,355 mks. for the past year.

It reports an income of 24,327 marks for the month of February from fares of 230,078 passengers.

The passenger business of the Strassenbahn Eisenbahn Gesellschaft yielded, in February, the sum of 235,970 mks. Last year, this month's earnings only showed 225,877 mks. An annual dividend of 5½ per cent. has been declared.

Koenigsberg—The Kœnigsberger Pferdeeisenbahn Gesellschaft report 17,754 mks. as representing their February earnings.

Koln—The Kolnische Strassenbahn Gesellschaft's February earnings amount to 58,202 marks.

Leipzig—The February report, just presented by the Leipziger Pferdebahngesellschaft shows that 149,261 passengers passed over the Lin-

denau Thonberg line, their fares amounting to 17,854 mks. On their Plagurtz-Sellershausen line, however, 206,357 passengers represented 25,998 mks. The latter line has the advantage of passing through a more populous portion of the city.

Magdeburg—The annual meeting of the Magdeburger Strassen Eisenbahn Gesellschaft took place March 28.

Munich—The Munchener Trambahn reports a gratifying increase in passenger business for February. The monthly statement of 106,612 mks. means an increase of 22,822 mks. over same month of last year.

Potsdam—A dividend of 7½ per cent. has been declared for 1888, by the Tramway company here. The preceding year the dividend was only 6 per cent. The difference is credited to new branches that have been opened lately and are well patronized.

Stettin—The passenger travel of the Stettiner Strassen-Eisenbahn Gesellschaft shows an increase for February. The earnings amount to 25,648.33 mks., which is 1,005.76 mks. more than the report made in the same month of last year.

Stuttgart—At the annual meeting of the Stuttgarter Pferde Eisenbahn Gesellschaft, held Feb. 27th, a consolidation of this line and the "Neue Eisenbahn" was affected. For a consideration of 900,000 mks. the former acquires possession of the "Neue Eisenbahn," together with all its buildings, live stock, cars, etc. As a result the capital of the enterprise has been augmented 800,000 mks. by an issuance of 800 shares of stock at a par value of 1,000 mks. each. The stock was easily placed. The income from passenger traffic last year was 319,315 mks. which entailed an outlay of 265,591 mks. In view of this consolidation the Board of Directors have concluded to pass the annual dividend.

Wiesbaden—The Weisbadener Strassenbahn has, under consideration, the placing of its single fares at 10 pfennigs for continuous or transfer rides, and early action will be taken in the matter.

HOLLAND.

Rotterdam—The bitter opposition between the Rotterdamsche TramOmnibus Maatschappig and the Rotterdamsche Tramweg Maatschappig has as last been terminated by the purchase of the franchise, cars, horses, etc., of the former company by the latter, under whose name the enterprise will be operated in future.

INDIA.

Naini Tal—The country lying between this point and the plains is being surveyed with a view to the construction of an electric railway.

IRELAND.

Belfast—The Belfast Street Tramways company has declared a dividend at the rate of 7½ per cent. (7s. 6d. per share), £1,238 being carried forward.

SCOTLAND.

Glasgow—At the last annual meeting of the Glasgow Tramway company, a member of the board of directors gave notice that he would urge the question of stopping tramways from running on Sundays.

A new underground railway seven miles long has been decided upon, and will probably be adopted.

SPAIN.

Barcelona—At the annual meeting of the Barcelona Tramways Co., held March 13, in London, a dividend of 5½ per cent., making 8 per cent. for the year, was declared.

Madrid—Some time ago a petition was lodged with the Madrid municipality to obtain powers to erect a tramway, about two miles long, in the north of the city, but it was pointed out that it was undesirable that any more concessions should be granted for tramways in Madrid, unless electricity were used as the motive power. The persons interested have now offered to adopt electricity so, and a decision may soon be expected. All the tramway lines in Madrid start from one point, La Puerta del Sol, and consequently a great block often takes place.

The Board of Directors of the Tramway of the Calle de Ferraz, el Paseo de Areneros and Salamanca Barriere has notified the city government that arrangements have been made for the introduction of the electric system in their lines in the northern part of Madrid.

U. S. OF COLUMBIA.

Carthagenia—At the annual meeting of the shareholders of the Carthagenia and Herrerias Steam Tramways company, held March 13, a dividend of 9s. per share, or 4½ per cent., was declared.

WALES.

Cardiff—The strike of the conductors employed by the Cardiff Tramways Co. is at an end, the company having made every concession asked for.

New Enterprises.

ALABAMA.

Birmingham—The Birmingham Union Railway Co. will build from two to four miles of track during the spring.

Dadeville—A dummy line will probably be built here in the immediate future. It will run from the Columbus and Western depot to the city. Mr. B. F. Ponder, of Opelika, Ala., is interested, and has organized a company to construct and operate the line.

Decatur—The Street Car company here contemplates using electric motive power.

Ensley—The Ensley Railway Co., through its secretary, Mr. McClary, advises us that his company contemplates the purchase of 12 thirty-foot closed coaches, with reversible seats, thirty inch wheels and No. 7 Pullman trucks.

Montgomery—The Highland Improvement Co. contemplates putting dummy engines on its street railroad.

The city council has granted important franchises to two substantial corporations; one headed by I. Pollock and associates, to run dummy lines through the city and suburbs; the other to W. F. Vandiver, F. M. Billing and W. F. Joseph, to run belt line cars through another part, in and around the city, at a fifty-four and a half-inch gauge. Both expect to commence work at once.

Oxford—The Choccolocco Valley Dummy line will be built here at once.

Selma—The Selma Street Railway Co. will extend its line to the park this spring.

ARKANSAS.

Fort Smith—The Fort Smith Street Railroad Co. will build an additional five miles of road this spring.

Little Rock—Articles of incorporation of the Little Rock and Argenta Street Railway company have been filed in the office of the Secretary of State. The company proposes to operate a line of railroad in the cities of Little Rock and Argenta.

The capital stock is placed at $20,000, of which amount $8,000 has been subscribed by the incorporators, Messrs. Louis Reinman, Gus. Straus, Charles M. Simon and D. J. Nichols.

This new company has unearthed another company of a similar character, of which J. H. Martin, a Chicago capitalist, is the head. Mr. Martin was here a few weeks since, looked over the ground, but went away without having filed the articles. While absent he purchased cars, iron, etc., and returned to find another Richmond occupying the field.

Pine Bluff—The Citizens' Street Railway Co. will build a mile of track this spring, and is in the market for the purchase of 4 new cars, 20 mules, and maybe 2 motor cars, gauge 4′ 8½″.

Texarkana—The Texarkana Street Railway Co. will build an additional three miles of track this summer.

BRITISH COLUMBIA.

Victoria—The National Electric Tramway and Lighting company has been incorporated.

CALIFORNIA.

Los Angeles—J. S. Drake has petitioned for a street railroad franchise here.

Oakland—Charles F. Crocker states that the San Pablo Avenue Cable Railroad will probably be extended to First street and Broadway, in the near future.

Oceanside—The Coast Motor company has been granted a franchise to build a street railway at this point.

Red Bluff—An electric road will be built here at an early date, current for the operation of which, we understand, will be obtained from the electric light station on Antelope Creek.

The road will be built from the City, along Berendos avenue to the residence of J. S. Cone.

Sacramento—The Pacific Electrical Storage company is likely to build a factory at this point, with Mr. Fred Reckenzaun as electrician in charge.

The Central Electric Railway company will build a line here, on which storage battery cars will be used.

San Francisco—We understand that the Omnibus Railroad and Cable company has petitioned the Supervisor for a franchise to cover the following extensions:

From the intersection of Broderick and Ellis streets, along Broderick and Sacramento to Walnut; from Brannan and Channel streets along Brannan and Third; from the crossing of Ellis and Leavenworth along Ellis to Market; from Post and Leavenworth to Jefferson and the water front; from Twenty-fourth street and Potrero avenue along Sonoma and Nebraska streets, and San Bruno and Fifteenth avenues to Platte street; from Second and Howard streets along Second to Brannan; from Montgomery and Jackson streets along Jackson to Stockton; from First and Brannan streets along First and Bryant to Spear.

The San Francisco Railway Association has been incorporated by Cornelius O'Connor, R. P. Hastings, Fisher Ames, Thomas J. Clunie and A. E. Davis, who will be recognized as the parties to whom was granted the Pine street franchise by the Board of Supervisors three weeks ago, in opposition to Mayor Pond's veto. The capital stock is stated to be $2,500,000, of which $25,000 has been subscribed and $2,500 actually paid in. Cornelius O'Connor has been elected treasurer of the concern.

COLORADO.

Denver—The South Denver Street Railway company has been incorporated. The capital stock is $75,000. Charles L. McIntosh, Joseph P. Ewing, Charles H. Toll, Avery Gallup, S. Vinson, Isaac L. Killer and John L. Dailey form the company. It will operate a line running along Broadway from the intersection of Alameda avenue and Broadway to the extreme southern limit of the town, a distance of about four miles.

The Denver City Railway company has started work on its Holladay street line at Fourteenth street, and will be continued southwest to Eighth street. From there the direction of the track is to Larimer street.

This work by the street car company is supposed to be done to hold Holladay street for future occupancy by a possible connection by cable. The charter, granted some time ago by the Council to the Denver City Street Railway company, gives it the right to build on any street in the city.

The Capitol Hill and Harman Railway company has been incorporated. Capital stock is $50,000. The idea is to construct a motor line from Colfax avenue southward along the Boulevard to Alameda avenue, and thence eastward. The incorporators are H. B. Chamberlin, Thomas H. Woodelton, G. O. Scott, Frank J. Boot and F. J. Chamberlin. The line, when completed, will be about six miles in length, although at present but four miles will be built.

Denver—The University Street Railroad company has been incorporated; the capital stock is $75,000, and the directors of the company are G. W. Bailey, Milo M. Smith, Thomas Fitzgerald and Samuel Collins. It is intended to run the cars by electricity.

Pueblo—The Pueblo Rapid Transit and Circle Railroad company has been incorporated by William Cook, James B. Orman, L. E. Moses, A. E. Graham and William A. Moses. The line is to commence at Orman street and Evans avenue and run south along Orman street to the city limits; thence to Palmer avenue, to Jones avenue, to Upland park; thence around the city to Adams and Quincy streets; thence to the point of beginning. The capital stock is fixed at $100,000, and the term of the corporation at fifty years.

DELAWARE.

Wilmington—We understand that the Wilmington City Railroad company will be in the market for one or two cars this spring.

DISTRICT COLUMBIA.

Washington—We understand the Eckington & Soldiers' Home Electric Street Railroad, Thomson-Houston system, here, is to be extended at an early date.

At a recent meeting of the stockholders of the Washington and Georgetown Railroad it was finally decided to adopt the recommendation of the directors to substitute a cable road for the horse car line on Seventh street. It is estimated that the road will cost $100,000 a mile per single track. The road is three miles and a half long, and the track will be double, thus making seven miles, at a total cost of $700,000.

FLORIDA.

Palatka—The Palatka & Heights Street Railway company, using a center bearing, twenty pound rail, track three feet gauge, will build an additional two and a half miles of track, also a stable and car house, and is in the market for ten mules and three cars. The Connelly motor will probably be adopted on this line.

Tallahassee—G. W. Saxon and T. F. Myers, of Tallahassee, and R. L. Bennett, of Philadelphia, Pa, contemplate building a street railroad here.

Tampa—The Tampa Street Railway company is in the market for two more passenger cars: —gauge three feet, three and a half inches.

GEORGIA.

Atlanta—We understand that the Atlanta Street Railway company will double-track its road on Peachtree street, and make other improvements. The company contemplates the adoption of electricity as a motive power, and may possibly build a dummy railroad.

Columbus—The Columbus Street Railway company will extend its lines at once.

Decatur—Major W. J. Houston and others contemplate building a dummy line from this point to Atlanta, a distance of six miles.

Griffin—A company has been formed here for the purpose of building a street railroad. It will probably be known as the Griffin Street Railroad Co. At the next session of the state legislature the company will apply for a charter.

Rome—The North & South Street Railway Co expects to extend its line into South Rome, a distance of from two to three miles. The road uses both T and flat rails, 16 lbs. to the yard, with gauge 4'-9½".

ILLINOIS.

Belleville—The National Railway Supply Agency at this city has been incorporated; capital $100,000; to deal in articles necessary and incident to the construction of steam, cable, electric and other rail tramways; incorporators, T. B. Wilson, George H. Poor and L. L. Austin.

Chicago—The Jefferson Electric Rapid Transit & Lighting Co. has been organized to build an electric railway from Western avenue, northwest on Elston avenue to Jefferson Park, with branches to tap Avondale, Irving Park, the county buildings and Montrose. One main branch will commence at the 200-acre subdivision that a syndicate have in hand west of and adjoining Jefferson Park, and extend east to Bowmanville. Another will begin at the intersection of Western and Elston avenues and reach out for patronage from Cragin and vicinity. G. C. Thomas and J. C. Elder are among the projectors.

Leonard & Izard, Rookery building, Chicago, have just incorporated their concern under the name of The Leonard & Izard company; capital stock, $300,000; to deal in engines, electrical appliances, and supplies of all kinds therefor, to build railways and to furnish expert service in electrical and engineering work of all kinds.

The Chicago Anti-Friction Collar & Pad company, at Chicago; capital stock, $20,000; to manufacture anti-friction horse collar pads; incorporators, F. L. Hagadorn, George W. Griswold and Franklin J. Thwing.

The Northwestern Street Railway Gas Motor company, of Chicago, has been incorporated; capital stock, $5,000,000; for the manufacture of street car motors and motors for manufacturing and domestic purposes, and furnishing propelling power. Incorporators, Francis A. Bates, F. Getchell, Jefferson Hodgkins.

The Chicago Roller Bearing Car-Truck company has been organized in Chicago with a capital stock of $250,000, for the manufacture of car trucks, cars, and running gear. Incorporators, W. J. Cooke, L. C. Burgess, and W. M. Baldwin.

The Green Bay and Fort Howard Electric Railway and Power company has been incorporated at Chicago; capital, $100,000; for the purpose of building and operating street and dummy railways in Brown county, Wis., supply electric light, heat and power in the cities of Green Bay, Fort Howard and other places; incorporators, H. Ward Leonard, E. M. Izard and M. L. Coffeen.

Decatur—Contracts for the power house, car shop, ties and steel rails for the new electric railway here have been placed. The road will be running according to contract, by July 1st.

Joliet—Joliet Street Railway company, at Joliet; capital stock, $150,000; to construct street railways in Joliet and suburbs; incorporators, J. A. Henry, G. J. Monroe and J. W. Polk.

Peoria—The Peoria Cable Railway company has been incorporated; capital stock, $400,000; for the construction, operation and maintenance of cable street railways in Peoria and suburbs; incorporators, Valentine Jacob, James Doheny and G. B. Foster.

South Chicago—A new line of street railway is projected to connect South Chicago, Englewood and the South Park system.

INDIANA.

Ft. Wayne—The Centlivre Street Railway company has been incorporated. The capital stock is $30,000. The stockholders are Charles L. Centlivre, L. A. Centlivre, C. F. Centlivre, John B. Bouss and A. A. Purman, all of Fort Wayne.

Terre Haute—Electricity will be adopted on the street railway here.

IOWA.

Centreville—We understand that the People's Street Railway Co., of this city, will probably substitute electricity for horses, in the near future.

Clinton—The Clinton and Lyons Horse Railway Co. has been granted a charter to build three miles more of street car tracks in the city. The work of putting in the electric street car system will be commenced soon. This will make over nine miles of railway operated by this company.

Sioux City—Articles of incorporation have been filed by the Metropolitan Street Railway company, of this city. They are signed by T. H. Stevens, R. Green and L. T. Burd. The capital stock is $200,000. The articles provide for annual meetings on the first Monday in March, for a board of five directors, and for the following officers: President, vice-president, treasurer, secretary and general manager.

If the charter is granted as asked, the company will at once begin the building of the line, which will be operated by either cable or electricity. Horse power might be used at the start, but the system would be made as rapid as the most improved methods could make it.

The enterprise is strongly backed by outside capital in addition to that commanded by its incorporators.

KANSAS.

Hutchinson—The Hutchinson Street Railway Co. will build four or five miles of track in the near future.

Kansas City—At a meeting of the stockholders of the West Side Electric Railway, held here lately, it was decided to build the line from Thirteenth street and Minnesota avenue to Chestnut street, thence to Fifteenth, from which street they will go to the Quindaro Boulevard. The return line will be laid from the Boulevard to Cobb's Place, thence to Edgerton Place; thence to Thirteenth street and Minnesota avenue.

Topeka—The Crowley Construction company, of Topeka, has filed a charter to do a general contracting business, construct railroads, street railways, etc.; capital stock, $25,000. F. C. Crowley, R. H. Delahay and L. M. Cunningham, of Topeka; Charles L. Eaton, Chicago, and Marion Pickett, Englewood, Ill.

Wichita—General Manager Dickson, of the Wichita Street Railway company, is negotiating for an electric equipment to cover 10 miles of his system, using overhead wires, with the pole line between the tracks.

The Valley Centre Railway Co. is preparing to adopt electricity on its lines. The officers of the company favor the use of the storage battery.

KENTUCKY.

Ashland—The proposed electric street railroad from Ashland to Catlettsburg, Ky., will be built shortly, a company being organized to push the work. Mr. A. C. Campbell, secretary; R. D. Davis, treasurer.

Lexington—The Lexington City Railway Co. will extend its tracks this summer. It is now using T and flat rails 20 pounds to the yard, 4'-10" gauge.

Mount Sterling—H. C. McKee and others contemplate building a street railroad at this point.

Paducah—The Paducah Street Railway Co. will build about a mile and a half of track this spring.

MAINE.

Augusta—An electric railway will probably be built between this point and Gardiner.

Camden—The Camden & Rockport Street Railway Co. has organized under its charter from the legislature, and that road is one of the possibilities this summer. Mountain Boulevard, a broad highway, will be opened from Belfast Boulevard to the Turnpike. This runs between Mounts Battie and Megunticook, and opens up some fine building sites, the location reminding one of the site of the fine residence of Hon. James G. Blaine at Bar Harbor, with its beautiful sea view. The owners of Beacon Park property have been cutting several avenues through their plant, this winter, opposite Negro Island, where improvements are to be made and the Bay View extension to be built as soon as the ground will permit.

Eastport—The Eastport Electric company is in the market, it is said, for storage batteries.

Portland—The Portland Street Railroad company proposes to put in an electric system during the year.

An electric road will probably be built during the summer between this city and Saccarappa and Cumberland mills.

MASSACHUSETTS.

Boston—The New England Julien Electric company has been formed, with a capital stock organized and capitalized at $1,000,000. It controls the right to the system for electric traction, etc., by arrangement with the Julien Electric company and Julien Electric Traction company of New York.

Fitchburg—At a recent meeting of the directors of the Fitchburg Street Railway company, it was decided to extend the line to the South Fitchburg school house. It is intended to commence operations as soon as the city fathers locate the tracks, and men and materials can be obtained. If the weather is good the work will only take some thirty or thirty-five days to lay the tracks, as the company intends to put a sufficient force of men at work to rapidly push matters, and if everything is favorable cars will be running on June 1st.

Northampton—The Northampton Street Railway Co. will extend its tracks one and one-half miles and will build new car sheds this spring.

Quincy—The Quincy Street Railway Co. will add four new open cars this spring to its present equipment.

Several electric railroad schemes are being talked of by business men. The Enos electric men have already given notice to the Board of Aldermen that they will apply for permission to build a road from Peabody to this city. Several well known business men are interested in the venture, including ex-Mayor Huntington, King Upton and others. The capital stock of $60,000 is already assured. The company proposes, if permission is granted, to run its cars from Peabody, via North Salem, to the city proper, and thence to Salem Willows.

A syndicate, representing local and Boston capitalists, will also apply to the city govern-

ment for permission to run street cars in Salem, using the storage battery system, while still another has been formed to build a horse railroad from Rowley to Haverhill, via Georgetown and Groveland.

Waltham—A new street car line is projected from here to Watertown, for which electricity will probably be the motive power.

MICHIGAN.

West Boy City—An electric street railway is about to be built here.

MISSOURI.

Illinois City—The Electric Railroad company of this city has filed articles of incorporation in Belleville. The company intends to build an electric railway from the approach to the Merchants' bridge in Venice to East St. Louis. The capital stock is $50,000, and the incorporators are Seth W. Cobb, C. C. Rainwater, John Whittaker, of St. Louis; Charles D. McLure, Granite, Mont., and L. M. Rumsey, Hennepin county, Minn.

St. Joseph—The Wyatt Park Electric Railway will be extended to the city limits.

The South Park Railway company has been incorporated, capitalized at $100,000, paid up. It will build an electric line through the south part of St. Joseph, from east to west, connecting with the Union line at Sixth and Patee streets. The directors are: John Donovan, Joseph Hansom, Ben Frazer, J. D. McNuley, J. C. Madinger, Jas. Craig, Jr., and Jas. Pfeiffer.

St. Louis—The city council has passed the elevated electric railway bill. The incorporators are: D. D. Bates, S. J. Fisher, Chas. Suter, Maurice Prendeville, D. S. Bentley, George F. Branham and Ben Von Phul.

Mr. T. H. Lightner, president of the Lindell Railway company, advises us that, should the council grant the franchise, his road will build another ten miles of single track at once and adopt the best overhead wire system of electrical transmission.

Springfield—An electric railway will probably be built here, thus affording quick transit between the city proper and its suburbs.

MONTANA.

Phillipsburg—The Phillipsburg and Granite Cable Railway Co. has been incorporated. The names of the incorporators are: F. C. Lawrence, Joseph A. Hyde, Henry Imkamp, Charles Kroger and James Patten. The company will construct a line of cable railway for the purpose of hauling freight and passengers and doing a general carrying business between Phillipsburg and Granite and other adjacent points in Deer Lodge Co., M. T.

NEBRASKA.

Beatrice—The West Beatrice Division Street Railway company, with a capital of $100,000, has filed articles of incorporation and will be ready for business in a short time. The incorporators are C. A. Jackson, George Hinkle, L. F. La Salle, James Kidston, L. Mineheart, G. R. Strockey, Alfred Hazlett, and William Hewerkerl. The object of the company is to build and operate a street railway over the principal streets of the west side of the city.

Lincoln—The Standard Street Railway Co. expects to build an additional three miles of track, standard gauge, and, we understand, is in the market for the purchase of three more cars and twenty horses.

Nebraska City—A street car company has been organized and construction will commence at once. The officers are: H. H. Bartling, Pres.; E. S. Hawley, Vice Pres.; E. S. Hawley, Sec.; W. L. Wilson, Treas.; A. F. Nims is Chief Engineer. The Johnson 40-lb. steel rail and chair will be used. The motive power will be horses.

Omaha—The Omaha Motor Railway company has been reorganized with a capital stock of $500,000 and will adopt electricity. Dr. S. D. Mercer is President; W. Millard, Secretary, and W. L. Adams, Engineer.

It is now practically settled that the electric motor line will be extended to Fairmount park. Work will be commenced at once and the branch will soon be completed. Much time will be consumed in boring the tunnel through the bluffs, by means of which the trains will be given access to the heart of the park. Double tracks are to be laid all along the route.

NEW BRUNSWICK.

St. John—The St. John City Railway Co. will, we understand, be in the market for the purchase of half a dozen new omnibuses, and 25 horses.

NEW JERSEY.

Elizabeth—A franchise to build an electric street railway has been applied for by the recently organized Union and Essex Street Railway company of this city.

Newark—A Rapid Transit Street Railway Co. has been organized here under a law recently enacted, the necessary papers have been filed at Trenton, and the sum of $10,000 at the rate of $2,000 a mile, for five miles of road has been deposited as a guarantee fund. The directors are Messrs. Elias S. Ward, Gottfried Krueger, Chandler W. Riker, Samuel Schoch, Wilbur A. Mott, Dr. Leslie D. Ward, John F. Dryden and Cortlandt Riker. The company will build cable roads on one or more avenues, after obtaining the consent of the necessary property owners. It is generally understood that Central avenue will be the one selected. The guarantee fund is held by the State until the work is completed.

The purpose of the company is to lay a cable road of the kind now in successful operation on Tenth avenue, New York.

NEW YORK.

Rochester—The Rochester City and Brighton Railway company is preparing to extend its tracks to the village of Brighton. The extended line will be constructed from the city line at Bates Street, through Park avenue to Hart avenue, thence through Hart avenue to East avenue, and thence to Bussey's hotel in the village of Brighton. Work upon the extension will be begun as soon as possible, and it is intended to have the line in operation this summer.

The company is also preparing to extend its East Main street line from the present terminus near the railroad bridge to the station of the Rochester and Glen Haven railroad near Henry street. Work will be begun as soon as the necessary permission is obtained, and an officer of the railroad says that the line will be in operation in time for the opening of the Glen Haven road.

The Crosstown Railroad Company of this city has been incorporated. Capital stock, $50,000 Directors: George E. Mumford, William S. Kimball, Arthur G. Yates, Frederick Cook, Charles M. Everest, Arthur Luetchford, Marsenus H. Briggs, Henry H. Craig, George W. Archer, George Weldon, Frank S. Upton, W. Howard Gilder, J. C. Kilbreth.

The South Park Railroad Co. has been incorporated. Capital stock $30,000. Directors same as those of Crosstown Railroad company (see foregoing item).

Syracuse—The Genesee and Wales Street Railway Co. will extend its tracks nearly three miles.

The Eleventh Ward Railway Co. has been incorporated and work will be begun at once, the contract for construction having been let to T. William Harris & Co., of New York. The capital stock is $100,000, and the incorporators are E. B. Judson, jr., R. S. Sperry, E. F. Rice, Louis Marshall, Hamilton S. White, Daniel Candee and D. K. McCarthy. The starting point will be at Fayette and Salina streets, whence the route will be through Fayette and Montgomery streets to Burt, to Cortland avenue, to Midland avenue, to Colvin street, and through Elizabeth street and Baker avenue to Grape street, where it will connect with the Seventh Ward company's tracks, making a belt line of both roads. The contract calls for the completion of the road by July 15.

Utica—At a recent meeting of the directors of the Oneida Street Railroad company it was decided that the company's line should be extended through Prospect street from the cemetery to Genesee street, where connections will be made with the Belt Line road. The work will be pushed forward rapidly, and probably be completed by April 30. Additional open cars will be purchased by the company, which will probably in another year extend its line to the business portion of the city.

NORTH CAROLINA.

Spartanburg—An electric street railway from this city to Whitney Factory is projected, distance about twelve miles, estimated cost, $100,000. Northern capitalists offer to provide for $85,000 if local parties will subscribe the balance. Col. A. H. Leftwich, president of the Spartanburg Gas company is interested.

Wilmington—The Wilmington Street Railway company, using the Johnson girder and side bearing rails, 30 and 32 lbs. to the yard, standard gauge, will extend its line about a mile in the immediate future.

Winston—A charter to operate an electric street railway has been applied for by the Winston Electric Street Railroad company.

OHIO.

Akron—The Akron Street Railway company will lay another four miles of track this spring, and buy some additional cars.

Cincinnati—The Cincinnati Incline Plane Railway company has secured the right to build an electric line over the Carthage Park.

Cleveland—The East Cleveland Street Railway company expects to shortly open up three new routes.

Dayton—The White Line Street Railway company will add two new motor cars to its present equipment at once.

Lancaster—An electric street railway is to be built by Ripley (O.), and Charleston, (W. Va.) capitalists.

Portsmouth—The new company will operate its cars by electricity. The Thomson-Houston system will probably be used, and the local electric light company say they will have no difficulty in supplying power after they get their works removed to their new plant. The contracts call for the completion of the road with everything in running order by the middle of June. Six open cars have been contracted for, and by the electric system two or more cars can coupled and run together. The tracks will be level with the streets, with the space between the rails macadamized

Toledo—David Robison, Jr., is interested in the building of an electric street railway here.

OREGON.

Albany—Over $12,000 has been subscribed towards the proposed street railroad in this city, and the road will undoubtedly be built during the summer.

Dalles—The Dalles Land and Improvement Co. will build a street car line this spring.

Milton—A street railway is to be built here in the near future.

Oregon City—An electric street car line is projected to run from this city to Portland.

Portland—The Portland Cable Railroad company has increased its capital stock to $300,000, all of which has been subscribed for, and the road will now be built.

PENNSYLVANIA.

Altoona—The City Passenger Railway Co contemplates the adoption of electricity and extension of its lines east and west about two miles.

Braddock—A street car line is to be constructed here. About eight months ago a charter was applied for and secured by some well known Pittsburgh gentlemen, under the title of the Braddock Street Railway company, with a capital stock of $25,000, in shares of $50 each. Messrs. Alex. Dempster, B. L. Wood, Scaife and Edward Bigelow, of Braddock, are interested.

Lebanon—The Lebanon Belt Railway company has been chartered at Pittsburgh; capital, $60,000.

Pittsburgh—A project is on foot for the construction of an electric line from this city to Elmwood.

Warren—A charter has been granted for the construction of a street railway here.

RHODE ISLAND.

Pawtucket—The Street Railway company here will probably adopt electricity as a motive power in the near future.

Woonsocket—An overhead electric railway system will shortly be adopted here.

TENNESSEE.

Chattanooga—The Chattanooga, Missionary Ridge and Chickamauga Railway company has been chartered to build an electrical railroad to the Chickamauga battle-field. W. K. Burton,

H. Clay Evans, W. A. Willingham and W. H. Russell are interested.

Nashville—The City Electric Railway company has been organized to build an electrical street railroad. The capital stock is $40,000. Isaac T. Rhea is president, Jas. H. Bruce, vice-president; Sanford Duncan, secretary, and R. W. Turnear, treasurer.

The Nashville and West Nashville Railway Co. will shortly be in the market for some more cars and dummies.

TEXAS.

Denison—The Denison Street Railway Co. will extend its track one or two miles this spring, using a 20 pound in lieu of the 16 pound T now in use, and will change the gauge of its track from 3′ 6″ to 4′.

Fort Worth—We understand that the East Fort Worth City company will build a dummy or electric road to Sylvania.

The North Side Street Railway company, using Johnson and T rails, 38 and 25 lbs., 4′ gauge will build an additional four miles of track this summer, and probably adopt electricity.

Greenville—The City Railway company will build one and three-quarter more miles of standard track this summer.

Laredo—The Laredo Improvement company, of this city, wants to purchase an electric street railway plant.

New Birmingham—M. D. Mather, D. R. B. Wickes, of Austin, and W. J. Needles, of Philadelphia, have chartered the New Birmingham Electric Light, Power, and Street Railway company, and will build an electric street railway. The capital is $50,000.

Rusk—The Rusk & New Birmingham Street Railway company has been incorporated by S. Buyman, N. J. Owen, W. E. Holmes and others, to build a street railway to be operated by electricity, steam or horse power. Capital stock, $50,000; incorporators, S. Buzman, C. Berner, N. J. Owen, W. R. Slosson and W. E. Holmes, all of Rusk county.

Tyler—The board of aldermen has granted right of way through the streets of the city to the Tyler Street Railway company, (which was incorporated on March 14th, and capitalized at $10,000) conditional upon its building one mile of road within the next eighteen months. Capt. Douglas, one of the company, says they will build more than that amount of road within the next few months, and will eventually build from five to six miles.

VERMONT.

Burlington—The street railway company here will, at once, extend its line from the head of Church street, via Pearl, Champlain and North streets to Lake View Cemetery, and is in the market for three more cars and eight horses.

VIRGINIA.

Charlottesville—The Charlottesville and University Street Railway company is in the market for some new open cars (standard gauge); this company is anxious to adopt the storage battery system as soon as the prices on the same will justify such purchase.

WASHINGTON TERRITORY.

Olympia—The Olympia & Tumwater Railway Light & Power company has been granted a street railway franchise.

Tacoma—A franchise for a motor line has been granted to Allen C. Mason, L. W. Anderson and H. C. and J. B. Wallace, by Tacoma trustees.

WEST VIRGINIA.

Huntington—The Huntington Electric Light and Street Railway Co. will extend its lines about two miles this summer.

WISCONSIN.

LaCrosse—The LaCrosse and Onalaska Street Railway company, of this city, has been incorporated; capital, $30,000. The incorporators are: Jas. B. Canterbury, Samuel Y. Hyde, Frank Pooler, George L. Kingsley and Edwin B. Magill.

WYOMING.

Cheyenne—The Cheyenne Street Railway company has decided to extend its line from this city to the fair grounds at Camp Carlin, two miles distant; also to build several miles of additional track within the city. Work on the extensions will be commenced at once.

Patents.

The following is a complete list of such patents as relate to street-railway interests, issued since our March number, especially prepared for the STREET RAILWAY GAZETTE by J. C. Higdon, Attorney for Patents and Trade-Marks, Room 29 St. Cloud building; opposite the U. S. Patent Office, Washington, D. C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

Issue of March 5, 1889.

398,814. Electrical tramway—H. T. Blake, New Haven, Conn.
398,816. Railway car heater—J. B. Gray, New York, N. Y.
398,878. Railway car heater—J. B. Gray, New York, N. Y.
399,034. Cable grip—W. Haddock, Cincinnati, Ohio.
399,035. Cable railway sheave—W. Haddock, Cincinnati, Ohio.
399,036. Crossing for cable railways—W. Haddock, Cincinnati, Ohio.
399,037. Cable conduit curve—W. Haddock, Cincinnati, Ohio.
399,145. Cable railway conduit construction—W. Haddock, Cincinnati, Ohio.
398, 963. Crossing conduit for electric railways—I. W. Heysinger, Philadelphia, Pa.
399,152. Driving mechanism for street cars—McLean Rapid Transit Machine Co. of Colorado.
399,155. Electric railway signaling apparatus—H. J. Palmer, Brooklyn, N. Y.
399,075. Grip for cable railways—Phillips Economical Cable Grip Construction Co., Chicago, Ill.
399,091. Electric railway—H. W. Smith, Newark, N. J.
399,092. Electric car—H. W. Smith, Newark, N. J.
399,103. Brake shoe—G. Westinghouse, Jr., Pittsburg, Pa.

Issue of March 12, 1889.

399,467. Car axle box—W. S. G. Baker, Baltimore, Md.
399,468. Car truck—W. S. G. Baker, Baltimore, Md.
399,236. Electric railway—J. B. Blair, Chicago, Ill.
399,372. Electric railway system—C. S. Bradley, Yonkers, N. Y.
399,319. Pneumatic railway—G. L. DuLaney, Philadelphia, Pa.
399,507. Switch for electric motors.—A. H. Eddy, Hartford, Conn.
399,331. Electric railway switch and alarm—W. S. Hull, Sheffield, Ala., and J. C. Anderson, Charlestown, N. C.
399,409. Conductor for electric railways—R. M. Hunter, Philadelphia, Pa.
399,421. Street railway track cleaner—J. A. Lewis, Binghamton, N. Y.
399,630. W. H. Phillips, Jenkintown, Pa.
399,633. Car heater—F. Ruprecht, Syracuse, N. Y., & F. G. Bates, Philadelphia.
399,572. Motor for railway cars—E. E. Sentmen, Philadelphia, Pa.

Issue of March 19, 1889.

399,815. Switching or transferring cars — J. Armil and R. M. Sebree, Nevada, Mo.
399,820. Fare box—T. L. Beaman, Knoxville, Tenn.
399,732. Electric railway switch—E. Blake, Boston, Mass.
399,740. Brake for street railway cars—W. B. Clark, Covington, Ky.
399,665. Brake shoe—G. Sanderson, Montreal, Quebec, Canada.
399,997. Elevated railway—H. W. Libbey, Boston, Mass.
399,929. Cable railway crossing—G. Prevost, San Francisco, Cal.
399,950. Friction gear for electric motors—C. J. Van Depoele, Lynn, Mass.
400,028. Electric alarm signals for cables—W. H. Woodring and C. S. Gilbert, Kansas City, Mo.
400,029. Car brake—B. L. Wright, Bridgeport, Conn.

Issue of March 26, 1889.

400,034. Tube or tunnel protector for cable roads—H. F. Ascheck, San Francisco, Cal.
400,038. Electric railway plow—E. M. Bently, New York, N. Y.
400,179. Electric railway contact—E. E. Bently, New York, N. Y.
400,100. Electric railway plow—E. M. Bently, New York, N. Y.

Expiring Patents.

The following patents will shortly be public property and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents :

Expire During the Present Month.

125,649. Car wheel—J. A Woodbury.
125,611. Railway switch, J. A. Pardee.
125,448. Splice piece for rails—R. French
125,547. Track cleaner—A. Day.
125,401. Car ventilator—S. C. Maine.
125,808. Latch for car doors—C. Graham.
125,665. Car brake—J. Darling.
125,836. Fare box—C Newman.
125,959. Car Spring—Jeffrey & Fisher.
126,073. Car spring—A. Middleton.
126,054. Pedestal for street cars—D. R. Haint.
126,280. Car wheel—A. C. Fletcher.
126,361. Counting register—A. M. White.

Business Mention.

THE construction of the Sprague Electric Railway in Chattanooga, Tenn., under the direction of Mr. Turner, of Woodbridge & Turner, is rapidly approaching completion.

CHADBOURNE, HAZELTON & Co., of Philadelphia, agents for the Sprague Co., have secured an order for a one car equipment from the East Reading Railway Co.; also one for a No. 16 dynamo from the Wilmington City Railway, to be used in the operation of that line. They report as follows : "The railway business in Pennsylvania, New Jersey, Maryland and Delaware has taken quite a boom this spring. Every day brings requests for estimates for equipping railways with the Sprague system, and we believe we shall add at least 6 new roads in our territory to our present list before next fall."

THE John Stephenson Company, Limited, has received an order for 30 electric cars for the Julien Storage Battery system for use on the Fourth and Madison Avenue line in New York City. The cars are to be 16-foot bodies, mounted on independent rigid trucks, with two motors directly geared to the axles. They are to have the latest improved Stephenson truck, including wheel and track brakes, capable of stopping the car almost instantly. All working machinery is to be detached from the car body, which will have windows of extreme height, cushioned with rubber in sash frame of bronze metal, thus affording a quietness and comfort hitherto unknown. The cars, equipped with motor and batteries, will weigh about 12,000 lbs. and every valuable appliance will be incorporated in their construction and fitting up. A ventilating ceiling will change the atmosphere of the cars and keep them as cool as possible during the heated term. This system of ventilation has been recommended by special action of the Philadelphia board of health.

MR. C. L. PULLMAN, contracting agent for the Pullman's Palace Car Company (Street Car Department), writes us: "We have just completed ten large cable cars for the Citizens Traction company, of Pittsburgh, Pa., making sixty cars for this line ; and are now building sixteen more of the same pattern for the Central Traction company, of the same city ; also a very handsome street railway train for Des Moines, Iowa. This train consists of a 16′ closed car, finished in mahogany; a 22′ open car, finished in oak and ash, and trimmed with bronze; and a 12′ motor car, propelled by the Patton Motor company's apparatus. This train, without doubt, is one of the finest of the kind in this country. During April we expect to deliver the following: Two combination cars, consisting of a smoking room in the forward part and a passenger compartment in the rear, for Helena, Montana; two large open excursion cars (35′ in length), for Portland, Oregon, with a seating capacity of

seventy-eight; twelve open electric cars for the Omaha & Council Bluffs Railway & Bus Co., of Omaha and Council Bluffs; four closed horse cars for Trinidad, Colorado; two of the same make for Vancouver, W. T.; and six cars for the 23rd Street Railway company, of New York. For May delivery we have the following: Fifteen electric cars for Fort Worth; ten closed horse cars for the Buffalo Street Railway Co., of Buffalo, N. Y.; four electric cars for Tacoma, W. T. For June: ten open and ten closed electric cars for the Omaha Motor Railway company, of Omaha, Nebraska; ten open and fifteen closed electric cars for Erie, Pa. For July: Six closed electric cars for the Omaha Motor Railway company, of Omaha, and four horse cars for Cincinnati."

W. W. BORST, formerly superintendent of the Denver & Rio Grande Railroad, has taken the general agency of the Swem automatic switches for steam roads, and thinks that in a very short time they will be in general use.

THE Pond Engineering Company, of St. Louis, Mo., has secured a contract for furnishing the power plant for an electric street railroad for the Metropolitan street Railway company, of Kansas City. The line will run from Kansas

THE GIBSON STORAGE BATTERY COMPANY reports an order for a big plant to go to New Orleans for street railway work. It says a syndicate has been formed there of leading men, and they have ordered one car with two sets of battery, 72 cells in each set, the size of cells being 7½×7×11 inches; capacity 150 ampere hours.

THE John Stephenson Company, Limited, is adapting its car works to the construction of cars equipped with electric motors and has now orders in hand for 20 cars for Cleveland to be worked by the Thomson-Houston system; 8 cars for Rochester (Thomson-Houston system); 5 cars for Port Chester (Bentley-Knight system); 4 cars for Essex (Daft), and 1 for Fourth Avenue, New York City (Julien Storage system), Brush motor.

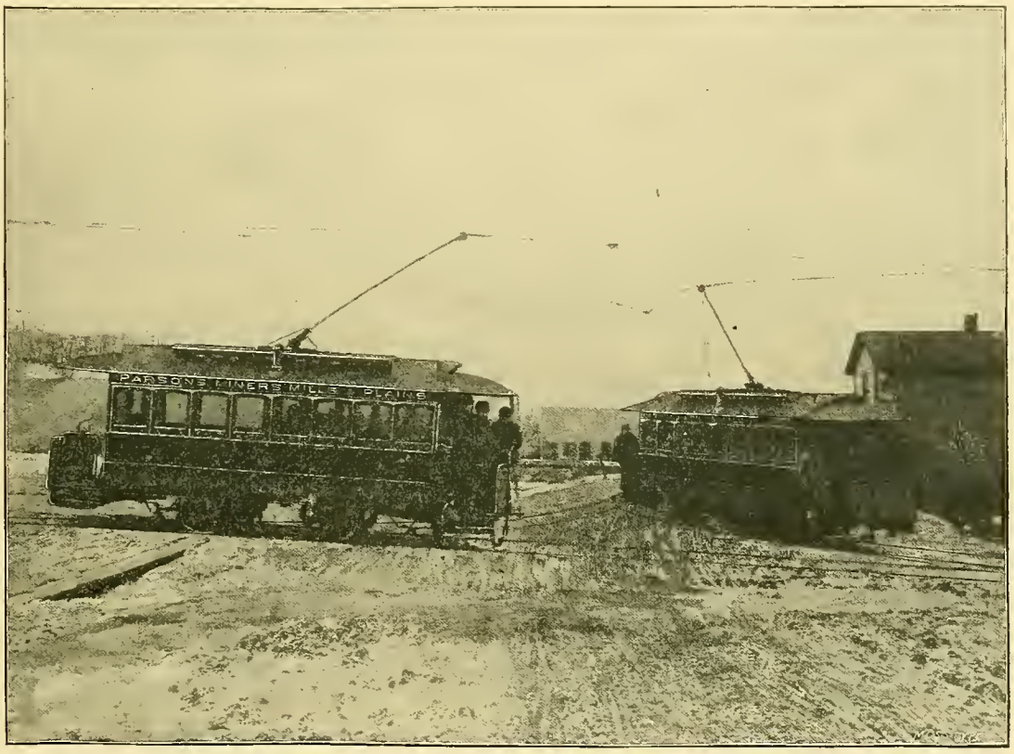
MR. WILLIAM C. PULLMAN, Western agent for Hicks & Smith, of New York, will, on or about May 1, open an office probably in the new Owings building, in Chicago, as manufacturers agent, and dealer in general supplies. Mr. Pullman's past experience in the field will doubtless serve him in good stead now, and the GAZETTE joins with his many friends in wishing him all prosperity in his new enterprise.

The financial results of the Julien Electric Traction company's storage battery cars, operating on the New York & Harlem R.R. city lines, from March 20 to March 30 this year, show a record of cash receipts of $708.00, in 144 trips, aggregating 1,658 miles, carrying 14,071 passengers, including 666 transfers. Such a record augurs well for the storage battery.

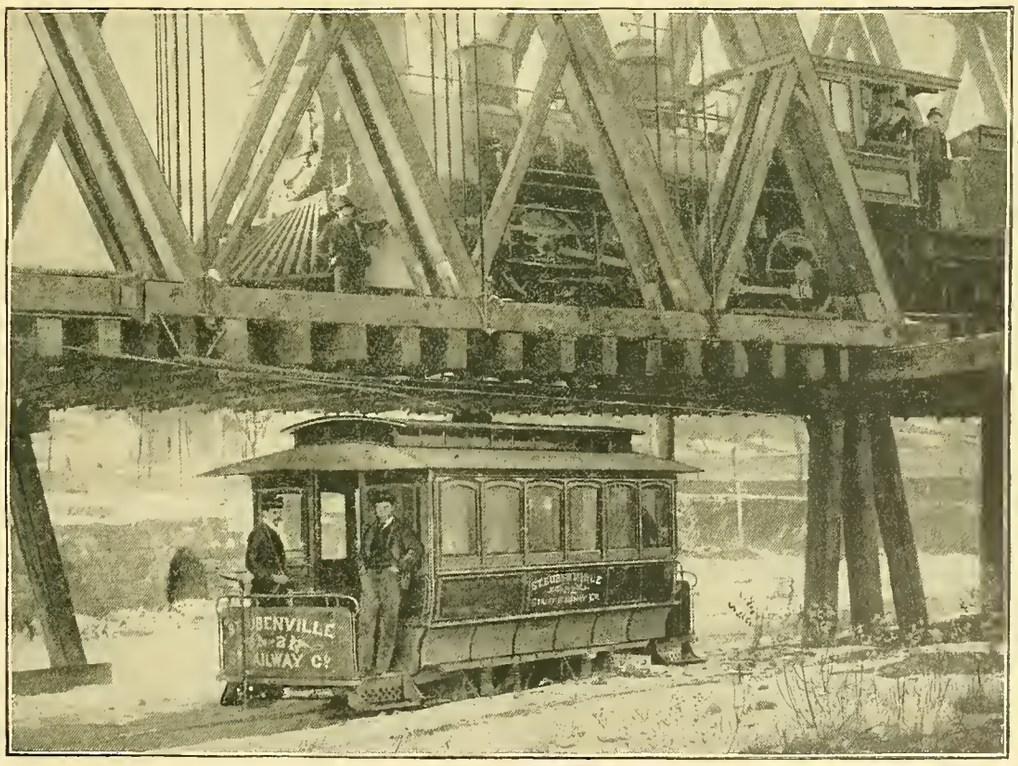
Book Reviews.

A very handy manual on the business of building cable, electric and horse railways, by Mr. W. L. S. Bayley, mechanical expert, is now nearly ready to go to press. The manual in question is complete, and treats of everything connected with street railways. Having access to advance sheets of the manual, the GAZETTE congratulates street railway men upon so instructive a help-meet being placed within their reach. The manual is in the "interviewal" style—terse, forcible and effective—an economical application of steel, stone, clay and labor to the purpose of street railway construction.

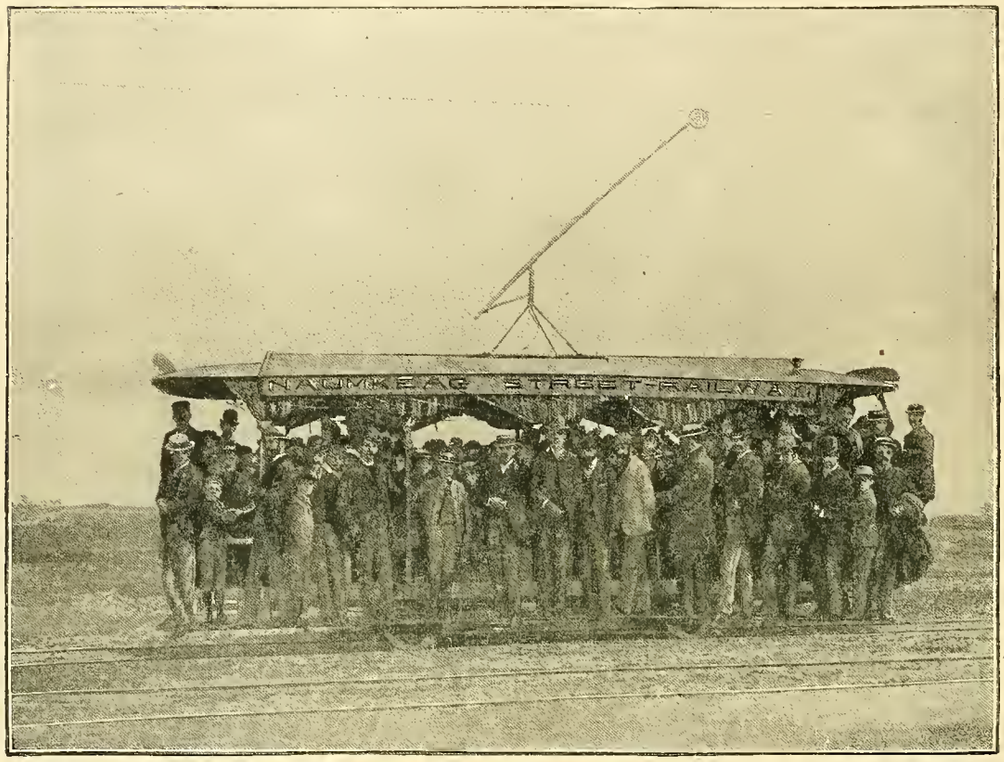
It is the intention of the STREET RAILWAY GAZETTE to publish in each issue advance extracts from this concise compilation of the expressed ideas of men experienced in the business; and its columns will always be open for a free criticism of the subjects treated.



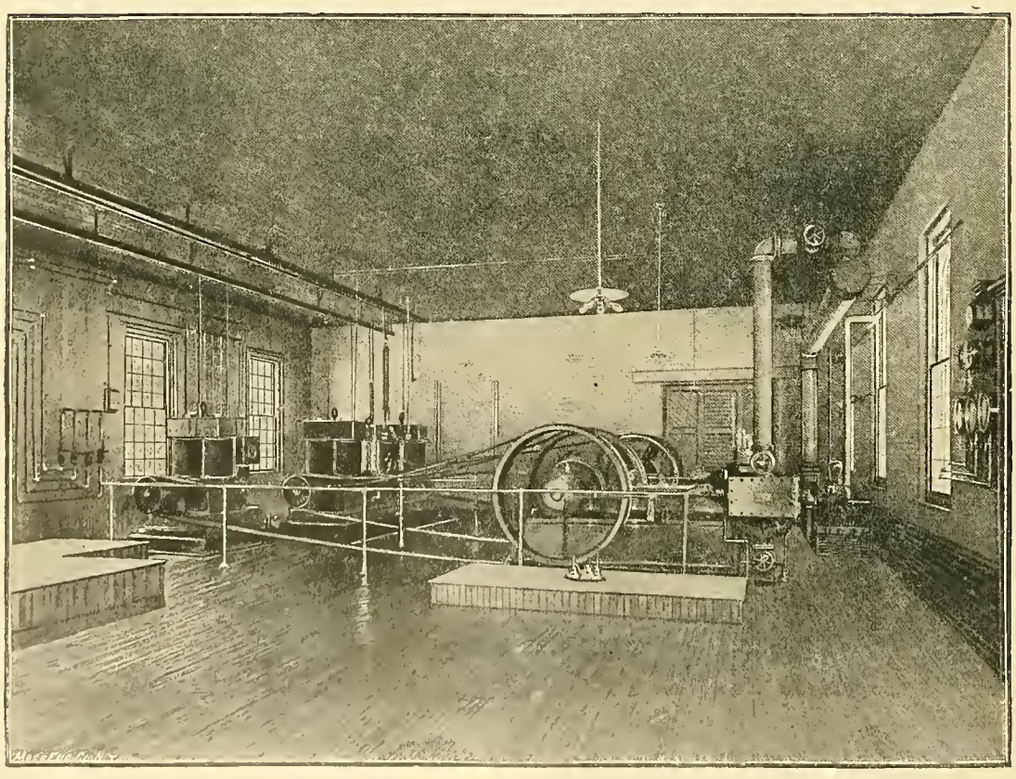
Electric Railway at Wilkesbarre, Pa.



Electric Car Passing Under R. R. Bridge, Steubenville, O.—Sprague System.

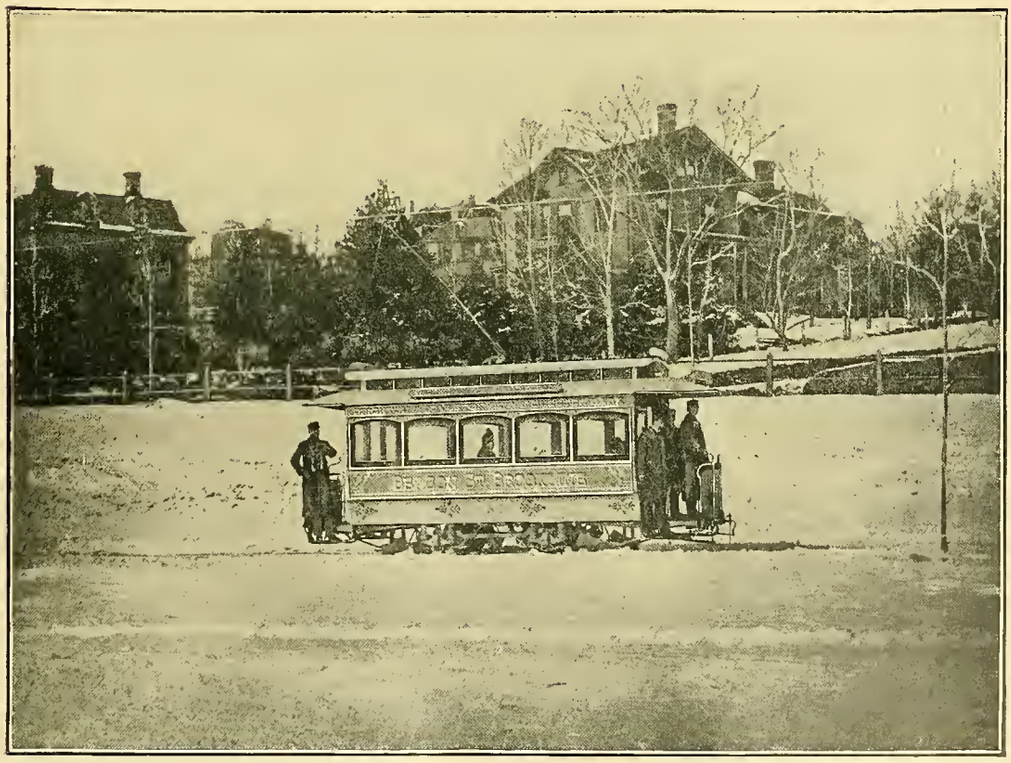


Electric Railway in Salem, Mass.



Power Station, Sprague Electric Railway, Scranton, Pa.

East Cleveland R. R. Co.—Electric Division.



The Sprague System in Boston.

Method of Crossing Fire Hose in Richmond, Va.—Car Jumping Fire Hose.

Sprague Electric Railway in St. Joseph, Mo.

The Street Railway Gazette.

(Copyrighted, May, 1889.)

VOL. IV. MAY, 1889. No. 5

ELECTRIC RAILWAYS.

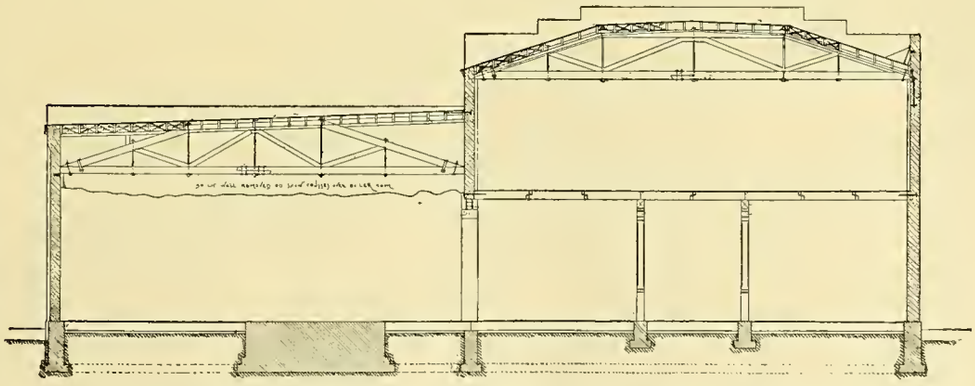
The Topeka Rapid Transit Railway.

THE LONGEST ELECTRIC RAILWAY IN THE WORLD.

While it is a fact that the West End Railway Co., of Boston (combining its two systems) is operating more miles of electric railway than any company in the world, the electric railway at Topeka is the longest line which has yet been built using one system, and receiving its current from one central station. No pains have been spared to make this a model road in every respect. Its operation since its starting (the first of April) has proved this to be a fact. The construction work was begun about Jan. 1st, and finished about the first of April. When it is called to mind that this road is 14 miles in length, and has a total length of track of 20 miles, and that the utmost care was exercised in its construction, even to the smallest details, it will be seen that good time was made.

The trial trip was announced for April 3d, and was most successful in every way. The directors of the road, and about 100 invited guests made the trip, and at its close expressed themselves in the highest possible terms of the action of the motor cars, the ease with which they could be operated, and the vast improvement which they were over horses and steam motors. It was quite a gala day for Topeka, the public, generally, turning out to witness what was to them a most novel sight. Everybody rejoiced to see the cars moving along quietly and easily without any visible means of propulsion, and it seemed to be the general opinion that rapid transit, which the electric railway would afford, was to be the utmost benefit to the city. The power station, a very handsome brick building, is illustrated by the accompanying cuts. It is located at the corner of Second and Jefferson streets. It has a front of 100 ft., and a depth of 85 ft. One half of the building is two stories high. At the rear of it is a massive chimney 125 ft. high.

RAPID TRANSIT ELECTRIC RAILWAY CO., TOPEKA, KANS.—POWER STATION, ELEVATION ON 2D ST.



RAPID TRANSIT ELECTRIC RAILWAY CO., TOPEKA, KANS. TRANSVERSE SECTION.

The foundations of the dynamos and engines are of solid masonry resting on bed rock, thus securing the utmost stability and firmness.

The engines are two in number and are of the Corliss type. They were built by Edw. P. Allis & Co., Reliance Works, of Milwaukee, subject to a special order by L. H. McIntire, the mechanical engineer who has designed and superintended the construction of the entire plant. The smaller engine is capable of developing 300 h. p., and has a fly wheel of 20 ft. in diameter, weighing 26,000 lbs. The larger engine is of 600 h. p., and has a 20 ft. fly wheel weighing 20 tons. The smaller engine, as will be seen on reference to the cut, is situated at one end of the building, the larger one directly opposite, and both are belted to the main shaft which runs the entire length of the building. Each engine rests on a foundation consisting of a concrete base, upon which are placed large blocks of stone laid in cement to a thickness of about ten feet. The foundations are entirely independent so that when the engines are running there is no appreciable jar communicated to the building. The engines are run at 80 revolutions per minute.

The battery of 5, boilers which supplies the steam for these engines, is located between them in a brick enclosure, which entirely isolates it from the dynamo and engine rooms. These boilers are built of the best quality of steel; are six feet in diameter, and are each sixteen feet long. They are arranged so they can be run separately or in series. The feed water for these boilers is taken from driven wells sixty-five feet deep. The water is first pumped into an exhaust heater, and the temperature is raised to 212 degrees Fahrenheit. A peculiarity in this exhaust heater, is that the water enters at the top and is received by a crescent shaped pan. From this pan the water runs over the edges, following the bottom until it reaches the center of the pan, when it drops into a similar shaped pan, and so on into another pan, until it passes into sixteen different pans. By this arrangement the exhaust steam strikes the water as it drops from pan to pan sixteen different times, and removes all the impurities that can be taken out with the above mentioned temperature. This water is then delivered by a special pump, fitted for handling hot water, into a superheater which is placed above the boilers. This heater is twenty-six feet long and contains twenty-four pans like those used in the exhaust heater. Live steam from the boiler is kept at full pressure upon this superheater, which carries the temperature up to 320 degrees. The high temperature to which the feed water is subjected causes the lime, iron, magnesia, and other impurities to collect on the bottom of these pans, forming an incrustation.

The floor of the boiler room is paved with hard brick. A track for a coal car runs in front of the furnace doors, enabling the fireman to transport coal from without the building to the furnace.

The electrical apparatus consists of five 80 h. p. generators for supplying the necessary current. These generators are shunt series, wound and connected in multiple. There is also used a large switch board fitted with the necessary current indicators, switches, etc.

In building the line the overhead method of construction has been employed, the rails serving for the return current.

The cars, twelve in number, are each equipped with two 10 h. p. motors.

Since the road has been in operation it has been visited by many prominent railway men, and the opinion has been generally expressed that the road, both in construction and operation, is a model electric railway and reflects considerable credit upon the Thomson-Houston Electric company.

Boston Officials in New York.

A party of gentlemen including Messrs. Homer Rogers, A. A. Folsom, Sam'l Kelly, Jas. A. Murphy, John C. Short, Ben. F. Tracy, Otis Eddy, J. M. Gove, J. M. McLaughlin, Wm. G. Reed, Wm. G. Smith, together with N. F. Dickinson, general counselor for the West End Co., of Boston, Mass., and Harvey W. Sheppard, formerly attorney general for that state, recently visited New York for the purpose of investigating the works of the Julien Electric Traction cars on 4th avenue and their electric railway system, as the West End Railway Co. has finally decided to abolish the old system of traction, and deem it advisable to closely investigate all the electric railway systems before deciding which of them will best answer the purpose in Boston. When in New York they were most hospitably entertained by the officers of the Julien Electric Traction Co. Breakfast was had at the café Savarin, and lunch at the Murray Hill hotel.

The trip on the Julien cars from the post office to 86th street was made promptly on scheduled time, viz.: one hour. The motors were started smoothly and carried the cars very rapidly through the tunnel. The *modus operandi* of the electrical application to the cars was thoroughly explained to the visiting gentlemen, together with the method of changing the batteries. A number of experiments were then made, one car, carrying twenty-four passengers, pulled an additional car, weighing ten tons, up the six per cent. grade in 86th street with perfect ease, and the car was frequently stopped and started upon the steepest point of the highest grades.

The party will visit and inspect the Daft system in Cincinnati, the Short system in Columbus, and the Conduit system in Detroit.

The result of the investigation will decide as to which system will be adopted in Boston, permission to erect overhead poles having been given by the city council.

New Electric Railways.

We understand that during the past few weeks the Tacoma Ave. Street Ry. Co.; the Pacific Ave. Street Ry. Co., both of Tacoma, W. T., have contracted for the Sprague apparatus; likewise the Salt Lake City Ry. Co. of Salt Lake City, Utah; the Lindell Ave. Street Ry. Co. of St. Louis; Wilkesbarre Co., of Wilkesbarre, Pa. and the Bay City Street Ry. Co. of Bay City, Mich.

The equipment of the Portland road is to be first class in every particular, each car being equipped with two 15-h. p. motors of the latest type, lightning arresters, and universal movement trolley arm, and with all modern devices and improvements. In the overhead system the regular Sprague Silicon Bronze Trolley Wire for a working conductor will be used, which enables the overhead system to be of the lightest description, as the current is carried at the side of the street, for the most part, instead of on a single wire over the center of the street.

The contract with the Lindell Ave. Street Ry. Co. is for 10 cars of 30 h. p. each, dynamo and power station equipment; each car is to be furnished with two 15 h. p. motors; the overhead system is to be used. The cars are to be brought over five miles of track.

The contract with the Wilkesbarre Co. is for three cars to be brought over four miles of track.

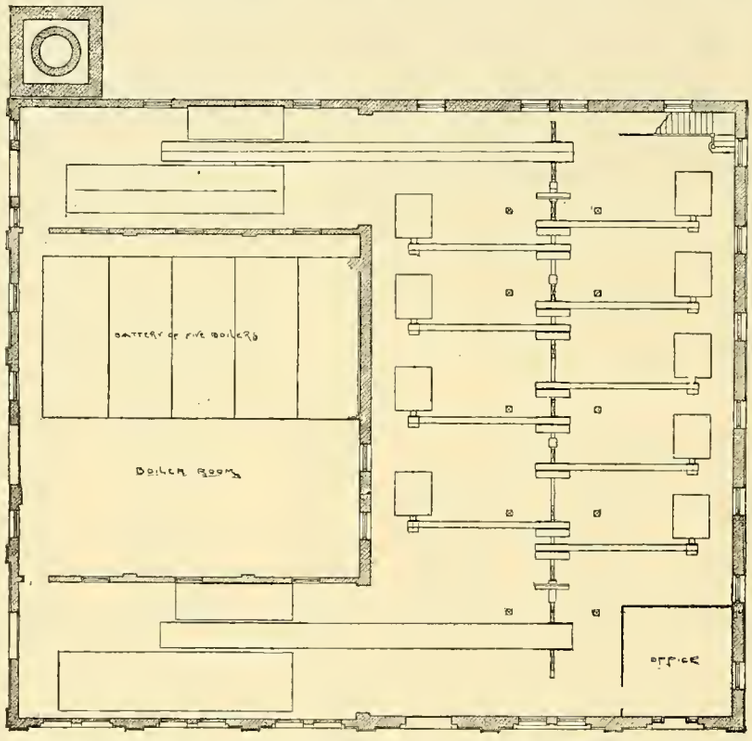
The Wilkesbarre and Suburban Street Railway Co. was one of the first roads to adopt electricity as a motive power, and is still increasing its equipment.

The Thomson-Houston Company.

This company has been obliged to greatly increase its facilities in order to handle its rapidly increasing business in electric railways. In addition to the contracts which it closed some time ago, it has lately closed the following:

Lynn & Boston Railroad company, Nahant line. This line has 4,300 feet of track, two turnouts, maximum gradient of four per cent. This line will extend from Central square, Lynn, to Nahant House, Nahant. One car will be put in operation at first, the power for which will be obtained from the station of the Lynn Electric Light company.

Newburyport & Amesbury Horse Railway company, Newburyport, Mass. This line is about six miles in length, and will operate two cars. It is made up almost entirely of curves and grades the maximum of which is ten per cent. The cars will be operated by a current from the Newburyport Electric Light company, Newburyport, Mass., and also from the Amesbury Electric Light company, Amesbury, Mass.



RAPID TRANSIT ELEC. RY. CO., TOPEKA, KAS.—PLAN OF FIRST FLOOR IN POWER HOUSE.

The Newton Circuit line, Newton, Mass. This line will operate ten cars, and is eight miles in length, the maximum gradient being five per cent. It will run from Newton to Watertown on the West End track, and on new track from Watertown to West Newton and Newtonville.

The Plymouth & Kingston Railway company, Plymouth, Mass. This line is four miles in length, and will operate three cars. The maximum gradient is six per cent. This line will run from Chiltonville, through Plymouth to Kingston. On nearly all of the line the bracket method will be used. The track is about laid.

The Quincy Street Railway company, Quincy, Mass. This line will operate four cars, and is five miles in length. It extends from Quincy, through Wollaston Heights and Atlantic to the Neponset river. The bracket method of overhead construction will be used.

The company has also received orders for new cars from the Wheeling Railway company, Wheeling, W. Va.; West End Street Railway company, Boston, Mass.; Topeka Rapid Transit company, Topeka, Kan.; Omaha & Council Bluffs Railway & Bridge company, Omaha, Neb.; Lynn & Boston Street Railway company, Lynn, Mass.

The company has also constructed a track of about one mile for the Hillside Coal company, at Scranton, Pa., on which a forty horse power locomotive is used. This is used for carrying coal, and is capable of hauling about twenty cars loaded with one ton each.

Electricity at St. Joseph, Mo.

St. Joseph, Mo., was one of the first cities to adopt electricity upon its street railroads as a motive power, and it now has more miles of electric railways in operation (including those in course of construction) than any other city in the country. On the line of its Union Passenger Railway, it demonstrated the advantages of electric power for propelling street cars. After this railroad had been running some time, another railway company in the same city, the Wyatt Park line, installed a complete equipment of electric cars, which has now been running about six months. These two lines have become very popular with the citizens on account of their speed and reliability, and the ease with which the cars are kept under control, and property along the route has increased considerably in value owing to their good service.

The only remaining lines in St. Joseph that had not yet adopted electric power have contracted with the Sprague company for the entire equipment of their roads.

This last order amounts to 20 cars, equipped with the latest improved motors, to operate over ten miles of track. Since the Union Passenger & Wyatt Park line have been in operation they have ordered additional equipments of five and nine cars respectively.

Electric Railway at Atlantic City, N. J.

During the last week several trial trips were run over the electric railway at Atlantic City (Sprague system, recently installed by Leonard and Izard of Chicago) which were perfectly successful, the cars running over the entire distance of the road at a speed exceeding fifteen miles an hour, each electric car towing an ordinary car behind it.

The equipment of this road includes, upon each car, two of the new 15-h. p. motors and all the latest known devices and improvements. Before adopting any system upon this road the officials of the Penna. R. R. Co. (which company controls the street railway system in Atlantic City) made a thorough investigation of all the systems of propulsion, both cable and electric, in use in this country, and visited nearly all the cities in which there were electric railways in use. They were so satisfied that electricity is the most convenient and economical force for operating street cars that they will now adopt electricity exclusively at this place. It is estimated that the roads will carry very large numbers of passengers during the coming season.

The Thomson-Houston System in Boston.

To those in whose mind there still clings some doubt as to the reliability of the electric railway will find in the following report of the Cambridge Division of the West End Street Railway, Boston, figures that prove conclusively that the electric railway can be depended upon.

This road has a previous record of but nine trips lost out of 1179.

The following report is for the month of April:

Average number of motors in daily service, 8; round trips of motor cars, 2720; time of in service, motor cars, 3,232 hours; mileage of motor cars, 17,680 miles; round trips, one tow car, 2,720; round trips, two tow cars, 226; time in service, towed cars, 3,500 hours, 30 minutes; mileage of towed cars, 19,149; total round trips, 5,666; total car mileage, 36,829. Of the above round trips but seven were lost.

Cable Railways.

Construction.

COST OF LABOR.

In order to give its readers the benefit of more than one man's experience in the employment of labor, the GAZETTE representative interviewed Mr. C. J. Luck, of the Chicago City Railroad, as follows :

QUESTION.—How long have you been connected with public works ?

Ans.—10 years.

You have been with this company several years ?

Ans.—Yes.

What in your opinion should be the cost of the labor per lin. foot for single track standard cable railway ?

Ans.—From 65 cents to 95 cents per foot.

Upon what basis do you make this calculation ?

Ans.—My experience has been that there should be nearly 280 men representing all branches of labor at a total cost of $479 per day. Now, the facts are, proved by practical experience, that there is a wide range of results from day to day. To illustrate, the above mentioned gang might build,

500 Lin. feet single track, cost would be 93c per ft.
600 " " " " " 78c "
700 " " " " " 68c "
800 " " " " " 60c "
900 " " " " " 53c "

An av. 700 Lin. ft. single track, would be 71c per ft.

What concessions would you make to first-class labor in regard to time ?

Ans.—I would consider mutual interests, and while being careful to get full average service from all, I would concede them their time to a certain extent; that is to say, a shower or a breakdown should not be followed too quickly by a stoppage of time. I am certain that a wise course of action lies midway between extremes, probably more so with unskilled labor than with skilled labor.

Interviewed upon the subject of street car horses, Mr. Harvey H. Brown, of the Chicago City Railway Co., answered:

How long have you been in charge of the horses of the Chicago City Railway Co.?

Ans.—13 years.

What is the average life of a street car horse as such under favorable conditions ?

Ans.—5 years.

What is the cost of a good horse ?

Ans.—$135.

What is a fair day's work for a car horse ?

Ans.—A 16-mile run.

At what speed are they driven ?

Ans.—7 miles per hour.

What is the cost per day for the "keep" including everything ?

Ans.—50c per day.

What do you get for him for farming purposes.

Ans.—$45.

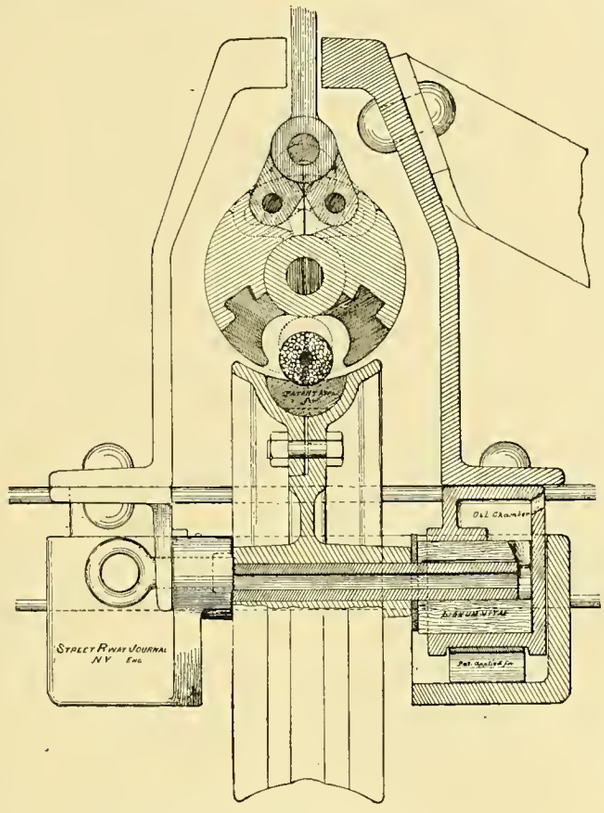
Do you know the relative cost of carrying passengers as between cables and horses ?

Ans.—Not of my own knowledge.

The Vogel & Whelan System.

TO EDITOR STREET RAILWAY GAZETTE :

Knowing it to be your desire to furnish your readers with anything new relative to cable railway construction, we submit the following. The time has arrived when most of the existing forms of cable railway construction will be abandoned, as they are impracticable, embodying unmechanical appliances, necessitating too great a cost for construction and maintainance. The adaptation of a cider or cheese press to serve as a cable grip has occasioned most of the existing trouble and expense in present forms of construction, its dimensions are such it requires the digging of miniature canals through the streets to accommodate its working, and as the lower die is in a rigid frame provision must be made for this to clear the carrier pulley, then when the cable is in the grip it is at a point six inches above it, so when it is required from any cause whatever to stop the car the cable is performing the function of a file upon the lower die, the result is obvious. Now let's see if we cannot provide another solution to this grip problem without being called crazy experimenters or being told you can't do it only just the old way and have it work.



CROSS SECTION THROUGH GRIP.

By referring to cut of our grip it will be seen it is constructed to open at the bottom, hence it is not necessary to lift the cable off its natural bed, the bottom of it conforms to the face of the carrier pulley and can as well take the cable directly off it as at any other point. It is placed in the grip car so as to easily clear the pulleys, but should it from any cause get to a point, say one or two inches below them, nothing serious would happen as the ends of the grip are conical and is hung by a coil spring so the pulley would only have the weight of the grip upon it, which is only about two hundred pounds.

Its construction is such that its diameter does not change inits operation, hence it is a conduit, can be constructed sufficiently large for it to operate in above a straight tie. We also hold that the drainage for a cable road is a separate problem, provision for which is made under the slot and tie, and can conform to existing local conditions, thus furnishing one of six inches or six feet, as occasion requires. It will be seen by referring to road-bed cut that the slot rail forms the cable and grip conduit and is securely braced at each cross tie. It will also be noticed there is no earth pressure against the slot rail and as the latter is so securely braced the frost would act upon the track rail which is the weaker construction. We claim our road bed construction to be the most durable, practicable and cheapest, as it conforms to the long tried steam railroadwork. The grip eliminates all friction possible with the cable as it is entirely released from it when car is at a stand still. The Butte City cable road has been built under our patents. The Kansas City Cable Railroad Co. (Ninth St. line) has adopted our grip. They did it because they got tired of buying cable to saw out grip dies.

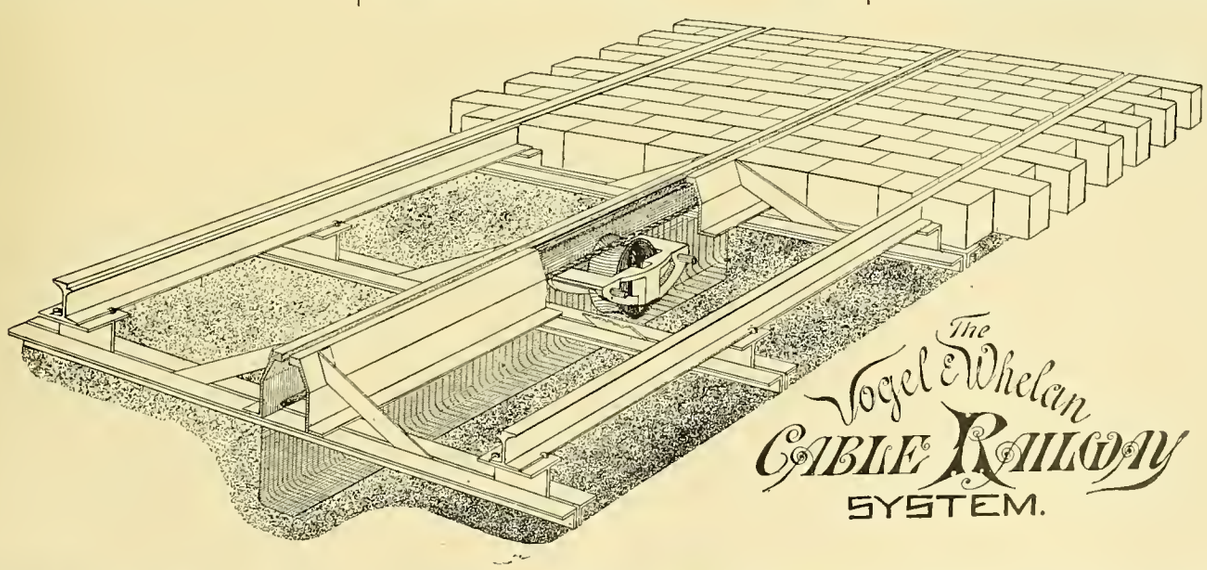
Very truly yours,
VOGEL & WHELAN CABLE CO.
New York.

Points on Cable Railway Construction.

W. S. L. BAYLEY.

CONCRETE:—Mix cement and sand, under cover if possible, and then add gravel and stone all in the order of 1, 2, 3, 4, or better.

LABOR:—Give every man a task.



TIME AND TIME KEEPER:—The time keeper should be a man of true character, and ought to be financially interested in the work.

ORDER:—Is heaven's first law and is man's best guide to financial success.

MATERIAL:—The best only will suffice, and should be on hand to save delays.

BAD WEATHER:—Stop work.

ACCURACY:—Right only.

MACHINERY:—Time contracts, under accurately drawn specifications; be careful that yuo

order the class of goods that you need for the service.

CONTRACT EARLY: — For paving, cement, gravel, stone, brick, tools, rails, curves, pulleys and castings.

CURVES:—Propose to the city or town to improve the area between the inside rail and the sidewalk, then turn the corners with a radius equal to the width of the widest intersecting walk. Having done this, use every available inch to reduce the curvature. Curves are costly; grades are not of any consequence to these giant carriers, the model cable railways. Square-cornered sidewalks are things of the past. You never see them in the parks of the city. They must go. Main and terminal wheel pits—make them of liberal dimensions.

MOMENTUM:—Make no unsightly depressions in the city grades on account of momentum: It is always safe in the hands of a skillful gripman, and none other should be trusted alone in so important a place or service.

Drums, large and small, sheaves and pulleys; their location will ensure 150,000 miles for the run of the cables if you have given healthy surroundings to those guides; or about 2,6500 miles for the life of the cables if you have disregarded this advice.

INSPECTORS, ENGINEERS, DRAUGHTSMEN AND FOREMEN:—Their education on your work will necessarily be costly, more so than on any other public work, especially in the use of concrete, as errors of to-day are immovable to-morrow. The inspector who does not inspect either for mental or moral reasons, and the moral reasons are less dangerous — the civil engineer who is not abreast of the times, and who can not take advantage of all helps, and, while being eminently capable, yet clings to the dead past, especially in the setting of grades, where he still makes measured distances a basis for too slow calculations, and consequent delays, also the mechanic who says, "It is near enough"—all these men belong to a class whose services are not needed. Secure good men, whose education some other company has, as pioneers, paid for.

THE DILIGENCE:—A quick-stepping team for accidental supplies.

Healthful Condition of Cables.

The first wire ropes used were made of straight wires served with a spiral wrapping. The same kind of cables are now used for the main cables of large suspension bridges. This style of wire rope was however found to be too stiff for any purpose where it was required to pass over winding drums or sheaves, and a twisted rope was substituted.

Unlike a hemp rope, which is made without a heart or centre, a wire rope is usually made of six strands of more or less wires laid around either a hemp heart or a seventh wire strand. Either a long twist or short twist is used, the latter making the most flexible rope.

In 1884 the late Jno. O. Roebling made a wire rope to be used on the Inclined Plane Railroad of the Portage R. R., in Pennsylvania. At this and other places the canal barges in use were drawn on a car from the lower to the next higher level of the canal, or vice versa, were let down from one level to the other. Wire ropes were in use there until the canal was abandoned in consequence of the building of the Pennsylvania Central Railroad.

In 1849 a rope walk about one mile in length was built at Trenton, N. J. This was operated by means of an endless rope, practically the same as in use on a modern cable road. Cars secured by a grip traveled backward and forward on the rails of the two existing tracks.

During the past ten years there has been a gradual substitution of crucible steel for iron in the manufacture of wire ropes, caused largely by the reduction in cost of steel, but good rope made of Swedish iron is yet preferred by many.

In cable roads a good crucible steel rope seems to be called for. The sizes used are from 1 inch diameter to 1⅝ inch diameter. They are all made with hemp hearts, and as a rule with 19 wires to each strand. These 19 wires are either all practically of one size, or as in the Seal patent, owned by the Roebling Co., the outside wires are large and the inside wires are small.

The construction of some cable roads owing to necessity is exceedingly bad. They are built with many curves, depression sheaves and other sheaves for guiding the cable, and the result is that cables are worn out in a few weeks. Experience seems to show that the cable having wires all of one size in the strand is more suitable on a road with numerous curves than the Seal patent rope, which is of undoubted advantage on a well constructed cable road. The Seal rope is not as flexible, but the large outside wires have a large wearing surface, and resist the tendency to become brittle longer than smaller wires will. In most cases cables do not wear out but the wires become brittle and break up. The original idea that the grip did all the damage by simply wearing the cable down until it was so reduced in size that it had to be taken out, is not a correct one. The principal damage it does is to harden the wires of the cable by constant friction, which at times produces great heat; it is this action which tends to make the cable wire brittle, and in consequence many cables have been condemned when their original quality has been all that it should be.

The lifetime of a cable depends largely on the road upon which it has been used; the mileage running from 106,000 miles down to 20,000 miles. No two cable roads wear the cable alike, and it is somewhat a matter of experiment to decide whether it is best to use a hard, soft flexible or moderately stiff cable.

The services of a good cable splicer are essential; by prudence and care several months more service is obtainable than by allowing the cable to take care of itself.

It is found on many well designed roads that some one small sheave is put in to guide or deflect the cable which gives it such a short bend that the other good work is practically thrown away.

The tensile strength of wire used for cables varies from 200,000 to 80,000 pounds per sq in. Single coils of wire weigh from 60 to 100 pounds, and a mile of No. 14, which is the average size, will weigh 89 pounds.

It is impossible to make a cable strand of a single continuous length of wire without splicing it, as in a five mile cable the weight of a single wire would be 445 pounds. The splicing of single wires is done in such a way that practically the wire is as good as though it was of a continuous length.

Economical Cable Railways.

FOR OTHERWISE INACCESSIBLE CITIES, VILLAGES AND MINES.

It is superfluous to assert that in hundreds of localities throughout this vast country and the world, the trade lines of steam railways have left important manufacturing and mining centers, three, five or ten miles "inland." While such is the topography of those districts that even with "switchbacks," sinuous windings and sharp gradients the cost, at least $50,000 per mile, with its corresponding increase in freight and passenger tariffs prohibits steam connections with the outside world. True it is that there are expensive incline railways in many parts of the world, built and being built, but such enterprises must and do enjoy an immense patronage from business and pleasure. It is well known and admitted that cable railways only can climb the hills and sweep the valleys without prohibitive expenditures. A good illustration comes to mind in the proposed cable line between the city of Phillipsburg, Montana, and the far-famed Granite mine some four miles from and at an altitude of over fifteen hundred feet above the city. Admit that a first-class patronage is assured, the cost of construction, great in any event, must be very reasonable indeed or it will inhibit the enterprise. We are informed that the city of Phillipsburg wishes a "loop" through its principal streets. The construction of the city division will, of course, be expensive, costing nearly $50,000 per mile, yet the length of the loop would not exceed 4,000 feet. From the outskirts of the city, as in many other localities, the company would have exclusive "right of way," and can build without the costly city conduits. Under the old system of constructing cable railways the twenty-one inch grip line is unavoidable, and a conduit outside the city would of necessity be built with deep channels, although they could be made open and with far less expense than in city divisions. But we change all this by a novel device in the construction of the grip; it is made adjustable; is changed from the twenty-one inch line to a two inch level in the twinkling of an eye, as it leaves the city loop and takes the swift running country cable. What does this sudden change mean in the cost of construction? That at Chicago prices, the country division of the road will cost only $10,000 per mile. How is this accomplished? By a novel adjustment of the grip and system of construction, all of which are exclusive inventions for which letters patents are asked. A system of double steel carrying pulleys, each weighing only twenty-two pounds per set, running on anti-friction journals, with twenty per cent. of the amount of steam now required to move the great lumbering cast iron makeshifts of to-day. The location of the cable will everywhere be healthful. Natural drainage is yours without the asking; in fact, will require some restraint. Second in importance is the transmission of 200 horse power for local service at the mine or workshop at either terminal. If at the mine, the labor is quickly transported to the depths from which the return brings the glistening metals for the distant marts of commerce. Consider for an instant that all the supplies to and all the products of these immense industries are now transported on the backs of mules or in some other primitive way.

Cable Rope.

In order to get an expression of opinion regarding cables, our mechanical expert called upon Mr. Thomas C. Nash, of the Chicago City Railway company, and the following is the result of the interview:

Question: Will you kindly give me the name of the maker of the first cable rope you used on the C. C. Ry. Co.'s lines?

Ans. Hazard.

What was the cost per pound?

Ans. 12 cents.

Why did you discard those cables?

Ans. They were too light for our work.

Some lines could use them?

Ans. Yes, where the work was light.

What was the diameter of that cable?

Ans. 1¼ inches.

What was the average life of that cable on your lines?

Ans. About nine months, or 60,000 miles.

To what use are old cables put?

Ans. And if not too much worn they may be used for hoisting, but they are generally smelted over.

What is the market price for old cable?

Ans. $7.50 per ton.

How many styles or makes are there now in use?

Ans. Five (5). Hazard, Roebling, Washburn & Moen, Williamsport, and Broderick & Bascom.

What make are you now using?

Ans. Hazard's, Roebling's, cast steel, 1 5-16 in. diameter, 2 75 100 lbs. per lineal foot, costing 15 cts. per lb.

You are thoroughly acquainted with the most delicate and sensitive part of cable work, to-wit: The mechanical action of drums, tensions and carrying pulleys, are you not? Then please inform me, can the drums now in use be made to give a more satisfactory and economical service? If yes, how?

Ans. Larger in diameter, and the drums should also be differential.

Your tension service has been finely adjusted has it not?

Ans. Quite so.

Please give me an example of your tension service?

Ans. On our longest cables, 28,000 feet, the tension is 6,000 lbs.

If readily obtained you could use more elbow room?

Ans. Yes, the longer the better.

How does your experience agree with the theories of Mechanical Engineers in regard to drums? 1st. Diameter?

Ans. As large as possible.

2nd. Number wraps?

Ans. Not more than four.

TESTS MADE WITH CABLE MODEL.*

BETWEEN SOLID AND DIFFERENTIAL DRUMS, WITH AND WITHOUT GEARS, JANUARY 28TH 1889.

	Driven from Gear. Leading drum with grooves of different diameters. End Drum with grooves of same diameter.	Drum driven direct. No Gearing on Drums. Leading Drum with grooves of different diameters. End Drum with grooves of same diameter.	Driven from Gear. Leading Drum with grooves of same diameter. End drum with grooves of same diameter.	Drum driven direct. No Gearing on Drum. Leading Drum with grooves of same diameter. End Drum with grooves of same diameter.
To move with 1 wrap on Solid Drums	2 lb 12 oz	2 lb 0 oz	2 lb 2 oz	2 lb 0 oz
To move with 1 wrap on Differential Drums	2 lb 2 oz	2 lb 0 oz	2 lb 2 oz	2 lb 0 oz
Difference	0 lb 10 oz	0 lb 0 oz	0 lb 0 oz	0 lb 0 oz
Loss of power with 1 Ring fast	29.41%			
To move with 2 wraps on Solid Drums	4 lb 8 oz	3 lb 10 oz	3 lb 0 oz	2 lb 14 oz
To move with 2 wraps on Differential drums	3 lb 0 oz	2 lb 14 oz	3 lb 0 oz	2 lb 14 oz
Difference	1 lb 8 ox	0 lb 12 oz	0 lb 0 oz	0 lb 0 oz
Loss of Power with 2 Rings fast	50 00%	26 08%		
To move with 3 wraps on Solid Drums	6 lb 8 oz	5 lb 0 oz	3 lb 10 oz	3 lb 8 oz
To move with 3 wraps on Differential Drums	3 lb 10 oz	3 lb 8 oz	3 lb 10 oz	3 lb 8 oz
Difference	2 lb 14 oz	1 lb 8 oz	0 lb 0 oz	0 lb 0 oz
Loss of Power with 3 Rings fast	79.31%	42.85%		
To move with 4 wraps on Solid Drums	7 lb 8 oz	6 lb 3 oz	4 lb 10 oz	4 lb 6 oz
To move with 4 wraps on Differential Drums	4 lb 10 oz	4 lb 6 oz	4 lb 10 oz	4 lb 6 oz
Difference	2 lb 14 oz	1 lb 13 oz	0 lb 0 oz	0 lb 0 oz
Loss of Power with 4 Rings fast	62.16%	41 42%		
To move with 5 wraps on Solid Drums	8 lb 8 oz	7 lb 6 oz	5 lb 10 oz	5 lb 3 oz
To move with 5 wraps on Differential Drums	5 lb 10 oz	5 lb 3 oz	5 lb 10 oz	5 lb 3 oz
Difference	2 lb 14 oz	2 lb 3 oz	0 lb 0 oz	0 lb 0 oz
Loss of power with 5 Rings fast	51.11%	42.16%		
To move with 6 wraps on Solid Drums	9 lb 12 oz	8 lb 9 oz	6 lb 10 oz	6 lb 0 oz
To move with 6 wraps on Differential Drums	6 lb 10 oz	6 lb 0 oz	6 lb 10 oz	6 lb 0 oz
Difference	3 lb 2 oz	2 lb 9 oz	0 lb 0 oz	0 lb 0 oz
Loss of Power with 6 Rings fast	47.17%	42.70%		

	Drum driven direct. No Gearing on Drums. Leading Drum with grooves of different diameters. End Drum with grooves of same diameter. Both Drums Differential.	Drum driven direct. No Gearing on Drums. Leading Drum with grooves of different diameters and Solid. End Drum with grooves of same diameter and Differential.	Difference.	Loss of Power.
To move with 1 wrap	2 lb 0 oz	2 lb 0 oz	0 lb 0 oz	
" 2 wraps	2 lb 14 oz	3 lb 8 oz	0 lb 10 oz	21.74%
" 3 "	3 lb 8 oz	4 lb 4 oz	0 lb 12 oz	21.42%
" 4 "	4 lb 6 oz	5 lb 4 oz	0 lb 14 oz	20.00%
" 5 "	5 lb 3 oz	6 lb 2 oz	0 lb 15 oz	18.07%
" 6 "	6 lb 0 oz	7 lb 0 oz	1 lb 0 oz	16.66%

	Drum driven direct. No Gearing on Drums. Leading Drum with grooves of different diameters, End Drum with grooves of same diameter. Both Drums Solid.	Drum driven direct. No Gearing on Drums. Leading Drum with grooves of different diameters and Solid. End Drum with grooves of same diameter and Differential.	Difference.	Loss of Power.
To move with 1 wrap	2 lb 0 oz	2 lb 0 oz	0 lb 0 oz	
" 2 wraps	4 lb 0 oz	3 lb 8 oz	0 lb 8 oz	14.28%
" 3 "	5 lb 0 oz	4 lb 4 oz	0 lb 12 oz	17.64%
" 4 "	6 lb 3 oz	5 lb 4 oz	0 lb 15 oz	17.85%
" 5 "	7 lb 6 oz	6 lb 2 oz	1 lb 4 oz	20.40%
" 6 "	8 lb 9 oz	7 lb 0 oz	1 lb 9 oz	22.32%

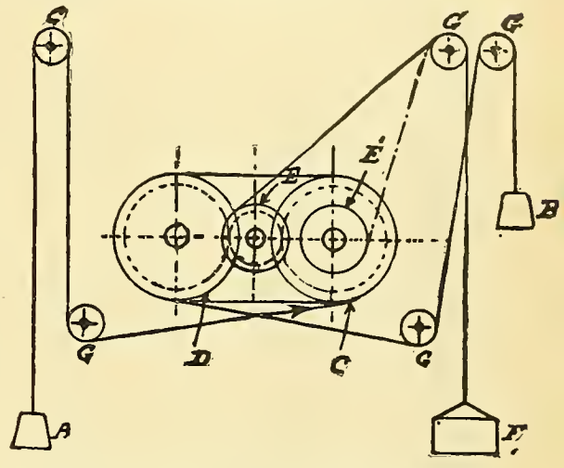
*WALKER MFG. Co., Cleveland, Ohio.

NOTES.—All tests driven from pinion show just half weight to move Model. Gears were 2 to 1. Weight A, 3 lb, 12 oz. Weight B, 3 lb., 11 oz.

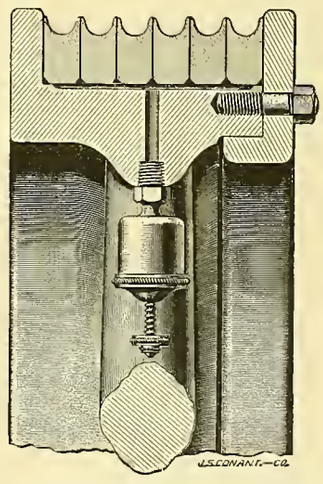
The foregoing tests were from an accurately finished model in the manner indicated by sketch. The weight A representing the cars or resistance, the weight B representing the tension weight. The leading drum is designated by C, the end drum by D. A parallel face pulley, with wraps enough wound on its face to allow for considerable motion of the cable, was applied at E when gears were used at E^1 when gears were dispensed with, to receive the power of weights in pounds and ounces applied at F. The pulleys, G, G, G, G, G, were simply idlers for the cable to run over.

The weights, A, B, and other conditions of the model, except those enumerated in the foregoing table, were the same in each test. The various amounts of weight in pounds and ounces, indicated in the table, show the relative amount of power to move the model. The difference in each case in pounds and ounces is also given with the various percentages of loss in driving with Solid Drums over that of Differential Drums.

It will be seen at a glance by referring to column one that there is an enormous loss of power in driving with Solid Drums with grooves of different diameters, which represent Solid Drums when worn. By referring to second line in each of the tests, in first and third columns, it will be seen that the Differential Drums, with grooves of different diameters, require no more power than the Differential Drums with grooves of the same diameter. By referring to third or fourth column, it will be observed that the Solid Drums, with grooves of the same diameter show just as good results as Differential Drums with rings of the same or different diameters; but, as experience has demonstrated that it is impossible to maintain the grooves of Solid Drums the same diameter (difference of as much as 2 inches in diameter of grooves have been known), it needs



no further argument of the advantage of Differential Drums. By comparing third and fourth columns it will be seen that there is a loss of power in using gearing from drum to drum of from 5% to 10%, this, however, is a very slight loss when we compare a gain of tractive power of the cable on end drum of 100%, that is, when the end drum is driven by gears or otherwise, only one-half of the wraps are required. This fact, when compared with the immense loss, as shown by increased wraps in column one, will certainly be convincing that the fewer wraps we



have the better. The immense loss of power shown in column one is caused by the slippage of cable in Solid Drums when they are worn; this power undoubtedly has been expended in wearing the grooves of Solid Drums and destoying the cable while slipping on same to accommodate itself to the diffreent circumferences of the grooves.

Answering a correspondent, we will say that the principal feature of the John D. Isaacs system of cable railway construction (the patents for which are controlled by the Southern Pacific Railway Co.) is the utilization of concrete in the construction of the road bed, which does away with a large part of the iron framework and braces employed by the old system. The rails and ties are supported on a concrete bed, laid in such a shape as to form a tube for the cable conduit. The concrete base is the shape of the letter U. The iron ties rest on the top, at one end supporting the bracket for the rail and to the other end bolted the 5x3 angle iron, which forms the slot for the cable grip to pass between.

From the apex of the conduit to the base of the concrete is 42 inches; the thickness of the concrete casing is fourteen inches at the bottom. The ties are doubly secured to the road-bed by a ⅞ anchor bolt imbedded in the concrete, and two braces form stays from the angle iron in the center of the tie.

Power Stations.

We herewith give the result of an interesting interview with Robert Hill, chief engineer of Steam Chicago City Railway.

What engines do you use, Mr. Hill?

Answer—Wheelock's.

What boiler do you prefer?

Ans.—Hazelton's Tripod Boiler.

What do you claim for those boilers, Mr. Hill?

Ans.—Each square foot of surface evaporates six pounds of steam per hour. The steam is dryer. There is no leakage because the tube joints are inward. With a good compound engine I can treble the horse power.

What stoker do you use?

Am.—The Roney Mechanical Stoker.

What is your claim for the stoker?

Ans.—It burns every grade of coal; it produces as much steam per pound of coal from the poorest as from the best;—no smoke;—automatic;—forced at will;—no open doors;—no cleaning grates.

What is your preference for a power plant?

Ans. Pool & Hunt of Baltimore make as good as the best, while John Walker & Co. have some splendid specialties, notably their Differential drums, which have the effect to tide the cable over what would otherwise be an unhealthy condition.

What grade of coal, and what does it cost in large amounts?

Ans.—Indiana screenings, costing $1.50 per ton.

What water do you use?

Ans. Lake Michigan water.

What are the waters of Lake Michigan?

Ans.—These waters are not very pure, as they contain 125 parts or grains of the carbonate of lime in each 1,000,000 grains of water, or one grain of lime in 12,500 grains of water, while pure water does not permit more than two or three grains of lime in 64,000 grains of water. It will be observed that our lake has five grains of lime in a gallon of its water. It is therefore not pure commercially considered, to say nothing of its injurious effects upon man. Effects that are greatly mitigated by the superior filtering agent which everybody with perfect health safely depends on.

How do you eliminate the lime which we all know is so injurious to your boilers? Do you use the coke filters? With what results?

Ans.—By the use of the coke filters with water at 212 degrees we remove 90 per cent. of the lime.

Although not exactly in your line Mr. Hill, I am anxious to get your opinion upon the advisability of an exclusive occupation of the power houses?

Ans.—I would exclude everything from the building except storage for coal and a small repair shop.

Should not the power plant be quite independent of the walls of the main or exterior building?

Ans.—Yes, by all means.

I noticed yesterday that all of your machinery together with the rolling stock was moving much more easily than the day before. Had the rain anything to do with the lubrication of the cable ways?

Ans.—Yes, of course; we always save 10 per cent. in power on account of rain.

Is it really a saving?

Ans.—No, not in realty, because 20 per cent. of "the riding falls off."

You are obliged to ride a great deal in your business as chief of steam, now what in your opinion is the income of the company derived from as between the following sonrces—labor, business and pleasure?

Ans. I have made that matter a study for a long time, both from my own standpoint and better I have had valuable assistance from the best observers and will grade the income as follows: Labor pays 20 per cent.; business pays 50 per cent., while pleasure comes forward with 30 per cent.

Plenty of room for all systems—cable, horse, electric, dummy, motor.

Roadbed.

Paving Material.

The Gazette considers itself fortunate in securing for its readers the following valuable scientific and commercial information in regard to the more valuable paving elements offered you from all parts of the country.

We are willing to admit that in certain localities, constantly decreasing in number, as great cities grow larger, and towns become cities, that cobble stone, a valuable make-shift for roadways, are unusually healthy, in fact, they have no superior in this regard, but in order to keep them in "form" frequent relaying, always expensive, is necessary, and the heavy traffic lines have long since adopted form stone, which will render the companies life-long service, in fact, these blocks are never to be replaced where once properly layed, except for general repairs.

At this writing we refer to the great Sioux Falls quarries of Dakota, represented by 3, and known as No. 7 in the series.

Six years of traffic on this stone in the city of Chicago show by actual tests less than 1,000th part of an inch wear, and no smoothing. While the crushed stone from the Sioux river section is needed everywhere for our splendid system of boulevard parkways, yet, like many another great industry, they are crippled by the political enactment of a national law, which losing sight of the special rights (and special rights since time began, always have, always should and always will exist!) of districts traversed by the great isothermal steam lines of trade, concedes to "Posey county" the same rights under or over the constitution as by Chicago and New York demanded.

Extract from the manual (unpublished), "The Business of Building Street Railways," by W. S. L. Bayley; "Stone for Paving Purposes," by Dr. Cummings Cherry, geologist and chemist, of Chicago.

My Dear Professor:

It being my primary object to present in a clean cut manner all that is essential to know of the material used in the construction of street railways, I am I believe, fortunate in having the opportunity of securing your valuable assistance. I herewith submit for your analysis seven specimens of well known building and paving material. Beg pardon, I mean stone that are in common use in all great cities, but I am in error in saying that they are well known, because the facts are that they are not better known than is the air we breathe or the water we drink. Some of these numbers, have by acts political or social, been foisted to niches that they cannot fill, while others have been rejected by the builders, till now they are to be "the head stone of the corner."

The reasons for using numerals in this analysis, is that no prejudice shall come of this effort to deal justly with this class of building material. Interested parties can secure the key for either number by applying to the Street Railway Gazette, 8 Lakeside Building, Chicago.

Says the Professor: I find No. 1 to be a diorite porphyrite. Showing it to be hornblende andesites, containing much quartz, like all granite formations of a close texture, rather too hard for building. It is extremely hard. For paving purposes it would be capable of withstanding much wear. It is flinty, and has the nature of glass. Its origin is considered volcanic. This is the heaviest stone in this market, because it is the most compact.

No. 2. I find No. 2 to be a porphyritic granite merging into a synite granite. Would be valuable for building purposes, yes, superior, having much cohesion. It could be dressed and polished at moderate expense. Well suited for paving purposes, as it contains an equivalent of potash and mica. The weight of this stone is classed next to No. 1.

No. 3. I find that No. 3 is a feldspatic granite. It is also a potash granite made up of feldspar hornblende mica. It will not stand fire on account of the potash it contains, fluxing it when submitted to great heat. It would make good building material, though not very durable on account of being deficient in silex. Would answer well for paving purposes. (Digression.) The harder the stone and closer the grain the harder to polish, enables the stone to withstand more abrasion, friction and wear if iron or alluminum in its admixture is found in quantities sufficient to prevent smoothing by traffic.

No. 3 is lighter than the average, contains much more hydroscopic water in its composition and nature.

I find that No. 4 is a synite feldspatic granite, made of felspar, hornblende and mica. It would make durable building stone, as the crystallization is fine, and the division of hornblende in its mixture with feldspar and mica, when dressed, would show it to great advantage. This I consid a most valuable specimen for fine buildings and monumental purposes. It contains less hydroscopic water in its composition than No. 3, which it resembles in weight.

I find No. 5 to be another porphyritic granite. This stone would be easily worked, but not so durable as No. 4. It contains more potash and the hornblende is not so uniformly distributed. It contains a large per cent. of hydroscopic water, and is therefore liable to disappoint you as a building stone, especially in this—our northern climate. It would answer very well for paving blocks, as it would not abraid and grind. It is low in silex which factor condition reduces its hardness and consequent durability. It is more porous, hence lacking in compactness and necessarily much lighter in weight.

I find No. 6 to be a quartz trachyte or quartz phyolite or liparite. The feldspar is of this class sanadine mainly and some plagioclase may be present. This rock has a compact or finely glandular substance, which is often porous and rough. It sometimes resembles hornstone or porcellanite, and is found in different colors. It would be hard to work from its compactness and close silex texture, would be exceedingly durable, would not disintegrate by exposure to the elements, nor be affected by acids, would be susceptible of a high polish, and may safely be used for many purposes in building and monumental work, would make beautiful table and mantel work, provided sufficient sized slabs were obtainable. This stone would stand much abrasion, and wear well as a paving stone. It contains almost no trace of potash. Its coloring is largely made up of organic matter. It is less in hydroscopic water, hence not affected by the action of the elements. In weight it ranks with No. 1, being very heavy.

I find No. 7 to be a quartzite and may be termed a limonite quartzite, is a compact, reddish opaque quartz and Lydian stone, and belongs with black shining varieties in hornstone or chert. It is compact and slightly translucent with a horny lustre. It is well suited when ground and made up into a pulpable mass for linings of Bessemer steel converters, being practically indestructible by any degree of heat used in smelting. It contains little hydroscopic water, is largely composed of silex and oxygen. It would make excellent paving stone. This stone's wearing qualities are unexcelled, in this degree much like No. 6. It would stand more abrasion than most of the numbers submitted. Atmospheric oxygen has no influence on it, as it is largely made up of and contains inorganic oxygen. Be it known that inorganic oxygen is nature's most powerful adhesive agent and is always at war with that disintegrating element of nature known as organic oxygen. This stone has 53½ per cent. of the above mentioned staying element. It is low in hydroscopic water from its fineness and compactness, and high in specific gravity when compared with the average primitive rock groups. Chemical analysis of No. 7—Silica, 96.50. Iron and Aluminum, 3.50.

Many thanks; now, professor, if you will tell the world all about that common adhesive and so called preservative material known as coal tar, I will release you from your very interesting and valuable dissertation.

Ans. Coal tar, being largely composed of carbon from the igniting, burning or distilling of hydro carbon or stone coal products by manufacturers of illuminating gas, partakes of the nature of the residuum which is thus thrown off. Coal tar contains sulphur and ammonia in large quantities, which is readily thrown off, especially when exposed to atmospheric influences. In this condition the oxygen of the atmosphere is taken greedily up by the above mentioned destroyers

and the metals are soon disintegrated with a loss of their elastic and cohesive properties. And these elements so essential to their life and beauty are literally wiped out. Thus is it that when steel and iron are exposed to moisture and "preserved" by coal tar products, they are rapidly reduced to "sulphate of iron" and their native organic condition, "rust." We will state further that companies situate too far from the great and inexhaustible quarries of Dakota, or the similar but smaller deposits of the same grade in Wisconsin, may by enclosing a small specimens of the stone, which their market offers, rely upon a prompt and accurate geological and chemical description and analysis of the same.

Steel and Iron.

Interview with Major C. I. Wickersham, of Chicago.

How long have you been familiar with steel and iron products?

Ans.—19 years.

Have the Bessemer or similar processes had the effect to largely supersede iron with steel, especially in railway appliances?

Ans.—Yes.

What are the relative and comparative weights of steel and iron?

Ans.—Very little difference. Steel 490 lbs. per cubic ft., iron 480 lbs.

Which is the most economical?

Ans.—Steel always.

What is the best formula for or method of treating steel or iron to prevent oxydization?

Ans.—Immerse the metal in boiling pine tar and grease, allow it to remain until the two have reached the same temperature.

Is this process economical?

Ans.—Yes.

Under what conditions can this method be advantageously used?

Ans.—Where metals are to be exposed to moisture.

Is it true that neither cements, paints or other external coatings will preserve steel or iron where moisture exists?

Ans.—No. To a certain extent they will act as a great preservative.

Why is the practice of placing steel and iron rails and bars in the foundations of buildings so popular?

Ans.—Because of the great strength, evenness and compactness which is thus secured, and all this at much less cost than the best or strongest masonry.

What is the relative life of steel or iron, conditions being equal?

Ans.—1 to 15 in favor of steel. Again you may lay iron under the most favorable conditions and yet steel will lead 1 to 9.

J. R. Matlack, jr., civil engineer, representing the Pittsburg Reduction company and Richli Bros. now universal testing machine, recently favored the office of the GAZETTE with a call, and, very gently, dropped into the editorial hand a tissue of aluminum, thin as air, light as vanity, with the strength of its associate, steel. The beautiful leaf is 94 per cent. pure, and sells in quantities for $4.00 per pound, while 96 per cent. commands $5.00 for the same amount. That the world moves is no more clearly demonstrated than that an inferior article was sold by Devalle, for $286 per pound.

MESSRS. KNIGHT & BONTECOU, the well-known cable railway engineers of Kansas City, Mo., have secured the contract for the construction of the cable railway in Washington, D. C., and Mr. D. Bontecou has gone there to start the work.

All the designs and working plans for this road are to be prepared by Messrs. Knight & Bontecou, and the selection of a Kansas City engineer to build a road so far distant, is no small compliment both to that hot-bed of cable roads, Kansas City, and to the enterprising firm that has secured the contract.

MOTORS.

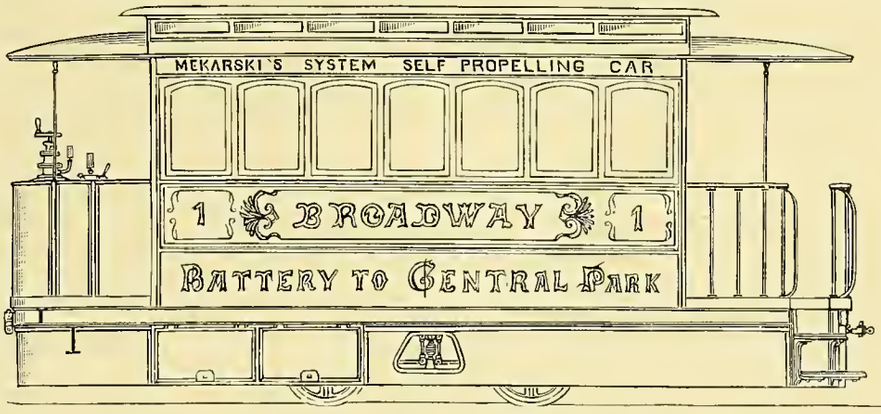
The Mekarski Compressed Air Motor Company, of New York City, writes us as follows:

"Answering your esteemed favor of the 11th inst., I will say that this company owns the sole and exclusive right to use this system on cars of city and suburban railways, elevated or underground lines, and a company has been formed for its introduction in this country.

This system has been in successful operation in the city of Nantes, France—population 150,000—for seven or eight years.

It is now in use in the suburbs of Paris, and arrangements have been made for its application to new lines in that city; also in Bordeaux, Lyons, Limoges, Berne, and other cities. The introduction and use of street railways is of comparatively modern date in European cities, and but little interest has been manifested in their developement until recently. This, with the fact that though a large and important city, Nantes is quite out of the way of American travelers, and has prevented this invention of Mr. Mekarski being known as it should have been. Its efficiency, simplicity and economy are not therefore matters of speculation or experiment.

Compressed air has long been used for a variety of purposes where power was required, but it was left for Mr. Mekarski, by a simple invention, to enlarge its application and use, as a motor for street and other cars. This is by passing the compressed air through superheated water, whereby its volume is increased and refrigeration in the cylinders of the motive parts prevented. The machinery was very simple, and preserves the old link motion, and it introduces no novel or untried methods. The cut accompanying this shows the elevation and proportions of the street car to which this system is applied. Under the floor of the cars the air cylinders are placed, and all the necessary driving machinery is on the front platform. The whole is simple in operation and under control of the driver, who need not be a skilled mechanic. The cars are charged at the central depot or station and are arranged to cover a given length of line, going and returning without further attention.



The advantages of the system are: First, No change of rails necessary. Second, Its adoption involves no increase of capital. Third, Operating expenses will be reduced 25 to 30 per cent. over the use of horses. Fourth, Economy of space, no stable being required. Fifth, The simplicity of mechanism requires no trained employes.

DETAILS OF MOTOR:—Length of car, 22 feet; width, 6½ feet; weight, 5 tons.

CAPACITY OF THE AIR RESERVOIRS:—First battery, 3 reservoirs, 25 cubic feet; second battery, 5 reservoirs, 45 cubic feet, 70 cubic feet. Normal pressure at charging, 600 lbs. per sq. in.

WEIGHT OF STORED AIR:—First battery (reservoirs) 80 lbs.; second battery (reservoirs) 144 lbs., 224 lbs. Weight of stored (hot) water, 224 lbs.; initial temperature of the hot water, 320°F; diameter of the motive cylinders, 5 in.; length of piston stroke, 8 in.; consumption of air per mile run, 20 lbs.; speed, 8 miles per hour; length of run, 11 miles.

In substitution of the above, official data covering a period of several years, can be seen at this office.

Yours very truly,

THE MEKARSKI COMPRESSED AIR MOTOR CO.,

Letters Patents.

Questions answered by Irwin Veeder, an expert and solicitor of patents, who is associated at Temple Court, Chicago, with J. H. Raymond, the counsellor in patent causes.

1. The issuance of patents in the United States is based upon special acts of Congress authorized by a special provision in the United States constitution.

2. The most of the patent laws of foreign governments have been modified so as to adopt the cardinal points of the United States patent system, but the details and practice are so various in the different countries as that practically it can not be said that uniformity prevails.

3. Excepting in Canada, the taking out of patents in foreign countries by American inventors is, as a rule, and in a majority of cases, of greater benefit to the solicitor than to the client, and, under existing foreign laws, should be discouraged except in instances where the inventor has personal or particular facilities for introducing his invention or for selling his patent abroad.

4. The life of a United States patent is seventeen years from the date of its issuance. The life of a Canadian patent is five, ten or fifteen years, dependent upon the payment of periodical fees. A Canadian patent may be taken out at any time within a year after the date of the United States patent without in any way affecting the life of the United States patent. If taken out previously to the United States patent, the Canadian patent may have the effect to materially shorten the life of the United States patent. This is by virtue of Section 4887, United States Revised Statutes, which section ought to be repealed by Congress.

5. Patents can now be extended only by special acts of Congress, very difficult and expensive to obtain.

6. "Patent applied for" gives no legal protection, but is a commercial warning quite proper, and as a rule efficacious when, from necessity, the inventor "gives his invention away" before he has secured his patent.

7. During the progress of developing and perfecting your invention put a date and signature to every drawing, sketch, model or sample, and, if convenient, have a subscribing witness.

8. Nine out of ten of the caveats which are filed benefit only the solicitor to the extent of his fees and seldom do the inventor any good.

9. The preliminaries of obtaining good United States patents are first, to consult a reputable patent lawyer or solicitor (shunning the "cheap Johns," and especially shunning the "no patent no pay sharks"); second, to pay him a reasonable compensation for his services in addition to his expenses for drawing and in addition to the Government fees. The Government fees are, in the absence of appeals and interferences, fifteen dollars upon the filing of the application and twenty dollars upon its being allowed. Competent lawyers and solicitors charge in ordinary cases (including all ordinary fees and expenses) from $70 to $100, and, as a rule, the higher the charge the more excellent is the service.

AN official inspection of the cable route of the Central Tramway Co. of Birmingham, Eng., was recently made by Major John Hutchinson, R. E., the inspector of the Birmingham Board of Trade. The line was thoroughly inspected, and a number of tests of appliances used in its operation were made. The result of the inspection was so satisfactory, that official sanction was forthwith given for passenger traffic, rather an unusual procedure in England. A lunch followed the inspection, at which enthusiastic speeches were made.

ON the Seattle Electric Railway, operated under the Thomson-Houston system, there is a grade as high as 11½ per cent.; we believe this is to be the highest grade that any electric company has yet attempted to overcome.

The Street Railway Gazette.

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Articles and papers on subjects relating to intermural transit always appreciated; the Gazette's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways.

Asbestos.

Few, seeing the asbestos pipe coverings, used for the prevention of radiation on the steam pipes in cable and electric railway plants, know much about it. The name "asbestos," is not generic, but is used as a term to designate a form or combination of several minerals, to-wit: tremolite, actinolite and other forms of hornblende, excepting those which contain alumina. In this peculiar combination these minerals pass into fibrous forms, and while looking like flax feel like silk. The colors are white, green and wood brown. The "amianthus" of the Greeks and Latins was the same thing. Again, "there is nothing new under the sun," because history tells us that the ancients used a cloth made of amianthus as a wrap for the bodies of their dead, while the same were being consumed on the funeral pile. They also made napkins of the beautiful material, which when soiled were thrown into the flames, from which they were taken purified. It is likely that with a few exceptions or special uses, principally on account of its non-conducting properties, its consumption will not be greatly increased. Asbestos is found in Switzerland, Italy, Scotland, Corsica, and on the New York islands, while inferior varieties are found in many other localities.

Unless the Gazette is very much mistaken, two more prominent steam railroad car builders, one in the East and one in the West will enter the street railway field within the next week or two. Although the street railway interests of the country are developing to an extent beyond the expectations of the most sanguine, we trust that the supply of cars will not become a drug on the market by reason of over-production. The Gazette wishes both these companies unlimited success in their new venture, and as far as possible will do its part towards booming the enterprise.

Heavier Motors.

Among the recent improvements which electric power companies have been adopting in their electric motors for street railway work, there is none which is perhaps more noticeable than the increase in weight, and consequently in strength, of the motors made by the leading manufacturers. When the electric motor was first introduced to the street railway public, it was practically a new device, and the designers had not had all the experience in the electric railway field that they have subsequently derived. There was a general fear among the leading manufacturers of building too heavy a motor, and so fell into the equally disastrous error of building too light a one. The unequalled advantages of an electric motor as compared with any other power producing machine of simplicity and strength, was not fully gained in some of the first electric motors which were put on the market.

The best practice of electric supply companies now seems to be, while having due regard for lightness, yet not to make the machines so light that they will not be as durable as possible. This same experience has been passed over in the history of the steam locomotive, which in the earlier days was made quite light. We have a vast amount of confidence in the future of the electric railway field, and each year of experience adds some new point of value to the electric machines on the market. We predict that the immediate future will show no little progression in the adoption of electricity as a motive power for street railway work.

A Water-proof Armature.

In a recent test of one of the new Sprague motors made at the factory of the Sprague Electric Railway and Motor company, at Schenectady, N. Y., one of the armatures was placed in a tub of fresh water, and allowed to soak there for twenty-four hours. It was then taken out from its bath and put into position in the machine and worked up to full load without developing any defect.

After this treatment it was again removed from the machine and placed in a tub of salt water, where it was allowed to remain for another twenty-four hours. It was then again placed in the machine, and after wiping off the commutator, the motor was worked up to over thirty-three per cent above its normal load for two to three hours without showing any defect or bad result of its treatment.

The practical result of this test and its successful outcome is, that results which would have been considered impossible a year ago, are now possible, and that the electric motor considered as a machine is stronger and more reliable than a steam engine or any other power producer.

Some time ago, it will be remembered, that Mr. Sprague said that he would accomplish just such a result as has been shown in this test, and that after soaking the armature for twenty-five hours in the water, he would put it in a machine and work the machine up to its load. The results of the foregoing tests show that he has amply fulfilled his promise.

Aluminum Alloys for Street Railways.

The recent successes in producing aluminum and its alloys, and the extraordinary results in tenacity and ductility of the metals produced, are drawing the attention of experts in all lines of structural enterprises.

When combined with iron, steel or copper, the tensile strength and ductility are enormously increased. Copper and bronze alloys give a tensile strength of from ninety to one hundred thousand pounds per square inch, with an elongation of 70 per cent. The strength of the bar copper used being about twenty thousand pounds.

With steel and iron the results are equally remarkable.

This increased ductility in the alloys combined with increased strength, suggests the use of such metal for the wire cables and grip blocks of street railways. Such cables and blocks would produce less grip than those in use at present. The increased ductility giving a tendency to smear, or smooth down the wearing surfaces. The disintegrated particles being flat they cannot convert the cable into an immense file.

The present cost of $4 per pound for 94 per cent. metal would add but little to the cost, the proportion of aluminum being so small, but the recent production of the metal in large quantities in Pittsburg, points to a much lower price as soon as the market shall call for greater quantities.

Aluminum pure has a tensile strength of nearly 40,000 pounds per square inch, with but one third the weight of copper (its specific gravity being 2.6 to 2.8), but is quite rigid when cast.

The cast pigs can be rolled cold but require annealing until reduced to about one tenth inch, after which annealing is unnecessary. We have before us a sheet rolled to one-two-thousandth ($\frac{1}{2000}$) of an inch.

One important property of aluminum is its lack of oxidation from exposure. This property it imparts to its alloys to a certain degree.

Electric Lights for "Special Hazards."

The rapid advance toward true sunlight made by electricians within the past ten years, phenomenal as it is, would be marvelously more so if errors of omission had not occurred. The time wil come, and quickly, when, by retrospectionl, the wizards will exclaim, "How careless, how unwise, to have blindly trusted to luck in placing the insulated wire in those car and horse barns, those factories and power houses, when we ought to have known that storms of fire must come, that, though the walls of a specially hazardous building be built of granite, or, better, of that fire-proof stone from the Big Sioux river, they alone will remain intact, while the interior and its contents quickly fall before the flame, unless the heroic efforts of the brave firemen stay its progress." Time was, and is yet, when the cry of "Powder," "Steam," or toppling walls was enough to cause an abandonment of the property, but "the wire" is an added menace which must be removed before we can hope to add health and economy of labor to the occupancy of special hazards. How? let an old fire underwriter tell: Every wire should traverse the building safely enclosed in the iron tube which gas has so long depended upon. Place a locked box at the point where the main enters the building, with keys safely and plentifully located. Then upon the first alarm it will be the duty of any and every clear headed citizen to shut off the fluid.

Then, with only legitimate danger before them the laddies will make quick work of it. The perforated ceiling, grand as it is, is second to the wisely erected electric plant, because the first is an extinguisher while the latter is an absolute preventive of accidental fires. The reduction of premium rates, always accorded by the underwriter for improvements, will pay you a legitimate interest on the last of your "Electric Lights for Special Hazards."

Concerning the cost of operating electric roads, an exchange says: "The statistics for operating electric roads are such as to challenge more and more the notice of street railway men and others interested in urban passenger business. The figures that come from President Allen, of the Sprague road at Davenport, Ia., are also very striking. This road has four 14-foot cars, with twin 7½ horse power motors, and one 10-foot car for transfers. This road went into operation last year, and the following is the result:

	1887.		1888.		Per ct.	Per ct.
	With horses		With elec.		gross.	net.
	Gross.	Net.	Gross.	Net.	incr.	incr.
Sept	$1,374 79	$474.79	$1,997.15	$ 997.15	48	110
Oct	1,232.47	302.47	1,903.94	1,121.94	54	270
Nov	1,131 49	231.49	1,866.06	986.06	66	320
Dec	1,283.14	353.14	2,022.98	1,122.48	59	220

"The showing is a remarkable one as to the advantages of electricity, but it can be understood in the light of the statement made about the Omaha Thomson-Houston road, by Capt. Eugene Griffin, to the effect that the fuel per day per car costs only 28½ cents. In Scranton, as is well known, the fuel costs even less, as the electric roads are simply burning the culm that has been slowly heaping up from the coal mines."

Through the courtesy of Mr. Wm. J. Richardson, Secretary and Treasurer, we have received a printed report of the proceedings of the sixth annual meeting of the Street Railway Association of the state of New York, and in some future issue we may possibly publish extracts therefrom.

Correspondence.

Minneapolis, May 12th, 1889.

Street Railway Gazette, Chicago, Ill.

Gentlemen: — An important announcement, coming direct from President Lowry, has recently been made. It is to the effect that the motor line will not be the only one to be replaced by a cable road, but that Washington avenue, from Twentieth north to Cedar avenue, will be included in the cable system. It is expected that work on the new roads will be commenced this month if a decision is reached next week in the St. Louis-Manitoba case now before the supreme court in Washington. When work commences it will be pushed through to completion as rapidly as possible, and strenuous efforts made to have the new roads opened by January 1st next year.

The time for the expiration of the franchise of the steam motor line is nearly at hand, and that fact, coupled with the one that the company has lost considerable money on the present system of street railroads, has served to mature the plans for the cable project. Under that franchise a certain amount of work on the cable line, replacing motor system, must be accomplished by next November, as the franchise expires on the first of that month. Upon the completion of the cable line the cars which run from one terminal to the other on Washington avenue will be run to the end of the cable line, and drawn to the proper junction on the Washington avenue trunk line.

It is estimated that the cost of the cable system will be not less than $3,000,000, and what is known as the Californian system will be adopted. In company with several other officials of the road, President Lowry has been studying the various cable systems in use in the country, and has come to the conclusion that the California system—as also used on the St. Paul City Railway—will answer all purposes. The engine for the new power house will probably be from five to eight hundred horse power, with a drum wheel about twelve feet in diameter.

The following is a statement recently taken from the books of the company, giving the expenses and profits of the entire system, leaving out the cost of extensions made during the year:

Earnings of the street railroad	$578,874.01
Earnings of the motor line	164,181.09
Total earnings	$743,055.10
Operating expense of street railroad	472,623.63
Operating expense of motor line	151,214.32
Total operating expenses	$623,837.95
Total earnings	743,055.10
Total operating expenditures	623,837.95
Net above expenditures	$119,217.15
For interest on street railroad bonds	72,844.67
For interest on motor bonds	45,280.17
Total	$118,124.84
Amount above expenditures	119,217.15
Amount paid in interest	118,124.84
Profit	$1,092,31

According to this statement, $1,092.31 is left to pay the expenses of building four miles of new track, $39,179.60, and defraying expenses of paving, $9,974.34. In addition to this there is the cost of new cars and purchase money for horses. Mr. Lowry said the actual loss of the street car company last year was $33,000.

The expenditures given in the statement consist only in repairs to cars, operating expenses, office expense, track repairs, pay roll, feed for horses, insurance and taxes, loss in horses, and general loss and damage. It is to be seen then that all extensions ordered by the city are paid for by issuing additional bonds, as the earnings of the car lines are insufficient. The office force is as small as possible, and the expense of clerk hire is about $12,000, greatly under the salary list of street car company offices in other cities equalling this in size. Mr. Lowry said recently that he had not drawn a dollar as salary from the organization, and always paid his traveling expenses while away on business for the company from his own purse.

The cable road is to be composed of six strands of sixteen wires each, protected by large wires wound about the outside, centered by hemp rope, preventing crystallization, and lending elasticity to the cable; it is to have a breaking tension of about sixty tons.

When more particulars are forthcoming, you shall have them. Yours truly,

T. J. L.

Topeka, Kansas, May 13, 1889

Within the last two years, Topeka has quadrupled her miles of street railways. Upon June 30th, 1886, there were nine miles of street railway in operation, over which the cars were propelled by that mild mannered beast with his wings on the side of his head, as Josh Billings said. At the present time there are 42 miles in operation, using steam horses and electricity, the mule being altogether too slow for Topekeans. The street railways are divided into four companies, viz:

	Power.	Miles.
Topeka City Railway	Horse	14
Rapid Transit	Electricity	14
West Side Circle	Steam	5
East " "	"	9
		42
Street railway in operation June 30, 1886,		9.5
	Increase	32.5
Number of men employed in 1886,		37
" " " " " 1888		176
	Increase	139

The total amount paid out for wages for the year 1889, not counting the building of new lines, was $98,118. Topeka has more miles of street railway than any other city in Kansas. Leaving out Wichita, Kansas City, Kan., and Atchison, it has more miles than all the rest of the cities combined. Wichita ranks second to Topeka, having 40 miles. In point of equipage Topeka "takes the cake,"—frosting and all. The electric cars run as steady as an old water-mill, and to all appearances are a decided success. There are one or two hills almost as steep as a house roof on the line, but the cars buckle right to them without a balk. Upon Sundays it is almost impossible to obtain even a footing on them on account of the crowds. A few days ago a bomb was exploded under one of the cars, resulting in no harm, only frightening the occupants of the car. The noise of the explosion was heard for a long distance. Who put it there is not known. The only unpleasant feature of the electric cars was experienced recently during a severe thunder-storm. The spirit of the elements made a strong effort to liberate its brother from bondage, and the way it flew around the electric wires and apparatus was dangerous. The cars stopped several times and refused to go, and several hundred dollars damage was done to the machinery. The Topeka Street Railway company is watching the workings of the electrical road and it is very probable will introduce it on their line before the close of the present year. A company has been organized in North Topeka to establish an electrical railway in that part of the city. The Jenny system will be used. The North Topeka and Silver Lake Rapid Transit road has evidently been abandoned. The rolling stock, consisting of one motor and coach combined, has disappeared to parts unknown and the road-bed is becoming badly demoralized.

The street car line at Kingman has been sold, Mr. O.W. Meysenburg of St. Louis purchasing the franchise, track, etc., and John R. Griffith the cars, loose rails and other appurtenances. It has not been determined what will be done with this line, but it is probable that it will be moved to some otner point.

Marion has voted $16,000 bonds to build a motor line.

The Riverside Electric Railway company of Wichita have received three new cars made after patterns furn shed by Edmund Verstact, electrician for the company. Two of the cars are so made that the "motorneers" (as they are called in Wichita) are out of the cold and out of the way of passengers getting on and off from the cars. The cars are 16 feet in the clear, with a vestibule on each end of four feet. They are finished in cherry with spring cushion seats. Each car will seat comfortably 30 people. In a rush 75 can find a place to hang onto. The other car is an open car with 28 reversible seats for two persons. This makes eight cars owned by the company. They are preparing to extend their lines considerably the present season. R. E. C.

Newburyport, Mass., May 14, 1889.

The Newburyport and Amesbury Horse Ry. is doing a very large business with a prospect of extending its line three and one-half miles on High street, which is one of the finest streets in New England. The location has been secured and the material will be ordered at once. It is expected to have the road opened July 1st. This road's receipts have increased over 80 per cent. in the past two years, with only the additional line to Merrimac, which is to be equipped with Thomson-Houston overhead system (electricity). It will be operated June 1st by electricity.

New York parties have been here this week in regard to purchasing it, and using electricity on the whole route, which with the High street line will be about 15 miles in length.

The Plum Island Street Railway has been in operation for the past two Sundays, only this season this is a summer line and done a profitable business since its opening. The company used a Baldwin motor on the sea shore part of its road last year. They have now built a new steam motor which, as far as tried, promises great results as to escaping steam and noise. A large number of new cottages are now being erected at the Island, which will increase the business this season. Band concerts and other attractions are given at the Island during the summer.

The Black Rock and Salisbury Beach Railway promises to be a large property in the near future. Last year the route was extended from two miles to six miles. Within the past three weeks two and one-half miles have been built from east Salisbury across the Merrimac river into the city of Newburyport to the Boston & Maine R.R. depot, with a permit to build to High street to connect with the new route of the Newburyport & Amesbury Horse Ry. This company will also extend its tracks at once from the depot at Salisbury to Amesbury, a distance of 3¾ miles, also will extend its line to the division line between Salisbury and Seabrook, N. H, will ask the Legislature of N. H. for a charter from Salisbury line to Seabrook at the next session, June, 1889. This is the only line in Mass. that has always paid 10 per cent. dividend since its opening, 1882. Its capital is only $45,000, but has authority to increase to $65,000 on May 6, 1889, this will leave the company free from debt. The company will use 15 cars, one dummy engine and one Baldwin motor car and 20 horses. The line from Newburyport to Salisbury will be opened this month, and the beach line June 1st. The People's Line steamers from Newburyport, and the Merrimac Valley Steamboat Line from Haverhill, which connect at Black Rocks with this road will commence running June 15th.

The Newburyport Car Manfg. Co. is doing a large business, in fact, their shops are full of cars. They will extend their plant during the summer. Among the orders on hand are 17 close cars for the West End Railway, Boston; six for Hartford Street Railway; five electric cars for Plymouth and Kingston; ten for Revere Electric Railway; two electric cars for Amesbury & Salisbury; three electric cars for Marlborough; three cars for Black Rocks & Salisbury; two for Bangor; have recently shipped four cars to Mankey Ry., Salem; two to Springfield. They now employ about 80 men. N. C. S.

The Thomson-Houston company has just contracted with the Naumkeag Street Railway Co., of Salem, Mass., to supply them with six motor trucks, each equipped with two 15-horse power motors. They will be used on the line from Salem to the Willows.

The company has also received an order from the East Harrisburg Passenger Railway for one double motor truck, equipped with two 15-horse power motors.

The Revere Street Railway is being rapidly pushed toward completion.

The line is double track and will extend from Winthrop Junction to Crescent Beach, and may be continued beyond there on the tracks of the West End Street Railway, of Boston.

Street Railway News.

(See also "New Enterprises," "Elections," "Dividends," etc., p. 93 to 95.)

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a vertification of each item received by them in time for each issue:)

ALABAMA.

Montgomery—The stockholders in the Capital City Street Railway company and the Highland Park Improvement company have made a formal transfer of the street railway property, including its rolling stock, live stock, track and franchises to Mr. I. Pollok and his associates, who recently purchased the property, paying therefor something under $100,000. There was not a hitch in the proceedings.

CALIFORNIA.

San Jose—The Electric Street railroad, running from East San Jose through San Jose and along the Alameda drive to Santa Clara, has been sold to San Francisco capitalists, the price paid being about $350,000. The purchase was negotiated by M. H. Turrill, and the franchise is considered very valuable.

A short time since the board of supervisors of Santa Clara county granted B. Radovich, A. Malpas and others, a franchise to construct a motor road from Santa Clara to San Jose, thence to Saratoga and Congress Springs. This franchise has also been secured by Mr. Turrill for the same parties who purchased the street railroad in San Jose.

The electric road will shortly be converted into a cable road and equipped similar to the Market street system of San Francisco. Work will be commenced on the new motor road to Saratoga before the first of June.

COLORADO.

Trinidad—Morgan Jones, president of the Fort Worth railway, was lately in this city, and said that the Pullman Car company, of Chicago, had about completed several new cars to be used on the extension of Trinidad's street railway. Work will commence soon to extend west to the Boulevard addition, adding fully one mile to the present system.

CONNECTICUT.

Fair Haven — The committee on cities and boroughs have reported a resolution amending the charter of the Fair Haven & Westville Railroad company, permitting the company to extend its tracks from the corner of West Chapel street and Norton street through Derby avenue to the Yale Athletic grounds; also from the corner of West Chapel and Norton streets through Chapel street to Central avenue, through Central avenue to Fountain street, through Fountain street to Main street, to connect with the present track; also through Central avenue to Tryon street, through Tryon street to Main street to connect with the track on the latter street.

DAKOTA.

Pierre—The street railway company will put in two and a half miles of new lines at once in order to hold the charter. A company has asked for a franchise for a motor line of railway to run from the business streets to the Indian Industrial school and the new city park dedicated to Pierre by the government. It is probable the franchise will be granted. The horse car line will also be extended in the immediate future.

St. Lawrence—There is talk of putting a street car line between Miller and St. Lawrence, thus uniting the twin cities, and it is hoped that the enmity between them will cease to exist, as the interests of each are identical and the space of two miles between them will be built up, and if we can get the capital located right in the center between them there will be built one of the grandest cities in all Dakota.

DELAWARE.

Wilmington—A special meeting of the construction committee of the new Eighth Street Railway was recently held at the office of the New Castle County Insurance company, No. 602 Market street. Reports were made of the prospects of the new undertaking, showing that $20,000 out of the needed $38,000 of stock subscription is already in hand. The following gentlemen were appointed a committee to solicit subscriptions to the remaining stock: D. W. Taylor, George W. Bush, Alexander J. Hart, William S. Haines, N. B. Culbert and Mark M. Cleaver. Each of the above has a separate district, and is prepared to receive subscriptions.

James Bradford, John Jones and General Manager Edwin W. Heald will act in conjunction with the constructing committee and commence construction of the new road immediately the last share is reported subscribed for. Plans are ready and estimates completed for quick work as soon as the word is given. Manager E. W. Heald has all the arrangements ready.

The par value of the shares is $10, the sum of $5 to be paid on subscription in consecutive monthly $1 payments, the payment and par value of the share being identical in price with the existing stock of the old company. In regard to dividend on the shares the finance committee state that the net earnings of the new road will go directly to the payment of dividends. Whatever the road earns the stockholders will receive until the earning capacity of the new road equals that of the old when the stock and earnings of the whole system, old and new, will be consolidated.

Among those who have subscribed to the new stock are George W. Bush, 500 shares; William R. Brinckle, 600; Barkley Brothers, 500; Charles W. Howland, 200; Edward Bringhurst, Jr., 200; E. T. Bellah, 100; James Morrow, 100; Thomas H. Savery, 100; William W. Pusey, 100; F. B. Colton, 100; George G. Lobdell, 100; Frank Pyle, 100; Elwood Garrett, 100; John Mulvena, 100; William Canby, 50; Charles Warner, 50; Joseph Davidson, 50; Robert W. Smith, 50; George W. McKee, 50, and numerous takers of amounts varying from 25 to 10 shares. All that is needed now is the additional subscription for 3,600 shares when the new Eighth street railway will be commenced from Eighth and Market streets to Eighth and Union.

GEORGIA.

Atlanta—The Union Street Car company has not taken charge of its recent purchase, and no time for the change has been designated.

Mr. Peters is still in command.

The terms of the sale stipulate that the purchasers are to assume control of the property upon making the second payment, and that payment can be made at any time within so many days after the first payment. Mr. Patterson, of the new system says he can not tell when he will assume control.

Mr. W. S. Larendon, who has been supervisor and engineer of the Atlanta street railway company for years, has been promoted to the superintendency.

Gainesville—Camp Bros. will probably operate their line with dummy engines. The line is over two miles in length.

INDIANA.

Indianapolis—Since our last issue the Citizens' Street Railway company petitioned the board of county commissioners to be allowed to lay another track on Illinois st., from 12th st. to Crown Hill. However, the company did not wait for the action of the board, but began the construction of the line with utter sang froid, and with a sublime assumption that things would come its way anyhow. The road is about completed now. The commissioners have granted the petition of the company, conditional upon the latter keeping the floors of all bridges and culverts in good repair, to put down new floors when needed, using two and one-half inch oak planks. The company must keep the highways between the rails, and for two feet on each side thereof in good repair; it must not scrape the dirt or snow in ridges beside the tracks, and must pay one-half the expense of all road improvements; keep the highways between the tracks filled with gravel, and the rails of a level with the grade of the streets. The company is also required to protect the county and township against damage suits that may arise as the result of the company's negligence.

Judge Howe refused the restraining order, petitioned for by the Indianapolis cable company, against the city of Indianapolis, to prevent the latter from interfering with the construction of a line up Tennessee st. The opinion was brief, and is as follows:

"Shortly stated, the prayer of the plaintiff is that the hands of the city officers may be tied while it digs up N. Tennessee st. for the purpose of laying down a railroad track, to be operated in some way not yet determined upon.

"There are various reasons disclosed why it is extremely doubtful whether the plaintiff is entitled to the temporary injunction prayed for. If erroneously granted, the injury to the city would be far greater than the injury which can result to the plaintiff if the injunction prayed is erroneously refused. In such a case it is well settled that a temporary injunction will be refused.

"I again call attention of the city council and board of aldermen to what I have already twice said in regard to the urgent necessity of enacting an ordinance vesting in some board or officer supervision of all work done by street railroad, gas, water and other companies or persons, requiring the tearing up of the city streets, and providing reasonable rules and regulations for the doing of such work, which will prevent conflicts between such companies and protect the rights of the city. The primary purpose of streets is to provide thoroughfares for the use of the public generally. Subordinate to this purpose is the use of the streets for street car tracks, gas and water mains, telegraph and telephone lines, and other uses of them by private corporations.

"It is, therefore, necessary the city should adopt reasonable rules and regulations, not only to protect the paramount rights of the public, but also to prevent any corporation having a right to use the streets for its purposes from so exercising its right as unnecessarily to interfere with the rights of other corporations to use the streets for their purposes.

"The right of the city to make such rules and regulations, notwithstanding any grant which it may heretofore have made to any corporation, is too well settled to be longer the subject of controversy.

"As it is now, the only way of settling conflicting claims to the use of the streets seems to be to fight them out, steal a march on rivals in the night, or rush to the courts for an injunction, and usually in such contests the rights of the general public are wholly ignored by the contestants. The general rights of the public are superior to those of all these corporations, and should be enforced by appropriate legislation."

Messrs. S. W. Allerton, S. B. Cobb, C. H. McCormick, M. C, J. J. Mitchell, L. L. Coburn, C. B. Holmes, J. B. Rumsey, W. B. Walker, and E. K. Butler, constituting the heaviest stockholders in the Indianapolis Street Railway system, reached here on the 13th inst. and made a thorough inspection of their property. They appeared to be much pleased with the management of the property by Supt. Shaffer. At a meeting of the stockholders of the road, held at the Bates House after the inspection, Mr. J. S. Schaffer was elected president, S. W. Allerton, vice president, and A. A. Anderson, secretary and treasurer. The question of improvements was discussed, but the general opinion was that the attitude of the council was not such as would encourage them in authorizing the expenditure of so much money.

The question of the adoption of electricity was brought up, but as the company's charter expires in twelve years it is doubtful whether electricity will be adopted unless the company is assured of the extension of its charter.

IOWA.

Des Moines—The end of the horse car street railway service in this city is nigh at hand. Not only this, but there is to come to Des Moines influences bringing the interest of wealthy men and eastern capital to the city.

A rumor lately obtained to the effect that the Des Moines Street Railway Co. had sold out, that the narrow gauge system is to be turned over to eastern people. Mr. Frank A. Sherman, secretary and manager of the company, said:

"I was in Cincinnati a short time ago and made a proposition to Col. George B. Kerper for the sale of about four-fifths of the stock of the company. It was accepted a few days ago and a representative of the company will be here soon to look the field over. I had said nothing about it, but I do not know that there is any

need of further concealment. The bargain is consummated. Col. Kerper is no less a person than the foremost street railroad man in the country, the head of one of the leading cable railways in Cincinnati, the Mt. Adam & Eden Park railroad, which has built several miles of railroad lately. He is also the President of the American Street Railway Association, which is an organization of all the street railways of the country and a very powerful society. He has with him interested in his railway enterprises, a number of capitalists, men who have entire confidence in his ability in that line, and they all become interested in this way in Des Moines. The new company will have abundant capital to put in just what it wants and to make such improvements as are necessary.

It intends to put in electricity or cable, or whatever it thinks best. If it believes there is room for a cable it will put one in. I have realized for more than a year that rapid transit is necessary, that something besides horses must be used. I have not attempted to conceal this fact from them in my dealings, and the new company therefore takes hold fully realizing the situation. They take possession just as soon as they are ready.

The stock owned by Mr. Sherman, Mr. McCain and several others is to be all transferred to the new owners, and they will have a controlling interest. For nearly three years the present company has operated the narrow gauge system. They made some wonderful changes in the character of the line and of the service given, and did the best that could be done by horse power. New cars were purchased, new and better horses, the tracks were renewed and relaid; but the advent of rapid transit has changed the demands of the people and the road must change also.

MICHIGAN.

Grand Rapids—The city council of this city recently considered a communication from the Street Railway company, giving a resume of its reasons for asking for the Blakeley and Jefferson avenue line. It estimated the expense required to run the road according to the amendments added to the ordinance at the last meeting as requiring 2,500 passengers per day to pay expenses, and claiming it would be run at a loss for several years. The proposal, it stated, was made to accommodate the public, and it would be pleased to accept the ordinance first asked for, but it would not accept the franchise as amended, for the reason that it imposed burdens aside from any connection with the franchise asked for, and including conditions not heretofore imposed upon either of the street railway companies in the city.

MINNESOTA.

Duluth—The organization of the Metropolitan Street Railway company of Duluth, is a move in the right direction, and the petition recently presented to the council, signed by some 1,200 representative citizens, indicates that its timeliness and importance are appreciated. Some months ago representatives of Chicago capitalists who came to Duluth to buy some city bonds, remarked to a local banker: "Your bonds would sell better if you had better street car service and more of it." This is the view held by those who see the matter just as it is, and are not moved by prejudice or interest. Business feels the utter lack of facilities in this direction.

The eastern end of the present street car track is two miles west of the new cemetery. If the Metropolitan company build it is its intention to run a line from Fifth avenue west on Superior street up the hill to Fourth street, thence east on Fourth as far as the grade of the street will allow towards the cemetery. The motive power will be electricity, compressed air, Prosser's, Connelly's, or the Patton independent motor will be adopted, and the cars be run at a high rate of speed.

Stillwater—The officers of the street car company say that the line will be constructed along the same route as originally proposed—down Main street to Chestnut, thence to Third, to Burlington, to Fourth avenue, thence to South Stillwater. They have been offered material assistance to go south farther on Main street, but at present the proposition can not be considered. They will push the work steadily to completion, and will leave all streets in as good condition as they find them. Should the line have been built along Commercial and Myrtle street to Third the business center would go farther north on Main street than it is at present. In almost every case where the street cars are run business has been built up along these streets, leaving the older established ones, where the business men objected, thinking it would spoil the streets and drive business away.

All work has ceased temporarily on the electric street railway, owing to the action of the city council in passing a resolution that no T rails shall be used inside the city limits. The company had arranged to have T rails from the corner of Burlington street and Fourth avenue to South Stillwater, and part of the distance is within the city limits. The T rail is no higher than the other rails and not a whit more difficult to cross, but a wagon can not run alongside of them as well, owing to the crossing of the ties, although the spaces between them are filled solidly and is as firm as any part of the street. Another point raised is the planking under the pavement, between the rails on Main street. The company objects to this, as it does not make as good a roadbed as if the blocks were put directly on the sand, which is made so firm as to resist any pressure, and in addition, the blocks are laid a little higher, and the same heavy pressure brings them to a level. It would also facilitate the ease with which repairs might be made, and instead of a sixteen-foot plank having to be removed, here you have only half that length to remove to reach water mains or gas. This plan has been adopted in Milwaukee, Omaha and other points, and the gentlemen who are building the lines are practical. It was said that the cutting up of Third street would destroy it as a thoroughfare, but such is not the case. Even already, with only part of the work done, the street is smoother than it has ever been, and the rails prove no detriment to street traffic. It is to be hoped that the difficulty will be arranged at once, and that the work will be completed in its entirety without further delay.

MISSOURI.

Kansas City—The negotiations which have been pending for some time for the purchase of the Metropolitan Company's Independence av. horse car line by the Blue Valley Cable Railway company were practically closed yesterday, and the deal will be consummated within a day or two. The price has not yet been definitely settled, but the figure fixed by the Metropolitan company is $75,000, and is about what will be paid by the purchasers. The Blue Valley Cable Road company is an outgrowth of the company which took up the Highland avenue franchise after the Metropolitan company had abandoned it, and comprises among its stockholders Captain T. A. Harris, W. H. Winants, E. L. Scarritt, W. C. Scarritt, A. W. Armour and others. The purchasers intend to convert the horse car line into an electric motor line. The present line extends from Fifth and Walnut streets to Woodland avenue, running on Independence avenue, east of Grand avenue. From Highland avenue the line will be extended north to Phelps avenue thence east to Maple avenue, thence north to Lexington avenue, thence east to Bellefontaine avenue, thence north to St. John avenue, thence east to the city limits, the necessary franchise for this extension having been granted by the council last week.

Bids are now being received for the construction of the new portion of the road, but the officials of the Blue Valley company are not yet able to say where the power house of the line will be located or what system of electric motors will be used.

It is probable that the negotiations for the sale of the Independence mule car road, which have been pending for several weeks, will be closed at an early day. It has already virtually passed from the hands of the Metropolitan company, although no cash has been paid over as yet. The road in question extends from Fifth and Main to Independence and Woodland. It is a short line and has not proved a very good paying investment since the Independence avenue extension of the Kansas City cable road shut it out from a territory that is rapidly developing.

The Blue Valley Cable Railway company, which recently secured a valuable franchise from the city council, will build an electric road from Woodland avenue, the present eastern terminus of the road, through the north eastern terminus of the city. The two lines will then be consolidated and operated by the "East Side Street Railway company." It is the intention of this new company to put about $250,000 into the line, and when completed it will be one of the best equipped electric roads in the country.

St. Louis.—Alex Martin of the firm of Martin, Laughlin & Kern, recently representing the newly incorporated Union Avenue & Forest Park Railway, applied for an injunction against the St. Louis Cable and Western Railway. A long story is attached to the proceeding. The Union Avenue company has been organized to operate a road running from the tracks of the St. Louis Cable & Western Railway just east of Union avenue, southwardly and some distance east of Union avenue until the north line of Forest Park addition, formerly Griswold track is reached, where the track diverges west under Union avenue and then continues south to the north line of Forest Park. The ordinance granting this company the right of way mentioned, also granted them the right of way of the tracks of the Narrow Gauge to Vanderventer avenue, where the cable road terminates, provided they could secure a contract with the company operating that road. The contract was secured, the new road was granted the use of the Narrow Gauge tracks and the ordinance was approved. Now comes the trouble. In compliance with a unanimous and popular demand for the removal of the Narrow Gauge steam cars and the laying of the cable road, by the people of that thickly populated ward, the owners of the road decided to accede to the demand and extend the cable to Union avenue. It was rumored out in the Twenty-eighth ward that the building of the cable road would be begun this month. The Union Avenue Co. have the right to run over the tracks to Vandeventer avenue come to court and ask that such action be prevented, as they claim it will do them great damage.

There is a peculiar feature about this maneuver which is not particularly clear. Martin, Laughlin & Kern are attorneys for the Cable & Western, yet the head of the firm applies for an injunction against it. It has also been generally understood that the Union Avenue company was but a healthy sprout from the Cable & Western, manager, controlled and owned by the same officers and stockholders. Martin claims they are separate and distinct companies.

On May 1st, an important issue of street railway stock was made. The Missouri Street Railway company issued five per cent bonds to the amount of $200,000 for the purpose of extending its line from Sarah street, the present terminus, to Forest Park. The old stockholders had the privilege of taking their stock at par. The stock is quoted at $250 a share, with no offers. When completed the road will be 4¾ miles in length.

The Senate has passed the McGinnis bill requiring street railways to permit passengers to get off and on at both ends of the car. The bill applies only to St. Louis.

A big damage suit, in which Mrs. Fanny Kraper, of Metropolis, Ill., was plaintiff, and the Forest Park, Laclede and Fourth Street Railroad was defendants, was recently decided in the United States Circuit Court, the jury returning a verdict for the full amount sued for—$15,000. The complaint filed by the plaintiff shows that on the 2d day of last October Mrs. Kraper, while on a visit to the city, boarded a bob-tail car on the extension of the Forest Park road, and when at Taylor avenue she signaled the driver to stop. The order was obeyed, but before she had stepped from the rear step the car started, throwing her and a baby she carried in her arms with great force to the street. She was rendered unconscious by the fall, and received a severe fracture of the hip which may prove a life injury. She has been unable to move about without crutches. Several physicians were examined in the case some claiming that the woman was crippled for life, while others testified that it was their opinion that she would recover in the course of time.

MASSACHUSETTS.

Holyoke.—The directors of the street railway company have voted to accept the route granted them by the aldermen for the extension of the tracks to Elmwood, and have instructed Treasurer Loomis to contract for the labor and material. The work of laying the track will be begun at once and will be pushed as rapidly as possible.

NEBRASKA.

Omaha.—The board of public works has granted the Omaha Street Railway company permission to lay double track on North Twenty-fourth street from the south side of Birney street to the south side of Spencer street. The company will of course pay for the cedar blocks torn up.

The Omaha Motor company has filed an application with the board of public works, asking permission to lay track on Sherman avenue from the south line of Locust street to the north line of Wirt street or so far as the pavement extends. The same company asks permission to lay double track on Sherman avenue from the south side of Ohio street to the south side of Locust street.

It also has asked permission to lay track for two blocks north on Twenty-seventh street to Miami street, one block west on Miami street to Twenty-eighth, and one block north on Twenty-eighth, being four blocks, for the purpose of connecting with the line on Twenty-seventh and Lake streets. The request states further that the company intends to built on Twenty-eighth to Cassius and on Cassius street to Thirtieth and north on Thirtieth to the city limits.

Plattsmouth—At a recent meeting of the Plattsmouth Street Railway company, it was decided to operate the line by electricity with overhead wires, and the contract has been placed with the Sprague Co.

NEW HAMPSHIRE.

Concord—The directors of the Concord, N. H. Street R.R. propose to adopt electricity as a motive power on their line.

NEW JERSEY.

Newark—There seems to be a good prospect that Newark will soon have effective cable roads. The directors of the new company have for some time been quietly securing the consent of the property owners on Avon avenue, Belmont avenue, Kinney street and Washington street, for the construction of the road through those streets. They have already secured a majority of the property owners on Central avenue, and have now secured more than a majority both on Belmont avenue and Kinney street. The work on Washington street is progressing rapidly, and in a few days the company will be prepared to present to the Common Council their application for permission to lay their tracks in these streets. The property owners and the people along the line have shown great interest in the proposed road, and those who have been seen have almost unanimously signed their consent to the construction and expressed themselves as ready to do all in their power to aid the enterprise. The effect upon Washington street will probably be more radical than upon any of the other streets. While it is already a business street, up to this time it has not been considered desirable for the larger business enterprises. It is probable that the building of the road will largely increase its value, and will make it rank nearer to Broad as a business street. Broad street is already completely occupied by business houses from Franklin street to Belleville avenue. The price of property near the centre has reached so high a figure that only a few of our business houses care to invest in the property, while prices on Washington street have remained about stationary. A comparison of the value of property on Broad street with that on Washington street was made at the request of some property owners last week by real estate agents Burgess, Runyon, and Burnett. Each differed somewhat in detailed figures, but all agreed that the value of property on Washington street averaged about one-tenth that of Broad. As it is a parallel street and has many advantages possessed by Broad street it is claimed, with reason that it only needs development to bring its property value up to a figure nearer that prevailing on Broad.

NEW YORK.

Brooklyn—What is said to be a part of a conspiracy to defraud surface railroads in this city and Brooklyn, by means of bogus accidents, followed up by genuine suits for injuries, was discovered a few days ago by Henry W. Slocum, Jr., the acting president of the Brooklyn Cross-town road. The principals in the alleged conspiracy were arrested. One of them is Arthur P. Carlin, a lawyer, with an office at 346 Fulton street, and a residenceat 454 Seventeenth street, Brooklyn.

He was counsel last fall in the suit brought against the Cross town road by Mrs. Henry C. Dubois, who lives with her husband at 205 Prospect avenue. Henry Dubois was at one time starter for the Atlantic avenue road at the Flatbush avenue station of the Long Island railroad. On July 10 last, his wife was injured by falling from a Cross-town car at Park and Washington avenues, and Lawyer Carlin took her case. His principal witness was Charles Carlstrand, a discharged driver, who lives at 335 Seventeenth street. This man swore that the car started before Mrs. Dubois could get off. The jury gave the plaintiff $250.

Mrs. Dubois, her husband and Carlin were arrested on warrants issued by Judge Moore. Carlstrand was then under arrest. Mr. Slocum is the complainant, and he charges that the prisoners conspired together to get money out of his company, and have done the same toward companies in this city. The prisoners were locked up in the Adams street station house, and will be arraigned in court to-day.

OHIO.

Cincinnati—Colonel George B. Kerper's new electric road was recently started on a trial trip and gave satisfaction. The trip was made from the cable driving station along the line of and to the terminus of the Oak street branch of the road. The only difficulty experienced was in crossing the flat rails of the cable road. Here the cars did not run so smoothly, but it is expected that the evil has since been overcome.

Mr. Kerper has closed an agreement with the stockholders of the Montgomery pike whereby his electric road will be run out the Montgomery pike as far as Norwood. For the sum of $1 and other considerations he secured the right of way to six feet on either side of the pike from the present terminus of the cable road to Norwood—a distance of over a mile. He will begin building the road at once.

The electric road out Colerain avenue is nearing completion. All the poles as far as Knowlton's corner will be in place this week. Work on the foundation of the power-house at Brighton has been commenced and the contract for the foundation for the engines has been awarded. The 350 horse-power engine is now being constructed in Hamilton, and the three 80 horse-power dynamos are on the road here from Boston. Unless something unexpected happens, the road will be in operation by the 1st of June.

Cleveland—Jacob Kahn has commenced proceedings in the United States Circuit Court to recover the title to a street railway patent. The defendants in the suit are Sol Schwab, B. Mahler, and E. D. Sawyer. Kahn says that on July 3, 1888, he was awarded a patent for an improvement in street car motors, and in August Messrs. Schwab and Mahler undertook to form a company for the manufacture of the motors. He says that they said that nothing could be done unless they were given a controlling interest in the patent, and he finally agreed to give each eighth interest and Mahler a half interest in trust, retaining only a quarter interest for himself. They failed to fulfill a promise to organize a company within a few weeks, and on January 2, when Kahn demanded the restoration of his patent, he found that the title had been transferred to Sheriff Sawyer. He claims that their intention is to get the patent from him, and he asks that the title be restored to him. His plan is to operate street cars by means of compressed air.

Tiffin—The Tiffin Railway company has increased its capital stock to $50,000. It has also ordered twenty more cars, eighty horses and 60 tons of rails, and will build an east and west line and an extension in Highland addition at once. The new company took charge of the line a month ago.

Columbus—The proposed Columbus Belt Railroad company has increased the stock of the concern to $1,000,000, on paper at the office of the Secretary of State.

Zanesville—The basis of the sale of the street car lines to an Eastern syndicate is $70,000. The gauge is to be widened and the cars operated by electricity.

OREGON.

Albany—The contract for constructing the first mile of the Albany Street Railway lines was let on the 23d ult. to W. E. Kelley, for $4,200, the contractor to furnish all the material.

Salem—Work has been commenced on building an extension of the street car line north.

The Oregon Land company is grading on its line to the state fair grounds, upon which a street car track will be built immediately.

Portland—A petition is being circulated asking the council to annul the franchise allowing the Transcontinental Street Railway company to build their road down North Twenty-first street from G. to S. Persons circulating the petition claim that the company have forfeited their franchise, but Mr. Tyler Woodward, superintendent of the company, says this is not so, as the franchise calls for the completion of the road within one year after the street is improved by planking or macadamizing.

Just how a franchise is to be annulled under the circumstances it is difficult to imagine. The company have built stables on S street on the strength of this franchise at a cost of $16,000, and will hardly care to abandon the line.

It is understood that the real motive of the persons asking to have the franchise of North Twenty-first street annulled is to force the company to build on another street. It is quite probable that some other street would suit the company as well, but some other plan for inducing them to make the change would be more likely to prove successful.

PENNSYLVANIA.

Carbondale—At a recent meeting of the common council it was resolved: That the President of the Electric Street Railway be served with a notice that the rails of said electric road are to be torn up and that all rights and privileges heretofore granted by councils to said railways were declared null and void.

Philadelphia—A very successful experiment of the electric car motor of the Electric Car company of America was made lately on the Germantown branch of the People's Passenger Railway.

The combined weight of the passengers was about 4,500 pounds, batteries 5,000 pounds, and the machinery 1,500 pounds. The run was made to the upper depot in Mt. Airy in exactly fifty minutes, or seven minutes less than the regular schedule time. All the heavy grades, particularly that at Negley's Hill, were gone over without difficulty. This car was not intended to run up hills, only a single motor of fifteen-horse power being supplied. In about two weeks' time another car with two motors will be tested, which is expected to do better work.

The lower depot was reached in forty-two minutes, or six minutes less than the regular time. The motor worked very noiselessly and emitted no sparks. Gibson's batteries were used, which are considered the best.

Pittsburgh—The City Bridge company, of this city, has been chartered. The capital stock is fixed at $100,000, and the bridge is to be built not nearer than 250 feet of any existing bridge. It is to be exclusively for traction cars and is to be used by any of the Pittsburgh companies that desire to use it. The stockholders are Joshua Rhoades, president; F. C. Hutchinson, treasurer; George C. Wilson, George Rice, A. C. McCollom, Jr., and J. A. McDevitt, of Lancaster.

Under the re-organization of the Pleasant Valley Passenger Railway company the capital stock is increased from $100,000 to $1,000,000, each stockholder receiving ten shares of new stock for one share of the old. No change is to be made in the route as at present followed, and it is expected the road will be in operation as an electric line by September 1.

Scranton—The People's Street Railway Co is offering the large car barn on Linden street for sale. The price is $40,000. It is purposed to erect a barn on the outskirts of the city, where assessments will not be so heavy.

It is the intention of the company to give an increased service by the addition of numerous summer cars. All of the cars have been ordered and are being constructed. Some of them will have thirty horse-power motors, capable of pulling an extra car if necessary. The power house is to be enlarged on account of the demands which will be made on it.

The New York syndicate of which President Bacon, of the People's line, is at the head, has just purchased two roads at St. Joseph, Missouri, and is putting in an electric plant that will not only furnish these roads and the other principal roads with power, but furnish the city with street lights.

RHODE ISLAND.

Newport—G. F. Mellin, of Fall river, has disposed of his interest in the Newport Street R. R. Co., and will resign as a director.

Providence—The report of the joint committee on railroads relative to the petition of the Union Railroad company, to operate its cars upon the city tracks by electric motors with storage batteries, states that it finds by personal examinations and tests, that the cars are safe, convenient and easily operated. Believing that the proposed system would commend itself to the public, the committee unanimously recommend the passage of an ordinance granting the permission.

The ordinance was passed.

Woonsocket—The Woonsocket street railway bill, enabling the company to enter and operate cars in Blackstone, recently passed the Massachusetts house, under a suspension of the rules.

SOUTH CAROLINA.

Greenville—The Greenville Street Railroad Co. contemplate the adoption of electricity as a motive power.

TENNESSEE.

Knoxville.—The Mabry Bell Ave. & Harder St. Ry., the Market Square & Asylum St. Ry., and the Knoxville Street Railroad Co., of this city, have been consolidated into one company, under the name of the Knoxville Street Railroad Co., with office 336 Broad street. The officials of the company are John S. Van Gilder, pres; S. H. Davis, sec. and treas; John Madden and L. O. Rogers, supt. The company is now building line on William street, Fifth and Fourth avenues.

TEXAS.

Fort Worth.—E. E. Chase, of the Houston street line, has leased for his company the ground occupied by the base ball park, and in a short time the power house for the electric railway and coach houses for the fifteen elegant Pullman cars will be erected thereon. The engines, boilers and dynamos for the electric motor line have been received.

VIRGINIA.

Roanoke.—M. M. Rogers and others, have bought the Roanoke Street Railroad.

WASHINGTON TERRITORY.

Seattle.—The Front Street Cable Railway company has decided to extend its line north, for about two miles, if a subsidy sufficient to warrant its construction can be secured from the owners of property along the line of the extension. The route adopted is along Poplar street eight blocks, thence west one block to Kentucky street, thence north to View street, where the course turns into Lincoln, and the route resumes its northerly direction to its terminus.

The new road will be constructed substantially of wood and iron. It will be single track and broad gauge, with turnouts. No great difficulties of engineering are presented in the course. Queen Anne hill will be surmounted by a grade of 20 per cent., and some minor cuts and fills will have to be made. The terminus of the proposed line is several hundred feet from Lake Union and near the flourishing town of Tremont. The construction and operation of the line, it is estimated, will treble the value of the property north of Queen Anne town, and it is expected, therefore, that property-holders will be willing to contribute quite liberally toward the construction of the line. The subsidy asked is quite a large one, inasmuch as the company expects to operate the line for some time at a loss.

The cost of the road will be about $125,000. It will be operated probably by the same machinery that now runs the Front street line. There will be two distinct cables, and it is likely that the one on the new extension will run faster than that on the Front street line, as it will be more of a "through line," not subject to so many stops.

The Seattle Electric Railway and Power company yesterday filed with the county auditor a trust mortgage to the Boston Safe Deposit and Trust company, of Boston, Mass., covering all its plant, franchise, right-of-way, etc., to the amount of $175,000. The mortgage is made to secure the issue of bonds to that amount, ordered by the board of trustees of the company on January 14.

Vancouver—This morning the Columbia Land and Improvement company, to whom this city granted a street car franchise, have broken ground near the ferry landing, and as all the rails are already on the ground, it is expected that that part of the route from the landing to the garrison will soon be completed and ready for travel.

WISCONSIN.

Milwaukee—Pres. Rumsey, of the Milwaukee & Wauwatosa Motor Ry. Co. is in the East studying the motor power in use on general systems of railway. Enough stock has been subscribed to ensure the construction of the road, and the promoters believe that they can complete the road by the first of July. This will enable people to use it in going to the Soldier's Home and Calvary Cemetery during the great encampment. Recently eastern parties made a proposition to take all the stock and bond the road, but it was declined, the promoters thinking they could dispose of all the stock in Milwaukee.

New Enterprises.

ALABAMA.

Anniston.—The Anniston, Oxford & Oxanna Street Railroad company has consolidated with the Minnelulah Lake company, and will extend its road and operate with dummy engines.

Gadsden.—A syndicate of capitalists has purchased the dummy line and will extend it to Beach Creek Falls, and build a new track to Atalla

Fort Payne.—The Fort Payne Land & Enterprise company has been organized with John R. Shields, of Birmingham, president; F. S. Ferguson, of Birmingham, vice-president, and E. W. Godfrey, secretary. The capital stock is $200,000. It will build and operate a dummy line.

Oxford.—The Oxford street car line will be extended to Oxford lake. The Oxford Lake company and Street Car company have consolidated and now form a strong company backed by plenty of money. The line will be extended into Anniston over Wilmer street to Tenth street.

ARKANSAS.

Argenta.—D. J. Nichols, Louis Reinman and others have incorporated the Little Rock & Argenta Street Railway company with a capital stock of $20,000. Will start work at once.

Mammoth Spring.—The Mammoth Springs Water, Light and Motor company was organized here lately, capitalized at $50,000. Incorporators are, Robert Greer, president; Thomas Star, vice-president; E. F. Brock, secretary and treasurer. The directors are Robert Greer, E. F. Brock, P. P. B. Hinson, Thomas Star, F. M Daniels. The object, among other things, is the building of a street car line.

CALIFORNIA.

Alameda—Theodore Meetz has been granted a new franchise to build and operate a street railway through Park street. It is to be completed and in running order within a year.

This is a link in a system to connect Alameda with East Oakland.

Marysville — Articles of incorporation have been filed with the Secretary of State, of the Marysville and Yuba City Street Railroad company. The directors are D. E. Knight, W. T. Ellis, J. H. Jewett, L. T. Crane and S. H. Bradley. The capital stock is $50,000.

Los Angeles—The Cable Railroad at Los Angeles is to be extended on Seventh street, Grand avenue, Boyle Heights and Downley avenue.

Pueblo—The Pueblo Street Railroad company is now extending a line up Victoria and Grant avenues, and also a line on Eighth street which will run to East Pueblo. A big force is at work and work is being pushed on to completion.

San Diego—A franchise for a cable road has been applied for by George D. Copeland and others.

San Francisco—For some reason the Street Committee of the Supervisors has decided not to report at once in favor of the petition of the North Beach and Mission Street Railroad company.

The franchise asked for is for a street railroad, either cable, electric or horse power, from Twenty-sixth and Folsom streets, along that thoroughfare to California avenue, to Columbia place; thence to Precita avenue, to Army street, and on Army street to Colusa street; thence to San Bruno avenue and Cortland avenue. Also on Twenty-sixth street, from Folsom street to Bryant avenue. Another branch is to run on Potrero avenue, from Army street and Potrero avenue to Twenty-fifth street and Bryant avenue, thence on Twenty-second street to Folsom. Still another proposed branch is to be along Bryant avenue from Twenty-second street to Channel; thence to Bryant street, to Spear and Folsom; also a line from Eighth and Bryant streets, along the former thoroughfare to Folsom street. Another branch provided for is to run from Bryant street, along Second to Folsom; thence along Folsom to East street and the ferry landing

The California Street Cable R. R. Co. has been incorporated to operate a cable road of five feet gauge over about eight miles of track.

Articles of incorporation of the Universal Street-indicator company have been filed. Directors — Charles E. Larabee, J. J. Scrivner, M. G. Loefler, Joseph A. Vaughan, J. L. Cahill, Thomas F. Garber, H. F. Larabee, C. W. Annager, Esrael Levinson, R. S. Colvin and John L. Boone. Capital stock, $300,000, divided into 300,000 shares, all of which has been subscribed.

CANADA.

Windsor—From present appearances there will be another street car line to Walkerville. Mr, Wm. McGregor, owner of the Sandwich line, will, if the council give him a franchise, build a line to connect with his Sandwich road. He proposes to run the road out Ouellette avenue to Wyandotte, and then directly eastward to the L. E. & D. R. R. R. station or else will run down London to Glengarry and then up Wyandotte. The present road does not run near the railway station, and as Mr. Walker would like to see the southern part of the county leave their trade in Windsor it is altogether likely that the road is a foregone conclusion.

DAKOTA.

Yankton—R. F. Pettigrew, of Sioux Falls, has been granted a charter for twenty years for a street car line on all the streets of Yankton, and work will commence immediately on two miles of track. The motive power will be electricity.

GEORGIA.

Americus—The capital stock of the Americus Street Railway company is $50,000, and has been all subscribed for. Eight miles of railway will be constructed, work upon which is already under headway. The road will be of standard gauge and electric motors operated under the Thomson-Houston overhead system will be used thereon.

Rome— The North and South Street Car Line Co. will change its line to a dummy road.

Waynesboro—W. A. Wilkins, J. H. McKenzie and P. L. Corker are the incorporators for a street railroad in Waynesboro. Application for a charter will be made to the superior court at the June term. The city council has consented to grant all the privileges called for. The capital stock will be $4,000, divided into forty shares of $100 each. Nearly all the stock is already taken, and there will be no difficulty in placing the balance. The proposed route of the road will be up Liberty street from a point below the store of McCathern & Co. to Stone street, in the upper part of the city, and from the depot to Liberty

street, and probably down Whitaker street. Cars will be provided for both freight and passengers, and the drayage business of the merchants will be done by the road.

IOWA.

Marshalltown—Articles of incorporation for the Marshalltown Passenger Railroad company, capital $25,000, have been filed. It will be a horse car line.

KANSAS.

Warrensburg—M. K. Bowen, E. P. Bates and Frank H. Dexter of this city, have filed articles of incorporation of the Pertle Springs Railway company. The capital stock of the company is $25,000 and its object is to build a dummy line from Warrensburg to Pertle Springs.

More than one-half of the stock has already been placed and the road will be in operation by the time the summer season begins.

KENTUCKY.

Bowling Green—Work has been commenced along the line of the Park City Street Railway Co. at this point and will be pushed through to completion.

MINNESOTA.

Duluth—A rumor is current here that a syndicate of capitalists, headed by Thomas Lowry, is buying property on the hill top, with the idea of booming it by building a cable line up the hill on Sixth avenue west, starting at the Union depot. The scheme is said to have been hatching for some time and that the strike at St. Paul and Minneapolis compelled a halt in the matter. The council committee will soon further consider the application for an order forcing the street car company to build a line on Fourth street, and it is thought the company's intentions in regard to a line up the hill will then become known.

The Reversible Cable Grip company, a full description of whose device appeared in our last issue, has been incorporated. The incorporators are: A. S. Chase, W. C. Sargent, Frank Burke, Jr., T. W. Lemieux and S. G. Stevens. The capital of the company is $100,000, divided into 1,000 shares, of $100 each. The officers are: Timothy W. Lemieux, president; A. S. Chase, treasurer, and Wm. C. Sargent, secretary. The company is the owner of the Lemieux & Stevens' patents, for reversible cable grips.

The object of the company is to manufacture, or sell the right to manufacture, these and other patents of every kind in connection with cable cars and cable roads.

MASSACHUSETTS.

Hull—The Hull Street Railway company has acquired the right to locate for a single track, the route to be as follows: Beginning at the wharf of the Hingham, Hull & Downer Landing Steamboat company, crossing the tracks of the Nantasket Beach Railroad company to Atlantic avenue; thence to the boundary line of Cohasset, via Atlantic avenue and the county road. Also beginning on Atlantic avenue, at the head of the steamboat wharf, and running northerly along the county road, known as Atlantic avenue, and Main avenue to a point near the station of the Nantasket Beach Railroad at Point Allerton. The consent of the railroad commissioners must be obtained to crossing the track of the Nantasket Beach Railroad, and before the location can be fixed it must be settled that the tracks will not interfere with the Hingham Water company's pipes. The capital stock of the company is to be $20,000. The stockholders are Horace B. Parker, William H. Long, John Shepard, Andrew F. Reed, John W. Hobart, Edwin Reed, Thomas Leavitt, Henry Norwell, Edward P. Shaw, W. B. Furguson and Henry D. Hyde.

Waltham—The Newton Street Railway Co. has been granted a location for its tracks and the right to operate by the overhead single trolley system and electric motors, provided the system be in running order within one year from date.

MISSOURI.

Kansas City—The Continental Cable and Gripper company has been capitalized at $1,000,000, all of which is already taken. The object of the company is to handle the Terry grip patents. The chief stockholders are the inventor, Mr. Terry, M. M. Broadwell, of New York, president of the Union Avenue Cable line; Edward Curd, a prominent banker of Fulton, Mo.; John Montgomery, of Sedalia, George Jackson, of Sedalia, and A. W. Nesbit, of Pomona, Cal. The eastern office of the company is at 11 Wall street.

The Terry patent grip is to be used on the new Union avenue line. Five cars are being manufactured in St. Louis, and will be put on the line as soon as it is in runnning order.

The ordinance amending the ordinance granting the Blue Valley Street Railway company a franchise for a cable road on Highland avenue, Woodland avenue and other streets from Independence avenue to the eastern city limits has been passed by the council after some slight amendments being made thereto. The original ordinance introduced into the council some five months ago granted the company a right of way on Fifth street and Woodland avenue, and allowed the company eight months in which to begin the construction of the road. The old ordinance has been indefinitely postponed and the amended one passed. It substituted Phelps avenue instead of Fifth street and Maple avenue instead of Woodland avenue, and requires the company to begin construction of the road within ninety days from the time of the passage of the ordinance.

St. Joseph—At a recent meeting a resolution was passed by the directors of the Union Street Railway, directing the secretary to call a meeting of stockholders to consider a proposition to increase the bonded indebtedness of the company from $75,000, what it is at present, to $250,000.

The additional money to be obtained by the Union company from the sale of bonds will be used in making improvements of different kinds and building branches which are now being contemplated by the company.

St. Louis—The Newstead Avenue Railroad company has filed articles of incorporation in the office of the Secretary of State. The capital stock of the company is $250,000; the shareholders and incorporators are Henry Dickkrueger, 2,465 shares; E. L. Buschman, E. Hayden, Robert M. Jennings, R. L. Henry, Joseph T. Donovan, Marcus A. Wolf and George W. Cale, all of St. Louis, five shares each.

The object of the organization of this company is the construction, maintenance and operation of a railway of the gauge prescribed by general ordinance of the City of St. Louis to and from a point in the City of St. Louis, at or near the intersection of Olive street and Newstead avenue, northwardly along Newstead avenue to Carter avenue; thence northwardly over, along and across intervening streets, alleys and city blocks between Bircher avenue and Florissant avenue to the city limits. It may be operated by electricity, cable or such other motors as the company may agree upon.

NEBRASKA.

Omaha—The city council has passed an ordinance granting the Cable Tramway company of Omaha a franchise for their street railway, which will extend under conditions for forty years.

NEW YORK.

Niagara Falls—The subject of electricity as a motive power for the operation of street railways is attracting the attention of the local company. L. F. Mayle and Thomas McGarigle of Falls, and Konrad Fink and Denby Waud, of Suspension Bridge, left Thursday afternoon for Boston to inspect the electric operation of street railways there. Messrs. Mayle and Fink are directors of the Niagara Falls & Suspension Bridge Street Railway, and Messrs. McGarigle & Waud are trustees of the villages of Niagara Falls and Suspension Bridge respectively.

NORTH CAROLINA.

Spartanburg—A franchise has been given the company lately organized to build an electrical railroad to Clifton. A. H. Leftwich, of Greensboro, N. C., is interested.

OREGON.

Baker City—The Baker City Street Railway company has been incorporated by John Geiser, Henry Rust, E. Silver, H. Dale and T. Calvin Hyde.

Portland—The Oregon Water and Street Railway company has been incorporated by C. H. Larrabee, C. H. Prescott, Ellis G. Hughes, and H. Y. Thompson. The object is to furnish a water supply for East Portland and Albina, and to build a street railway between East Portland, Portland and Albina. The capital stock is $100,000.

The city and West Portland Park Motor Company has been incorporated by E. T. Howes, F. E. Ferris and J. E. Bennett. The object is to build a motor line from Portland to West Portland and West Portland park and to any other point in Multnomah, Clackamas, or Washington county. The capital stock is $50,000.

OHIO.

Lake Side.—The Lake Side Street Railway company, has been incorporated; capital $15,000.

Franklin.—The name of the Franklin Electric Railway, Light and Power company, has been changed to the Franklin and Carlisle Railway company.

Fremont.—The Fremont Street Railway company, of Fremont, O., has been incorporated, capital stock $100,000.

Tiffin.—The sale of the Tiffin Street Railway was consummated on April 18, and the line was formally turned over to New Bedford, Mass., and Toledo, O., capitalists. The price was $25,000. Several new lines will be built at once and new cars will be put on all.

Toledo.—The Toledo Electric Street Railway company, of Toledo, O., has been incorporated, capital stock $500,000.

PENNSYLVANIA.

Easton—If present plans succeed Easton will soon have a line of street car rails from Sixth street through Northampton to Seventeenth street, thence to Washington street. This will enable cars to be run to South Easton every ten minutes, and through Washington and through Northampton streets every twenty minutes, in both directions. The money is to be raised by selling trip books containing 500 tickets for $25. This tickets will also be good on the electric road.

Harrisburg—A opinion was recently handed down by Judge McPherson in the case of the commonwealth against the Lafayette Traction company, of Easton. This company, along with seventy-three other street car companies, was incorporated under the act of 1878. The court holds that the act of 1878 was special and local legislation in reference to passenger railway companies, and therefore unconstitutional and void. Among the companies affected by this decision is the East Harrisburg Passsenger Railway company. An act is now pending in the Legislature validating the charters granted under the act of 1878.

SOUTH CAROLINA.

Orangeburg—All the stock of the Orangeburg Street Railway company has been taken. There are 1,000 shares at $25 each.

TENNESSEE.

Knoxville—The Riverside Electric Street Railway Co. has been incorporated by Jno. M. Brooks, W. A. Park, C. A. Fellows, W. W. Denning and G. W. Arthur, to build the electrical railroad here. It will be 5 miles in length.

Memphis—The Memphis & Fort Pickering Railway company is petitioning for a right of way over certain roads in that portion of Memphis known as Fort Pickering. The incorporators of the road are Louis Hanauer, J. Katzenberger, M. Gavin, G. V. Rambaut and D. E. Myers. The purpose of petitioners is to build a street car passenger line, to be operated by horse or mule power. A portion of the line will be constructed this summer, and the remainder at as early a date as practical.

TEXAS.

Dallas.—The Dallas Suburban Street Railway company has been incorporated with a capital stock of $100,000.

The Queen City Electric Street Railway company have asked for permit to built an electric railway on certain streets.

Denison.—A company has applied for a franchise to build a dummy or an electric street railway here.

The Denison Land & Investment company has bought out the franchise and property of the Denison Street Railroad and will change to a dummy line.

Houston.—The Bayou City Street Railway company has been incorporated. Incorporators, J. C. League, Wm. Boyd and S. E. Boyd.

Paris.—The Paris Street Railway company is extending its line a mile or so.

VIRGINIA.

Staunton.—The Staunton Improvement company will build a street railway here three miles long, and operate it by electricity.

WEST VIRGINIA.

Charleston.—E. B. Dyer and associates have received a franchise to build a street railway in this place.

WASHINGTON TERRITORY.

Ellensburg.—A franchise for a street car line, embracing eight of the principal streets, has been granted to Moffitt, of Wichita, Kan. The franchise calls for work to begin within thirty days after the designated streets are graded by the city. Grading contracts are to be let in a few days Contracts are being made for ties. Probably five miles of line will be completed this season.

Seattle — The Seattle Electric Railway and Power company has fully decided to extend its line as follows, without a subsidy: From the intersection of Second and Cherry streets; along Cherry to Third; along Third to Marion; along Marion to Fourth; along Fourth to Seneca; along Seneca to Sixth; along Sixth to Madison.

From the intersection of Sixth and Madison the company has received three different propositions to extend their line in as many directions, from persons who offer subsidies. One proposed line is to the city park. A second is to run along Filbert street toward Lake Washington. A third is to run by the most direct route to Union bay. No decision has been reached regarding the last three extensions. Their construction will depend entirely on the payment of the subsidies. It is learned, however, that the larger property owners in the sections to be opened by these lines are willing and ready to give enough to make it worth while for the company to build all of them.

The Front Street Cable Railway company has decided to extend its line from its present terminus at Depot street in North Seattle, to a point near Lake Union, two miles north, provided a sufficient subsidy can be secured from the property holders along the proposed extension. If the efforts to obtain the subsidy are successful the Front Street Cable Railway company will operate a continuous line from Occidental square, in the heart of the city, to a point over three and one-half miles north. The cost of the proposed extension, excepting power and machinery, will be $125,000.

Tacoma.— The Villard Syndicate has been granted additional franchise here, and will at once commence the construction of an electric road between this point and Old Town, thus replacing the present motor road. The franchise granted to the syndicate demands that it must build two miles of new road within the next twelve months, ten thousand feet of which must be operated by cable, and one additional mile per year must be laid for the next six years.

Walla Walla—The Street Car Co. here has closed a contract for 42 tons of rails for the first two and one-third miles of its road.

Elections.

Americus, Ga.—The following named gentlemen have been elected as officers for the Americus Street Railway company:

President—Maj. J. B. Felder.
Vice-President—Uriah B. Harrold
Secretary and Treasurer—W. E. Murphy.
Directors—H. C. Bagly, J. B. Felder, B. Harrold, G. C. Echefield, C. M. Wheatly.
Capital stock—$50,000 (all taken).

Baltimore, Md.—The North Baltimore Passenger Railway company has elected as directors Chas. E. Dickey, Wallace King, C. Morton Stewart, Wm. F. Burns, Wm. H. Blackford, German H. Hunt, James A. Gary, Thomas J. Wilson and Robert K. Martin. Messrs. James W. Tyson and Daniel J. Foley have retired.

Beaver, Pa.—At a meeting of the stockholders of the Union Street Railway company the following officers were elected for the ensuing year:

President—John Conway.
Secretary—Ellis N. Bigger.
Treasurer—N. F. Hurst.
Directors—John W. Buchanan, A. T. Anderson, W. G. Taylor, A. C. Hurst, T. Y. Shilton and N. F. Hurst.

Birmingham, Ala.— At the meeting of the stockholders of the Birmingham, Powderly and Bessemer Street Railroad company, the following were elected as officers for the ensuing year:

President—J. R. Hochstadter.
Vice-President—Joe Beitman.
Secretary—L. Brown.
Treasurer—B. Steiner.
Directors—J. R. Hochstadter, E. Lesser, Joe Beitman, C. B. Powell, B. Steiner, — Downey, J. H. Parsons.

A resolution was unanimously adopted to issue bonds not exceeding $100,000 to construct and equip the line.

Fairfield, Me.—At the annual meeting of the Fairfield and Waterville Street Railway company. The following were elected as officers for the ensuing year:

President—G. M. Williams, Boston.
Clerk—E. F. Webb, Waterville.
Directors—G. M. Williams, E. F. Webb, I. S. Abbott, Waterville; W. B. Fergusen, Salem; W. G. Barker, Boston; B. J. Bond, Lynn; Amos F. Gerald, Fairfield.

It was voted to raise $10,000 to wipe out the indebtedness. The year has been very favorable thus far and the travel is steadily increasing, thus insuring a dividend the first year, something not expected by any.

Little Rock, Ark.—At the annual meeting of the stockholders of the Little Rock and Citizens' Street Railway company the following officers were elected for the ensuing year:

President—James R. Miller.
Secretary and Treasurer—A. N. Johnson.
Directors—J. R. Miller, C. F. Penzel, J. M. Moore, R. D. Apperson and A. N. Johnson.

Milwaukee, Wis.—The Milwaukee & Wauwatosa Motor Railway company recently elected the following named officers:

President—T. H. Rumsey.
Vice-president—Jas. Petley.
Treasurer—R. Nunnemacher.
Secretary—A. B. Meyers.

Newark, N. J.—The Rapid Transit Street Railway company, of this city, has elected the following officers:

President—Elias S. Ward.
Vice-President—Gottfried Krueger.
Secretary—Wilbur Mott.
Counsel—Chandler W. Riker.
No treasurer has yet been selected.

The directors are: Elias S. Ward, Gottfried Krueger, John F. Dryden, Dr. Leslie D. Ward, Wilbur A. Mott, Samuel Schoch, Chandler W. Riker, Cortlandt Riker, and Stewart L. Woodford, of New York.

Philadelphia, Pa.—At the annual meeting of the stockholders of the Fairmount Park Railway company the following officers were elected for the ensuing year:

President—B. S. Kunkel.
Directors—R. Creswell, George W. Hall, William R. Warner, John C. Bingham, and Travis Cochran.

Portland, Ore.—At the annual meeting of the stockholders of the Portland Cable Railway company, 2375 shares were represented.

The old Board of Directors was re-elected as follows: Ira B. Sturgis, Kenneth Macleay, S. Heitscheu, Ella Talbot, A. W. Oliver, R. H. Thompson, E. D. White, Captain W. Young, P. C. Smith.

San Francisco, Cal.—The following have been elected Directors of the National Indicator company of this city: W. G. Cohen, of New York; George L. Brander, A. H. Cohen, Augustus Laver and H. B. Berryman.

St. Joseph, Miss.—The Union Street Railway company has elected the following officers:

President—James Craig, Jr.
Vice-President—C. F. Ernst.
Secretary and Treasurer—A. Steinacher.

The Jos. Dixon Crucible Co., of Jersey City, has found a new use for graphite. This valuable substance is prepared in the form of a grease for the purpose of applying it to cables. It is claimed that it prevents the wire from rusting, saves the rope from abrasion when striking hard substances, and insures a much longer life to the cable.

Dividends.

New Orleans, La.—The Orleans Street Railroad company has declared a dividend of 2 per cent on the capital stock of the company out of the earnings for the past three months.

Fall River, Mass.—The Globe Street Railway Co. of Fall River, has declared a dividend of 1½ per cent quarterly.

Haverhill, Mass.—The Haverhill and Groveland Street Railway company has declared a dividend of 2 per cent.

New York City—The Forty-second street, Manhattanville and St. Nicholas avenue reports as follows for 1889:

	1889.	1888.
Gross earnings	$91,284 16	$85,846 97
Operating expenses	84,741 54	79,224 04
Other income	600 00	----
Fixed charges	28,849 98	28,850 00
Loss from operations	21,707 36	22,227 07
Cash on hand	2,344 29	----
Profit and loss, deficiency	151,532 70	----

Our Advertisers.

(NEW ADVERTISEMENTS, CHANGES, ETC.)

The Continental Cable and Gripper Co. exploits its goods in a full page advertisement in this issue.

The Parrott Varnish Co., of Bridgeport, Conn., are catering to the street railway field more than ever, and their advertisement will be found in this issue.

The Reversible Cable Grip Co., of Duluth, Minn., makes a change in its advertisement, and now shows therein the cuts descriptive of its wonderful device.

The Ellis Car Co., of Amesbury, Mass., bids for business in a half-page advertisement in this issue. (An item relative to this new company will be found elsewhere in this paper.)

Mr. L. A. Marshall, contractor for public improvements, and dealer in Sioux Falls jasper, granite, etc., offers the goods to the street railway fraternity in this issue of the Gazette.

The Sioux City Granite Co., through its western office, of which Mr. Albert Chappelle is the manager, bids for trade in paving rocks and Sioux City granite, in a one-eighth-page space.

The Bemis Car Box Co. has removed its western office to No. 45, Lakeside building, Chicago, where the enterprising and energetic Mr. Bird, its general western agent, will hereafter be found.

The Julien Electric Traction Co., enterprising as it always is, takes an extra page in this issue for the purpose of stating certain facts of paramount interest to those interested in electric propulsion.

The Eureka Mineral Springs Hotel at Sagertown, Pa., has itself represented in this issue. The experience that the editor of this paper had at that charming resort last year justifies him in recommending it most strongly to those in search of health, pleasure or relaxation.

The Sprague Electric Railway & Motor Co., not content with their one page advertisement which they have been carrying right along in this paper, comes in with another page now, upon which is given a list of the contracts made by it in one year—a record of which they may indeed be proud.

Personal.

Messrs. Lemieux & Stevens, of Duluth, Minn., who were recently in Chicago exploiting their reversible cable grip, have returned home, and will shortly leave for New York on a business trip.

We understand that the new electric car of the Westinghouse Electric Co., equipped with two Tellsa motors, is almost completed, and the result of a test of the same will be awaited with interest.

The editor of this paper when on an eastern trip lately met Mr. Odell, president of the Salem road, in company with a party of gentlemen en-

route to Newburyport and Amesbury, on street railway business.

Mr. John A. Brill, vice-president of the J. G. Brill company, recently favored us with a call, en route home from a prolonged trip in Texas. He will probably reach Philadelphia by the middle of June.

Bernard H. Schmidt, who has been representing the J. G. Brill Co. in the southwest for nearly ten years, will, hereafter, have his headquarters in Chicago, being known as the western selling agent of the same company.

Mr. F. E. Pettingell, of Pettingell, Andrews & Co., manufacturers of electric railway supplies, of Boston, was in Chicago last month and returned to Boston accompanied by Mr. George Cutter, his western agent, where a reception was tendered him at the Electric Club there.

Mr. H. H. Dorner, of the firm of Dorner & Dutton of Cleveland, O., recently favored the GAZETTE office with a call. He had just returned from an extended western trip in the interests of his concern, and reported business as fair. If energy, perseverance and persistency will create success, then this firm is fortunate, indeed, in having connected with it a man like Mr. Dorner.

While all recognize the wisdom of selecting "Old men for counsel and young men for war," we note that in about 1,000 special cases in this city, young men have been selected for counselors and warriors combined, and, see, high up on this list, that Johnson company has placed as its active representative in Chicago and the Northwest that young Maine-Marylander, A. S. Littlefield. In years way back we knew the Littlefields of Maine, and we note in their descendant those many forceful characteristics which made the Maine pioneer, and will, invariably command success.

'Tis a favorite maxim with our mechanical expert Mr. W. S. L. Bayley, that "Right only is near enough." By an easy transposition this may be made to read "Only Wright is near enough;" or, "There is only one Wright," and he has just returned from the summer land to build the Milwaukee avenue cable line in this city. That, with the thoughtful Meyenberg, brother Wright will find it easy sailing along the avenue, goes without saying, and we confidentially predict that the avenue folks will find that "only Wright" and Meyenberg can construct this cable line with very little hindrance to the ordinary street traffic of that busy lane.

The STREET RAILWAY GAZETTE notes with pleasure the restoration to apparently sturdy health of the secretary of the C. C. R. R. Co., Mr. H. H. Windsor, only those who have tried it can appreciate the amount of brain force requisite to the arduous duties of secretary to such an immense corporation. Stronger in brain than in brawn, Mr. Windsor very quickly caused the immense pile of his correspondence to disappear like magic, when, at last, he was able to return to his duties. Such duties invariably seek the man, and we can readily understand how President Holmes can leave his home work in such reliable hands, while he flies across the continent in the management of his ever-increasing financial interests. It certainly helps to have such men on guard.

Business Mention.

MR. W. C. PULLMAN who was reported in the last issue of the GAZETTE as about to open his office in the new Owings' building, changed his mind and has secured most comfortable quarters in the Phenix building of Chicago. Mr. Pullman in addition to handling the goods of Hicks & Smith will do a general street railway brokerage business, and will undoubtely make a success of it.

A SHORT time ago the editor of this paper when in the East, visited the works of the Ellis Car Co. in Amesbury, Mass., and found them to be about as complete as one could wish for. The building, 60 x 175 feet, is used in the basement as blacksmith's shop, where all appliances for the work are at hand. The car bodies and seats are cared for on the first floor, while the ground floor is spacious enough to permit 30 cars being set up there at one time.

Mr. Ellis called our attention to his patent bent post, and claimed that the bending insured greater strength in the car body than when the post is sawed. In the large car room we noticed ten monitor deck, 8-bench, open cars that presented a very fine appearance, and will undoubtedly find a ready market. The Ellis Car Works recently furnished the Thomson-Houston Co. with two cars for service in Toledo, O., and have since received quite a number of orders.

THE Beaman Fare Box has been recently improved; formerly these boxes were lighted only by outside lanterns, but recent improvements provide lighting for them by inclosed side-light, and by reflected light from the lamphouse of the car. By this last mentioned method of lighting the fare-box, the extra care and expense of a light for it is entirely avoided. Sample boxes of this style, "6½ D," are now being placed with car builders as fast as requested. Also several other valuable improvements have been made which lack of space will not permit us to mention. We understand that circulars showing all these improvements are forthcoming.

LEONARD & IZARD of Chicago have just completed the construction of the Thomson-Houston Company's road in Topeka, and are now engaged on the extension of the Wyatt Park road at St. Joseph, Mo. The Topeka road, an illustrated description of which appears in this issue, is stated therein, the longest electric street railway in existence, and the Thomson-Houston Co. have highly commended Leonard and Izard for their superb construction work on the road. Leonard & Izard also made installation of the Sprague road at Atlantic City, N. J., and we understand that there is a probability of the number of cars being increased by 20 at once, in fact we have reason to believe that the order has already been placed for the same.

MR. H. G. BIRD, general agent of the Bemis Car Box Co. of Springfield, Mass., has removed to 45 Lakeside Building, Chicago; he reports business as very heavy, in fact for the season of the year the volume has been almost unprecedented. Mr. Bird has received quite a number of orders from the Pullman Palace Car Co. and the Calumet Co. for gears, also a heavy order for gears for summer cars from the West Chicago Street R. R. Co., and, altogether Mr. Bird feels well satisfied with business all round.

WHEN in Dayton, Ohio, a few days ago the editor of this paper visited the barns of the Oakwood Street Railway, of which Mr. Charles B. Clegg is president, his attention was directed to a roller bearing that had been put on one of the cars for trial. Investigation showed that it was a Worswick roller bearing and had been put on the car by Dorner & Dutton of Cleveland. Superintendent Jones spoke in the highest terms of the device, and the driver of the car said that it was the easiest running car, and the one most easily started of the whole line. To quote his own words "When we start the car it seems as though there was some one behind pushing it and helping it; it is about the best car starter I ever saw or heard of."

Spontaneous recommendations like this are far more convincing as to merits of a device than any solicited testimonials.

NOTICE.—ST. LOUIS, MO., APRIL 22, 1889.—A meeting of the stockholders of the People's Railway Company will be held at the office of said company, No. 1810 Park Avenue, in the city of St. Louis, State of Missouri, on the first day of July, 1889, for the purpose of considering and acting upon the following propositions, that is to say:

First. A proposition to increase the capital stock of said company from $800,000, the present amount thereof, to the sum of $1,000,000.

Second. A proposition to authorize the issue by said company of its 10-20 6-per-cent. bonds for the aggregate sum of $1,000,000, the payment of the principal and interest on said bonds to be secured upon the property and franchise of the company, the said bonds to be used for the purpose of altering and extending the railroad of the company and changing the motive power thereof, and for such other purposes as said meeting may determine.

Third. To consider and act upon any other matter which may be properly brought before said meeting.

Said meeting will be convened at 9 o'clock A. M., on said 1st day of July, 1889.

CHARLES GREEN,
President.

JOHN R. LIONBERGER,
JOSEPH P. WHYTE,
JAS. F. HOW,
JAMES CAMPBELL,
Directors.

JOSEPH PERRY, Secretary.

The Street Railway Gazette.

VOL. IV. JUNE, 1889. No. 6

ELECTRIC RAILWAYS.

The Robinson-Foster System.*

The car motor is peculiar in its construction, being of double V shape externally, so as to occupy the least amount of space, and, at the same time, give the greatest power. The winding of the field magnets is such that absolute and instantaneous control is obtained over the motor, under any and all circumstances; while the armature, unlike any other, cannot be injured or affected by dirt, inasmuch as the wires are entirely buried in the iron of the cylinder, excepting, of course, the ends, and even these are carefully covered in so that dust cannot get at them. By not having the wire on the surface, the air space is reduced to a minimum, thus materially decreasing the magnetic resistance in the circuit, which means a maximum power for a minimum of weight.

The generators used for producing the electricity have an armature similar to that of the motor, while the frame work follows somewhat the "Manchester" type, the combination of the two making a strikingly compact and powerful machine.

The motors of this company, Fig. 1, that are now manufactured for power purposes are of the single field type, having the field magnet placed low down underneath the armature, so as to bring the center of gravity of the whole machine as low down as possible, and thus avoid the top heaviness and instability frequently complained of on some types of motors. At the same time, by using this type of motor the company is enabled to place on the market a motor which, for the same power only, occupies a much less space than others, with corresponding decrease in weight, extremely valuable considerations to many purchasers.

The dynamo made by this company (as shown in Fig. 2) is of the double horse shoe type, having two exciting coils situate at the neutral points of the magnets, the cores of which are of wrought iron, circular cross set section and terminating in heavy cast iron pole pieces, which also form the yokes, completing the magnetic circuit. The exciting coils are wound on shells of sheet iron and slipped over the cores. By means of a peculiar shaping of the pole pieces in embracing the armature, the coils lying at the neutral point are perfectly dead, thus preventing sparking at the brushes, and keeping the lead constant for varying loads. In fact, so perfectly has this been carried out, that by looking at the brushes it is impossible to tell when the current is on or off.

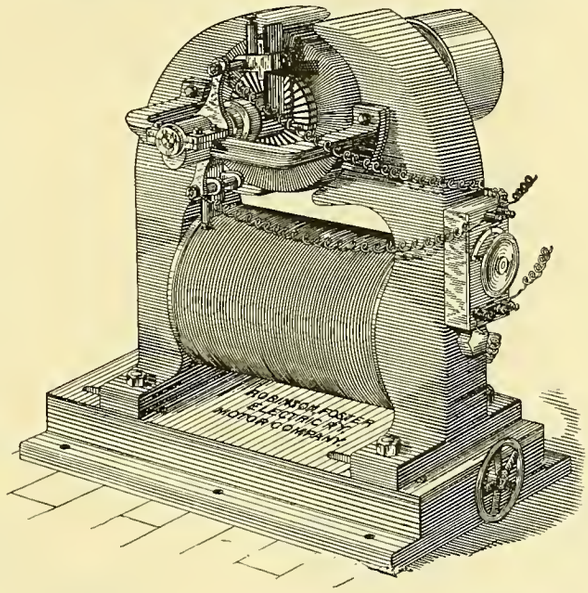


FIG. 1.

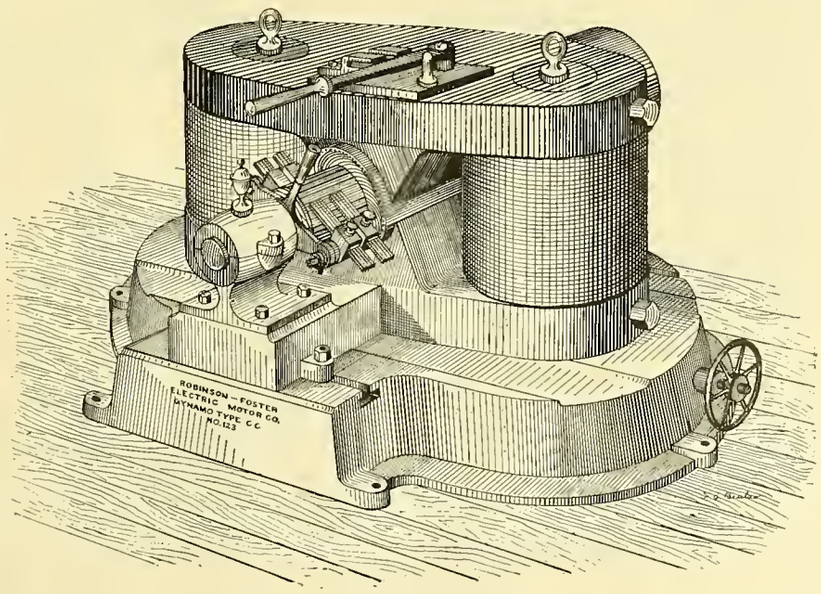


FIG. 2.

The armature, which is a modified drum formed of wrought iron discs insulated from one another and the shaft is wound so that the coils embrace certain chords of the armature circumference, depending on the area covered by the pole pieces and the distance between the same, generating the greatest amount of electromotive force with the least length of wire, preventing sparking, and is absolutely protected from mechanical injury, and the effects of centrifugal force, each wire being contained in its respective channel within the core, and at the same time the resistance of the air space between pole and armature is reduced to a minimum, causing the armature to revolve in a most intense field.

The coils are joined to the commutator by means of copper connectors of special form making the head very small and saving space between commutator and armature.

The machine shows ingenious mechanical design, all parts being interchangeable, and well and carefully proportioned to withstand wear and tear, and give the greatest efficiency with the least depreciation.

This company also controls an entirely new style of underground conduit for electric railway service (see Figs. 3 and 4), which is made of cast iron of sufficient strength to resist any strain that it may be subjected to, and is provided with the usual slot for the admission of the contact brushes or plough. The floor of the conduit is of skeleton form, to permit any moisture or siftings to fall into the subconduit or trough below. At intervals along the floor of the conduit are placed vertical pins or screws, and upon them porcelain insulators similar in construction to the ordinary telegraph pole insulators of the double bell type; the insulators for the positive and the negative conductors alternating with each other in two rows; the conductors being supported in grooves in the tops of the insulators into which they are secured by metallic wedges or keys.

In this method of laying and insulating the conductors, the concavities of the double bell insulators perform a very important function; viz., that of preventing the moisture from acting as a conductor between the conductors and the screws or supports for the insulators.

Like all others this conduit is drained at intervals, and in addition, at short intervals, is also fitted so that portions of the upper section can

*The Robinson-Foster Co., Boston, Mass.

be removed for the purpose of cleansing. The other main advantage claimed for this system of conduits is the facility of laying the same; particularly is this true with reference to the fixing of the conductors in place; no other means being employed to make connection at the breaks in the conductors, than to place them in the cavities in the insulators, and secure them by the keys.

It is further claimed that this system prevents, by the position of the conductors with reference to the slot, short circuiting from the introduction of hoop iron, etc.; a mischievous practice of boys, or those inimical to the successful working of the road, and also sometimes occurring by accident.

Cost of Producing, Transmitting and Applying Electricity for Street Railway Purposes.

Extract from advance sheets of "Electricity, as applied to Street Railways," by Fred. H. Whipple.

In making any comparison of the costs of electric, cable or horse railroads, there are so many points to consider that at least a whole book of this size should be devoted to it to cover the field. The salient points of each system can only be touched upon here.

To maintain as near as possible a straightforward description, the subject may be divided as follows:

First: Plant. This includes all lands and buildings, their location, size and cost.

Second: Power. This includes the steam plant; the electric or cable machinery; the horses, storage batteries and motors.

Third: Permanent way, covering track, conduit or overhead work.

Fourth: Rolling stock.

Under the first head—the plant—the two greatest factors are its location and its size. The system necessitating a spread eagle policy on the land question, will cost. What could be a more perfect illustration than the horse railroad system? The motive power of the New York Central Railroad between New York and Albany could be comfortably stowed in the barns of some of the New York City street railways. What a contrast! The real estate, buildings and fixtures of the Third Avenue line are valued at $1,524,000; and what buildings! Cattle sheds in the metropolis of America. Surely they did not cost a tithe of this great sum. Far from it; but something must have, and that something is plainly the land. Thus it is in every large city of the Union, the expenditure for land being one, if not the greatest, of enormous sums necessary for the company to undergo. State reports usually sum up in this fashion: Permanent way, equipment, land and buildings; and it is to be observed that the third item holds its own, and in many cases exceeds the other two. From the Massachusetts Railroad Commission's report for 1888, it is found that of the total assets and property of all the forty-four street roads in the state, nearly twenty-five per cent is in lands and buildings. We learn that the Central Park, North and East River Railroad Co. has built a new building, which is one of the largest in the city of New York, being 200 feet front by 475 feet deep, and four stories high—95,000 square feet of land, costing at least $1,000,000. This for about 1,300 horses, or, allowing ten horses to a car, a working force of 260 horses for 130 cars on the street. Allowing that there is only a sixty per cent. recovery of our prime source of power, we then must have a 1,300 horse power steam engine to obtain six horse power per car in the street, which power is sufficient on such a road. Would a steam plant of this capacity need a floor and one third, or 126,666 square feet of floor space, as is required in this building for horses? Experience in building electric light stations has shown that a plant of 1,300 horse power can easily be placed in a two story building on a lot 75 feet by 100 feet, and still have ample room for coal bins, repair and store room.

Here we have a complete electric plant more than the equal of the horse plant, occupying a total floor space of 15,000 square feet, as against 221,666 square feet for horses, if the additional 95,000 square feet is included necessary for grain, hay, etc. Taking land area we have 7,500 against 9,500. This gives us the ratio land area as 1 : 12.7. The total floor space allowed for

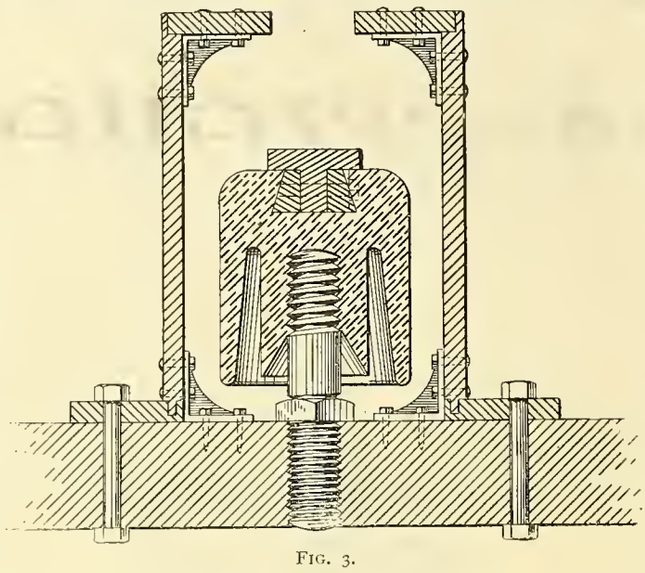


Fig. 3.

cars, snow plows, sweepers, etc., is a gain of 126,000 square feet. Naturally this area would be about the same in any instance, either horses, cable or electric. If to this we add 15,000 feet for the steam plant, for electric or cable, we have 141,500 square feet as the total area necessary for the whole plant; as against 95,000×4=380,000 square feet necessary for horse plant. Ratio 1 : 2.6. This shows a clear saving of fifty per cent in real estate, assuming that the location of the plants were the same.

Let us look a little further into this matter of ratio between space for steam plant and that for horses. From careful examination of many engine plants, considering the ratio between a certain number of horses with their necessary adjuncts, and a steam plant of numerically equal power, I find it stands as one to thirty. That is, a steam plant complete of thirty horse power capacity would need only the floor space of one horse. With larger powers this ratio is still greater, and from one estimate it stood as 1 to 108, *i. e.*, for horses one would have to have 108 times more floor space than for an equal number of mechanical horse power. It was from one maker, taking the engine alone, I found that a rated 100 horse power engine, guaranteed in every particular, would have ample room in the stall for one horse in the average stable. Another instance showed that one could get a steam plant complete, engine, boiler, etc., of fifty horse power, in a space five by six feet, which is much smaller than the average stall.

From scores of electric plants and many cable plants it is found that it is safe to allow twelve square feet of floor for every horse power of energy going into the street. This figure will cover boilers, engines, dynamos, or gears, pumps, heaters, condensers, and a generous coal bin. With very large plants it is true that a still less figure will answer for the steam plant. With horses at least forty square feet are necessary.

In regard to the storage and handling of cars in general terms the floor space would be about equal in all three cases. It is, however, to be noted that since the running time of the cars can be decreased, a less number are necessary with power than with horses, hence a saving is sure to follow, due to this cause. It may be argued that the cost of a suitable building for a steam plant would far exceed that of one for horses. This is no doubt true to a certain extent, but I do not think that its increased cost could ever balance the saving in real estate.

With electricity alone, then, exists another advantage which has not yet been mentioned. Since hoisting power is at hand, and the cars can be as readily handled from an overhead wire in a building as in the street, the driver of each car can run it upon an elevator, and upon being hoisted to any floor can store it wherever it is desired.

Thus far it has been assumed that the steam plant and the car house be one and the same building. If, however, we separate the two the question of cost for land for the electric system becomes a very simple problem. With neither cable or horses is this true. While it is advantageous to locate the electric plant for the direct system as near the centre of the track system as possible, it is not imperative, but in the suburbs or off on cheap land the station can be built, and its power transmitted over the wires, costing but a few hundred dollars per mile to string to the track.

It is nevertheless always advisable to locate a power plant as near the coal pile as possible. By this is meant, locate it near the coal wharfs, if it be brought to the city in vessels, or near the railroads, if by them.

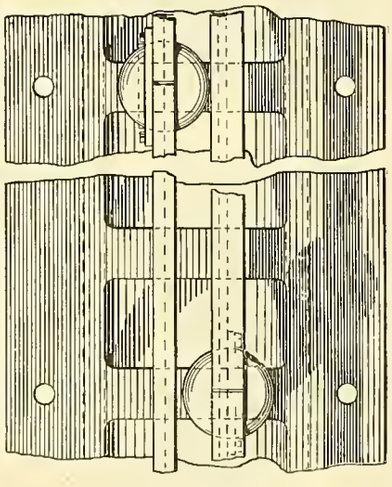


Fig. 4.—Plan.

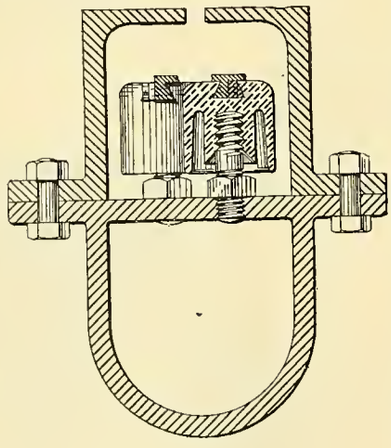


Fig. 4.—Section.

From an economical standpoint, it is very desirable to locate, if possible, near an abundant supply of water, so as to make use of condensers, which would result in a saving in fuel of at least 20 per cent. In regard to coal, if it has to be hauled, it will cost at least from 50 to 60 cents a ton. A 100 horse power plant, running eighteen hours out of twenty-four, and burning four pounds of coal per horse power per hour, would burn 1,314 tons of coal a year. This means $657 for haulage, or 6 per cent. interest on $10,950. This amount saved, the principal could clearly be credited to improvements, extensions, or dividends. It is reasonable to believe, also, that property would not be as valuable near the coal yards as elsewhere. On a 1,300 horse power plant, this saving of haulage would amount to $8,541, or 6 per cent. on $142,350, a very considerable item.

Under the second heading, the cost of the engines, boilers, foundations, heaters, pumps, etc., set up complete and ready to run, of a plant of this size, would average about $55 per horse power, or $71,500. This would be the same for the cable plant. The cost of dynamos, belts, and all station equipments, including voltmeters, ammeters, lightning arresters, switches, etc., would cost for the electric plant, about $50 per horse power, or $65,000. The cost of the gears, foundations, tension buggy, etc., for the cable plant would be about $40 per horse power, or $52,000. A total for the electric plant of $136,-

500, and for the cable of $123,500. For horses, I would estimate the 1,300 horses at $150 each, making $195,000. Allowing $12,000 for harness and appurtenances, there would be a total of $207,000.

If the road was operated with storage batteries, an approximate cost could be arrived at as follows: If the cars are run sixteen to eighteen hours out of the twenty-four, it is certain that practically as large a steam plant is necessary to charge the batteries as is necessary to operate the road by the direct system, for, if there were 130 cars out, there must be in the car house 130 sets of batteries being charged to take the place of the exhausted ones soon to come in. In practice, it has been stated that one charge will last from five to twelve hours, and propel a car 30 to 100 miles, according to the battery used. As the regular service of an electric car is about 100 miles a day, at least three charges will be necessary in some batteries. It ordinarily takes as long to charge, if not longer, than it is allowable to discharge. On small roads, a saving can be effected through the fact that, the the cars not running more than twelve or fourteen hours out of the twenty-four, the engine plant can be reduced but run longer. For a road which has been under discussion, I would allow as the cost of the steam and electric plant, $135,500. This is an amount equal to that allowed for the direct system.

In regard to land areas, allowances can be made as follows: Electric, direct system, 15,000 square feet; electric, storage system, 18,000 square feet; cable, 15,000 square feet; and horses, 95,000 square feet. In valuation, I have estimated the land at 30 cents per foot, and I then have for electric, direct system, $4,500; storage system, $5,400; cables, $4,500; and for horses, $28,500. For buildings, I have allowed, for the direct system, $20,000; storage, $25,000; cable, $20,000; and horses, $150,000.

I have not as yet considered the car house. It is plain that for all systems this will cost approximately the same. There are, however, one or two points to be considered. The repair shop for the electric and cable systems would be much larger than for horses,and in the case of the storage system, more room would be needed to properly handle the batteries. * * * *

A fair approximation for land and building would be, for the direct system, $40,000; storage, $45,000; cable, $40,000; and horses, $35,000.

In estimating for the permanent way, the track, evidently, should be the same in all cases, and it has been accordingly estimated at $7,000 per mile of single track. The electric conduit is estimated at $30,000 per mile of single track; and the cable at $65,000 per mile of track. The overhead electric system is estimated at $3,000 per mile, since it is taken for granted that for a road of such magnitude it must be in a city where iron poles would be required.

For rolling stock, the car bodies are estimated at $700 apiece. The electric trucks are estimated at $3,000 apiece, and of fifteen horse power. They include wheels, axles, pedestals, two motors and all controlling devices. The grips for the cable cars are figured at $150 each. For the horse road the cars are placed at $900.

To obtain from all the foregoing an approximate total cost, the figures have been arranged in tabular form. There may be slight discrepancies, but, as near as I have been able to gather, I would judge that the figures fairly represent the ratios of cost as they exist to-day for fifteen miles of track and 130 cars:

	ELECTRIC OVERHEAD.	ELECTRIC CONDUIT.	ELECTRIC STORAGE.	CABLE.	HORSES.
Land	$ 4,500	$ 4,500	$ 5,400	$ 4,500	$ 28,500
Buildings and Foundations	20,000	20,000	25,000	25,000	15,000
Engines, Boilers, Dynamos and Gears	135,500	135,500	135,500	123,500	----------
Car House and Land	40,000	40,000	45,000	40,000	35,000
Horses and Harnesses	----------	----------	----------	----------	207,000
Storage batteries	----------	----------	456,300	----------	----------
Cars and Motors or Grips	481,000	481,000	481,000	136,500	117,000
Conduit	----------	450,000	----------	975,000	----------
Cable	----------	----------	----------	19,800	----------
Overhead System	45,000	----------	----------	----------	----------
Track	105,000	105,000	105,000	105,000	105,000
Totals	$791,000	$1,236,000	$1,252,200	$1,429,300	$507,000

In discussing the operating expenses of a road of such magnitude, first approximately estimate the cost of producing one horse power. In any case 90 per cent. of the engine energy would be delivered to the wires leading to the motors on cars, to storage batteries or from the gears to the cable leading to the street. The estimated expenses per annum would be about as follows:

Coal 3 lbs horse power hour @ $4, on the average of 14 hours daily	$39,856 00
Superintendent and Manager	2,500 00
Assistant Superintendent and Electrician	1,800 00
Chief Engineer	1,200 00
Two Assistant Engineers	1,800 00
Four Firemen	3,120 00
One Boy	500 00
Repairs and maintenance	2,500 00
Oil, waste and sundries	1,000 00
Water	500 00
Depreciation	7,000 00
Taxes	2,000 00
Interest	4,200 00
Total	$68,976 00

Per horse power for one year this is $53 as the total costs, or per horse power hour about one cent. Take this figure as a fair average for all cases.

According to this, if we lose ten per cent. of this amount as energy in the overhead conductors, or in the conductors in the electric conduit, and another ten per cent. in the motors, and five per cent. in the gears, we would have as the cost per horse power per year delivered at the wheels of the electric car, $67.33. If the car takes on the average eight horse power, we would have as the cost for power per day, $1,47.

In the case of the conduit system the cost of power would be the same.

With the storage system a slight increase of cost is inevitable. Starting with the original cost as $53, there would be a loss of twenty per cent. in the batteries, ten per cent. in the motors, and five per cent. in the gearings. This places the cost per horse power per annum for power delivered to the car wheels at $73.41. * *

In the case of the cable road the best engineers place the loss at seventy per cent. At this rate the cost per horse power delivered at the wheel per annum would be $89.10, or allowing eight h. p. per car the cost per day would be $1.95.

In the case of horses I have allowed ten for each car at twenty-five cents per day for feed, making per car a total cost of $2.50.

There are now left the further items of repairs, interest, depreciation and supplies to add to the cost of power to complete the total operating expenses per car. These have been arranged for the various roads in tabular form:

	ELECTRIC OVERHEAD.	ELECTRIC CONDUIT.	ELECTRIC STORAGE.	CABLE.	HORSES.
Power	$1 47	$1 47	$1 80	$1 95	$2 50
Repairs, Trucks	1 85	1 85	1 95	1 35	50
Depreciation, Power, and Rolling Stock	1 29	1 29	2 26	88	1 02
Interest, Power and Rolling Stock	77	77	1 37	37	40
Attendance	45	45	45	35	2 15
Supplies	25	25	30	25	75
	$6 08	$6 08	$8 13	$5 15	$7 32
Perman't Way—Dep	25	1 16	17	2 73	17
" " —Int.	17	70	13	1 38	13
	42	1 86	30	4 11	30
Total	$6 50	$8 94	$8 43	$9 26	$7 62

In this table no office salaries or labor account of drivers and conductors has appeared. There being so little difference, to avoid complication it was omitted. In estimating depreciation, I am aware that some figures have had to be taken for which I had no actual reliable data. There are other considerations of which I have taken no account which would modify one or two of the figures to a slight extent. It is true, also, that I could have allowed all the way through a less number of cars for the systems operated by mechanical power, since a higher rate of speed could be maintained. I, however, carried the estimate through with an equal number to make as fair a showing for horses as possible. The table must stand for just what it is intended, and, as in every estimate of this kind, is open to amendment; but the ratios will stand the test of actual practice.

Again, it must not be thought that the same ratios would hold true with the receipts. People infinitely and universally prefer mechanical power as their propelling agent. It is therefore reasonable to believe that those which are shown to be more expensive than horses could very successfully compete with them. The limitations of a horse road are self evident. It has so many inherent faults that it is needless to discuss them. As, however, it has often been advanced that electricity would never compete with the cable system, a few of the comparative points between the two systems might be advantageously glanced at.

Electric Railway Switch.

A new electric switch for street railway work has been brought out by the Sprague Electric Railway & Motor Co. which will simplify and make more compact than ever the method of controlling railway motors on street-cars.

The hand movement required to operate this switch is extremely slight, so that, in case of emergency, the motor can be stopped and reversed in a very short space of time, reducing to a minimum all possibility of collision with other cars, or with any obstruction on the track.

The new switch is entirely fire and moisture proof, is only about one-half the size of the present railway switch, and so arranged that it can be carried between the wheels, underneath the flooring, where it is entirely out of the way, and where it occupies no valuable room on the platform. The control is obtained by a vertical rod, passing up from the switch box to the platform, looking exactly like a brake-rod. A movement forward of this handle for the space of a quarter of a circle means ahead at full speed. A reverse movement of the same amount means backing at full speed, and there are all the combinations between, so that it is possible to regulate the speed of the car to any desired degree.

The improved switch does away with all through wiring in the car, and all possible sparking inside of the switch.

In case of any obstruction upon the track, the advantages of the improved switch over any method of controlling the motors by means of a rheostat is very evident. The natural tendency, in case of an expected collision is, for the driver to jump back from his dash-board. By this movement he will carry his lever-handle with him, instantly reversing his machine without giving it a thought, and thus avoiding all trouble and danger.

A YOUNG mechanic of Pittsburg has invented an appliance for electric cars, for which Mr. George Westinghouse has given him $25,000.—Next.

At the request of several of its subscribers the GAZETTE commencing with the June number will publish in each issue a complete list of all the electric railways in the country, showing in the same, under what system each road is operated.

THE ninety-nine-year lease is said to result from the well known timidity of capital. Somewhere in the unwritten code of common law, but certainly not in equity, capital has been given to understand that the lessor will claim the property after the ninety-nine-year limit is passed, and the claim will be sustained by "common law."

Storage Battery Record.

The Julien Electric Traction company, of New York, sends us the following statement:

"We beg to inform you that one of the standard cars of our system on 4th and Madison avenue lines, this city, has completed sixty days' service of five round trips per day between 86th street and the postoffice, or 57½ miles daily. This is a car-day's work on that line.

During that time (sixty days) its receipts in cash have been $1,578.75 (exclusive of over 1,100 transfers, for which it gets no credit); this represents, at the rate per annum,	$9,599 50
The average earnings of horse cars on the same line are	6,387 50
Difference in favor of the Storage battery	$3,212 00
Deducting from gross earnings $4 a day for driver and conductor, and $3 per day for motive power, wear and tear and royalty, would leave per annum	7,125 50
Further deducting 6 per cent. interest on $6,000 (cost of the car with battery racks, stationary motors, etc.)	360 00
Leaves net earnings,	$6,765 50

These net earnings will thus pay the entire cost of car and equipment at end of first year.

Since this car went into operation, February 11th, 1888, the repairs to batteries, motors and electrical apparatus have been confined to the replacing of one carbon brush worth about five cents. On the 23d day of February it began making five round trips per day; it has therefore run one-fourth of a year with practically no expenditure for electrical repairs.

Car No. 1 commenced service on September 3d, 1889, and on April 8th, 1889, its batteries were examined for the first time.

They had not in this period been lifted from the cells to be cleaned or inspected. They were found to be in as good condition as when in service—not a single plate in the whole battery showing any unusual wear, injury or depreciation.

By our new battery shifting device, occupying the length of a car body, sufficient batteries are stored and manipulated to do the work of 135 horses. The racks containing the batteries do not, in all, cover as many cubic feet as two 16-foot cars. The batteries are changed in less than three minutes; less than five minutes are required to inspect the car thoroughly and change the battery.

Street railway companies no longer need to own generating machinery as must be the case with cables and other systems. Central lighting stations will gladly sell power for charging the batteries for about two cents per horse power. Thus the plant for our system is reduced to the simple device of one battery rack, as above mentioned, for each set of fifteen cars, and switchboards for governing the distribution of the current. Can anything be more simple?

Cost of motive power for a car day of sixty miles, we estimate at $3.10 as against $4 80 for horse traction, or eight cents per car mile. By motive power we mean cost of energy at two cents per horse-power, and $700 per annum for maintenance of batteries and motors."

Chadbourne, Hazelton & Co., of Philadelphia, have recently closed a contract with the Federal St. & Pleasant Valley R. R. Co., of Pittsburgh, for 25 cars and complete station equipment. The Sprague over-head wire system, with iron poles, is to be used. Mr. McCreery recently made examination of various electric railway systems, finally deciding to adopt the one similar to that in operation at Atlantic City.

Electricity in Harrisburg, Pa.

The East Harrisburg Passenger Railway Co. (Electric) which has been in operation for some eight or nine months, and which has already increased the number of its cars, has recently sent in a second additional order to the Sprague Company for two more cars. Almost all the Electric Street Railway companies that have been operating under the Sprague patents, including those in Richmond, Va., Wilmington, Wilkesbarre, St. Joseph, Hartford, Cleveland, Boston, Reading, Asheville, Tacoma and Atlantic City, have, from time to time, increased their equipment, and the prospects are that they will still continue to do so.

MR. H. A. EVERETT, secretary of the East Cleveland Street Railway Co., Cleveland, O., believes that the overhead wires may be advantageously used by the fire department, in case of fire along the line. The idea is for the department to use an engine operated by electricity. A wire might be thrown over the trolley wire, and by the turning of a switch or button, the current from the power-house can be transmitted to the engine. We see no reason at all why this scheme should not be thoroughly tested, and there is no doubt that, should it prove successful, it would be generally in all the cities where the overhead wire system was in operation.

If correspondents will be kind enough to address all their communications direct to the principal office of the STREET RAILWAY GAZETTE, 8 Lakeside Building, Chicago, Ill., they may rest assured that their letters will be promptly attended to.

ELECTRIC STREET RAILWAYS IN AMERICA.

(IN OPERATION OR UNDER CONTRACT.)

Corrected to June 1, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Akron Electric Ry. Co.	Akron, O.	Sprague	12	6 5
Alliance St. Ry. Co.	Alliance, O.	Bentley-Knight	6	3.7
Americus Street RR. Co.	Americus, Ga.	Thomson-Houston	4	
Appleton Elec. St. Ry. Co.	Appleton, Wis.	Van Depoele	6	5.5
Asheville St. Ry. Co.	Asheville, N. C.	Sprague	3	4.5
Atlanta & Edgewood St. Ry Co.	Atlanta, Ga.	Sprague	10	1
Atlantic City Elec. RR. Extension	Atlantic City,	Thomson-Houston	4	5
Attleboro & North Attleboro RR. Co.	Attleboro, Mass.	Thomson-Houston	5	
Auburn Street RR. Co.	Auburn, N. Y.	Thomson Houston	3	
Balt. Union Pass. Ry. Co.	Baltimore, Md.	Daft	4	2
Bangor St. Ry. Co.	Bangor, Me.	Thomson-Houston	4	3.5
Bay City RR.	Bay City, Mich.	Sprague	3	5
Bay Ridge Elec. RR.	Bay Ridge, Md.	Sprague	2	2
Brooklyn St. Ry. Co.	Cleveland, O.	Thomson-Houston	10	10
Buffalo St. Ry. Co.	Buffalo, N. Y.	Sprague	4	2.5
Carbondale & Jermyn St. Ry.	Carbondale, Penn.	Sprague	3	1.5
Central Passenger Ry. Co.	Louisville, Ky.	Thomson-Houston		10
Chattanooga Electric St. Ry. Co.	Chattanooga, Tenn.	Sprague	6	5
Cincinnati & Inclined Plane Ry.	Cincinnati, O.	Sprague	20	6
Cincinnati St. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	2.7
Citizens Elec. St. Ry.	Decatur, Ill.	Thomson-Houston		
Colerain Ave. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	2.75
Collamer Line	East Cleveland, O	Sprague	8	3
Columbus Consolidated St. Ry. Co.	Columbus, O.	Short	2	2
Danville St. C. Co.	Danville, Va.	Thomson-Houston	4	2
Derby Horse Ry. Co.	Ansonia, Conn.	Thomson-Houston	1	4
Davenport Cent. St. Ry. Co.	Davenport, Ia.	Sprague	9	3 5
DesMoines Broad Gauge Ry. Co.	DesMoines, Ia.	Thomson-Houston	10	8
Detroit Elec. Ry. Co.	Detroit, Mich.			
East Cleveland Ry. Co.	Cleveland, O.	Sprague	16	8
East Harrisburg Pass. Ry. Co.	Harrisburg, Pa.	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa.	Thomson-Houston		
East Reading RR Co.	Reading, Pa.	Sprague	3	2.5
" " Extension	" "	Sprague	1	1
East Side St. Ry. Co.	Brockton, Mass.	Sprague	4	4
Eau Claire St. Ry. Co.	Eau Claire, Wis.	Sprague	6	5
Erie City Pass. Ry. Co.	Erie, Pa.	Sprague	20	12
Eckington & Soldiers Home Elec. Ry.	Washington, D. C.	Thomson-Houston	7	2.7
Essex Co. Pass. Ry. Co.	Newark, N. J.	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa.	Sprague	25	8.5
Fulton County St. RR.	Atlanta, Ga.	Thomson-Houston	8	8
Gratiot Elec. Ry.	Fort Gratiot, Mich.	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn.	Sprague	4	3
Hoosac Valley St. Ry. Co.	N. Adams Mass.	Thomson Houston	6	5
Highland Park Elec. Ry. Co.	Detroit, Mich.	Fisher	4	3 5
Hillside Coal Co.	Scranton, Pa.	Thomson-Houston		
Huntington Elec. Ry. Co.	Huntington, W. Va.	Short	2	3.5
Ithica Street Ry. Co.	Ithica, N. Y.	Daft	2	1
Jamaica & Brooklyn RR.	Jamaica, N. Y.	Van Depoele	10	9
Key City Elec. Ry. Co.	Dubuque, Ia.	Sprague	4	2
Lafayette St. Ry. Co.	Lafayette, Ind.	Sprague	9	3
Lafayette Traction Co.	Easton Pa.	Daft	2	1
Laredo City RR. Co.	Laredo, Tex.	Sprague	4	4
Lima St. Ry. Power and Motor Co.	Lima, O	Van Depoele	7	6
Lindell Ry. Co.	St. Louis, Mo.	Julien	1	
" Ave. RR. Co.	" "	Sprague	10	5.5
Lng. Island City& Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Los Angeles Elec. Ry. Co.	Los Angeles, Cal.	Daft	4	5
Lynn & Boston Ry.Co.—Crescent Beach	Lynn, Mass.	Thomson-Houston	1	1
" " Ry. Co —Nahant Line.	" "	Thomson-Houston		
" " RR. Co.—Highl'nd line	" "	Thomson-Houston	1	2
" " RR. Co—Nathan line.	" "	Thomson-Houston	1	.8
" " St. Ry. Co.	Crescent Beach, Mass.	Thomson-Houston	1	1
Main Street Line Extn., U. P. Ry.	St. Joseph, Mo.	Sprague	4	1
Manchester & Richmond Ry. Co.	Manchester, (Va.	Sprague	10	3.5
Mansfield Elec. St. Ry. Co.	Mansfield, O.	Daft	5	4.5
McGavoc & Mt. Vernon St. Ry. Co.	Nashville, Tenn.	Thomson-Houston	6	3
Marlboro St. Ry. Co.	Marlboro, Mass.	Sprague	2	3
Meriden Horse Ry. Co.	Meriden, Conn.	Daft	12	5
Metropolitan RR.	Portland, Ore.	Sprague	4	3
Metropolitan St. Ry. Co.	Kansas City, Mo.		8	2.5
Minneapolis St. Ry. Co.	Minneapolis, Minn.	Sprague	6	6.5
Naumkeag St. Ry. Co.	Salem, Mass.	Sprague	6	2
Naumkeag St. Ry. Co.	Salem, Mass.	Thomson-Houston		
Nayang Cross-Town Ry.	Scranton, Pa.	Thomson-Houston	4	1.25
New Horse Ry.	Meriden, Conn.	Daft	12	5
Newburyport & Amesbury Horse Ry.	Newburyport, Mass.	Thomson-Houston		
Newburyport & Amesbury H. Ry. Co.	Newburyport, Mass.	Thomson-Houston	2	6
Newport Horse Ry. Co.	Newport, R. I.	Thomson-Houston		
Newton Circuit Line	Newton Mass.	Thomson-Houston	2	6
N. Y. & Harlem RR. Co. (4th Ave)	New York, N. Y.	Julien	10	8 5
North & East River RR. Co.	New York, N. Y.	Bentley-Knight	20	3
Observatory Hill Pass. Ry. Co.	Allegheny, Pa.	Bentley Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg.Co.	Omaha, Neb.	Thomson Houston	13	9
Omaha Horse RR.	Omaha, Neb.	Sprague	20	10
Omaha Motor Ry. Co.	Omaha, Neb.	Thomson-Houston	20	5
Ontario & SanAntonio Heights Ry. Co.	Ontario, Cal.	Daft	4	8
Pacific Ave. St. Ry. Co.	Tacoma, Wash. Ter.	Sprague	8	6
Passenger RR., Extension	East Harrisburg, Pa.	Sprague	4	3
Peoples RR. Co.	St. Joseph, Mo.	Sprague	20	10
Pennsylvania RR. Co.	Atlantic City, N. J.	Sprague	6	6.5
Pittsburgh Sub. Rapid Transit Co.	Pittsburgh, Pa.	Daft	3	
Pittsb., Knoxville & St. Clair St. Ry.	Pittsburgh, Pa.	Daft	4	2.25
Plattsmouth Elec. RR.	Plattsmouth, Neb.	Sprague	2	2
Plymouth & Kingston Ry. Co.	Plymouth, Mass.	Thomson-Houston	3	4
Port Chester & Rye Beach St. Ry.Co.	Port Chester, N. Y.	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich.	Van Depoele	6	4
Quincy St. Ry.	Quincy, Mass.	Thomson-Houston	4	5
Quincy St. Ry. Co.	Quincy, Mass.	Thomson-Houston	4	5
Redbank & Seabright Ry.	Redbank, N. S.	Thomson-Houston		
Revere Beach Ry. Co.	Revere, Mass.	Thomson-Houston	1	1
Revere St. Ry. Co.	Revere, Mass. (Ex.)	Thomson-Houston	1	1
Richmond City Ry. Co.	Richmond, Va.	Sprague	46	13
Richmond St. Ry. Co.	Richmond, Ind.	Thomson-Houston		
Richmond Union Pass. Ry. Co.	Richmond, Va.	Sprague	50	7.5
Riverside & Suburban Ry. Co.	Wichita, Kans.	Thomson-Houston	6	6
Rochester Elec. Ry. Co.	Rochester, N. Y.	Thomson-Houston	8	7
Ross Park St. Ry. Co.	Spokane Falls, W. T.	Thomson-Houston		
St. Louis St. Ry Co.	St. Louis, Mo.	Short	5	3
San Diego St. Ry. Co.	San Diego, Cal.	Henry	9	4
Sandusky Elec. Ry. Co.	Sandusky, O.	Sprague	6	6.75
San Jose & Santa Clara RR. Co.	San Jose, Cal.	Fischer	6	10
St. C., Merriton & Thorold St. Ry. Co.	St. Catharines, Ont.	Van Depoele	10	7
Salt Lake City RR. Co.	Salt Lake, Utah	Sprague	10	6.5
Sault Ste. Marie St. Ry. Co.	Sault Ste. Marie, Mich.	Fischer	2	
Seashore Elec. Ry. Co.	Asbury Park, N. J.	Daft	20	4
Seattle Elec. Ry. & Power Co.	Seattle, W. T.	Thomson-Houston	5	5
Scranton Suburban Ry. Co.	Scranton, Pa.	Thomson-Houston	10	4
Scranton Pass. Ry. Co.	Scranton, Pa	Thomson-Houston	4	2
Southington & Plantsville Ry. Co.	Southington, Conn.	Thomson-Houston	2	2 2
South St. Paul Rapid Transit Co.	S. St. Paul, Minn.	Daft	10	8
Steubenville Elec. Ry. Co	Steubenville O.	Thomson-Houston	6	2.5
Stillwater Elec. St. Ry.	Stillwater, Minn.	Sprague	6	5
Tacoma Ave. St. Ry. Co.	Tacoma, Wash. Ter.	Sprague	4	2
The Peoples St. Ry.	Topeka, Kans.	Sprague	20	12
Third Ward Ry Co.	Troy, N. Y.	Thomson Houston	8	4
Toledo Elec. Ry. Co.	Toledo, O.	Thomson-Houston	2	2
Topeka Rapid Transit Co.	Scranton, Pa.	Thomson-Houston	12	14
Troy & Lansinburg St. RR.	Syracuse, N. Y.	Sprague	6	5.5
Union Pass. RR.	St. Joseph, Mo.	Sprague	8	5
Union Elec. RR.	Sterling, Ill.	Sprague	7	6
Washington St. Asylum & Park RR.	Binghampton, N. Y.	Sprague	4	5
West End St. Ry Co , Brookline Brch.	Boston, Mass.	Sprague	23	12
" " Harvrd. Sq. Brch.	Boston, Mass.	Thomson-Houston	15	14
" " Bylstn & Beach sts	Boston, Mass.	Bentley-Knight		
Wheeling Ry. Co.	Wheeling, W. Va.	Thomson-Houston	10	10
Wichita & Suburban Ry. Co.	Wichita, Kans.	Sprague	7	7.5
Wilkesbarro & Sub. St. Ry. Co.	Wilkesbarre, Pa.	Sprague	7	3
Wilkesburre & West Side RR.	Wilkesbarre, Pa.	Sprague	3	4
Willamette Bridge RR.	Portland, Ore	Sprague	5	1.5
Wilmington City Ry. Co.	Wilmington, Del.	Sprague	4	3
Windsor Elec. St. Railway Co.	Windsor, Ont.	Van Depoele	2	2
White Line St. RR.	Dayton, O.	Van Depoele	12	9
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo.	Sprague	9	4.5
Wyatt Park Ry. Co.	St. Joseph, Mo.	Sprague	8	5.5

New Drying Kiln.*

There is hardly a car-builder or a manufacturer of lumber in the world but who has not experienced the difficulty of getting a kiln which would combine speed in drying with freedom from the defects common to the various methods, heretofore in use, such as casehardening, hollow horning, chucking, warping, mildewing, blueing or discoloring, or drawing the pitch to the surface of the lumber; and it is a common belief that no system of rapid drying can avoid these defects.

In the Drying Kiln shown in the accompanying illustration, a cold air process is adopted, by means of which, it is claimed, that hard and soft wood lumber of any thickness from ¼-in. to 4-in. taken green from the saw can not only be dried as rapidly as by any of the hot air or hot blast methods, but to have it in better condition than if dried in the open air. It is claimed for this kiln that it is constructed and operated on strictly scientific principles; that the chemical and anatomical structure of timber are duly considered, and by following their lamp, preserve it, by retaining in the wood all the resinous and saccaharine matter, and extracting only the water.

The cut shows a kiln with three rooms, each having capacity for, say, 15,000 feet, with condensing chamber at one end. Underneath is the air chamber, into which the air is forced through the walls of the condensers, which are made hollow for that purpose, at the rate of many thousands of cubic feet per minute, depending on the size of the kiln. This body of air moves solidly under pressure in one direction, producing capillary action which syphons the water to the surface of the lumber, from whence it is immediately absorbed, and carried to the condensing chamber, where it is again converted into water, and runs out of the kiln.

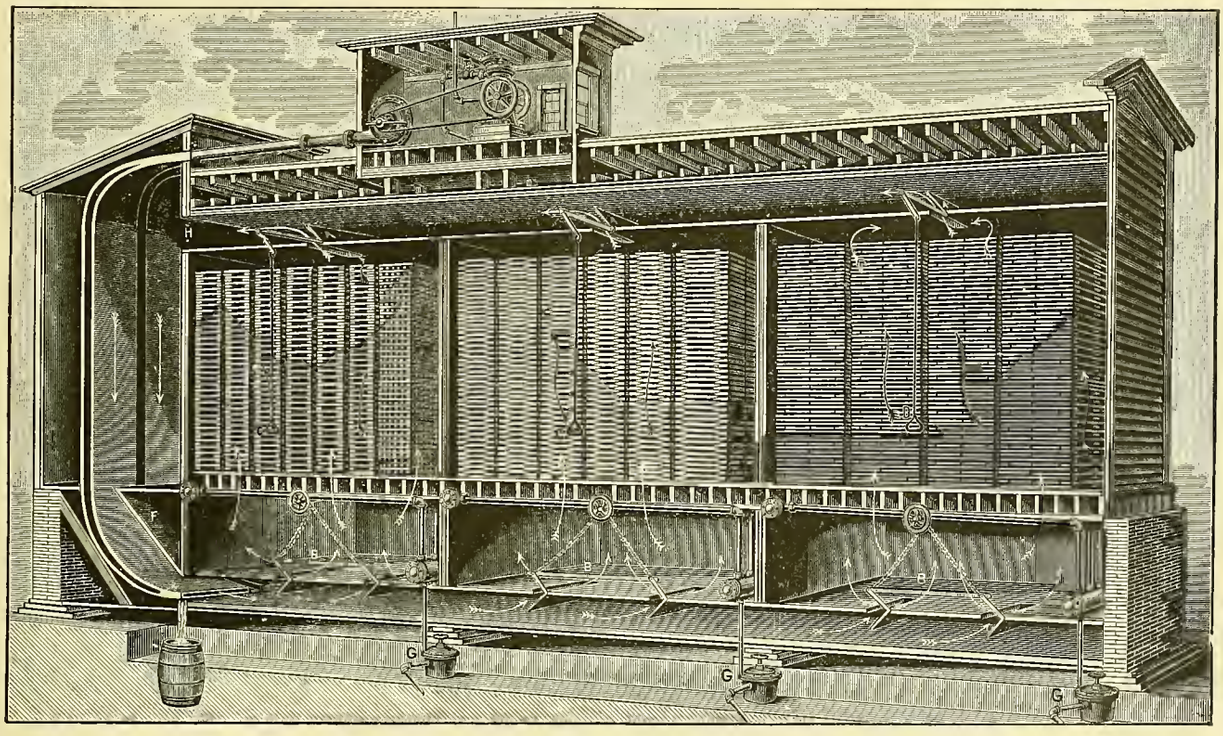
Every particle of air in each room is changed once every minute, hence there is no settling down or souring of damp air in the kiln, as a disk wheel in the condensing chamber, connected by belt with engine at top of kiln, has the capacity for sucking up and into the condensing chamber all the air that is or has become saturated, by passing over or around the lumber in the different rooms. This positive action and movement of air determines just how much heat is required to successfully extract the water in shortest possible time, without injury of any kind to the lumber.

The time required by this process for drying one-inch white oak, green from the saw-mill, is about seven days, and the lumber dries at all points of the room alike, and at the same time.

Each room when in operation is entirely independent of the others; one or more can be idle, being loading or unloading, and the others engaged in drying, or all can be used at one time.

In the construction of this kiln, as much pipe is used as in the hot blast kiln, but much less steam, as only sufficient heat is required to keep up the temperature of the kiln from 80° to 95° in hard and from 80° to 120° in soft woods.

These kilns can be used either with or without cars, and built with any number of rooms from one to ten, capacity from 10,000 to 60,000 feet per room.



New Drying Kiln.

* G. F. Speer, Cincinnati, O.

Cable Railways

Construction.

FAVORABLE CONDITIONS THEREFOR.

These conditions depend upon a few general principles or truths, and the great city of Chicago's phenomenal growth is undoubtedly the best illustration of "the when and the where" obtainable.

Were the geographical, hygienic, political and commercial conditions, with which our country and its institutions surrounded us, favorable to the building of Chicago?

Are Marshall Fields' dry goods palaces, C. B. Holmes' cable railway, and Pullman's palace cars safe guarantees of kindred enterprises? Then, like, or measurably like, conditions in any part of the country, will insure comparative success.

CABLE LIMITS.

All economical systems will have two divisions of two and one half miles of double track each way, run by five-mile lengths of cable—the power house being located as near the geographical centre of the system as possible.

The physical map of the territory, which you intend to invade with your cable system, demands your most careful investigation. Will the territory improve? Are the health conditions favorable to a splendid and rapid settlement! Many homes in and around Chicago have, from some local taint, seen the zenith of their prosperity and are now on the wane. Of course, no business men would build in that direction—better by a grand detour, even with additional expense, keep with, or better, lead the people where mutual interest calls. One of the most successful street railway men of the age, is remarkable in the selection of his routes.

CABLE LINES

should always be as perfect as engineering skill and persistence can make them. We use the word "persistence" with a full knowledge of the situation.

The building of the Brooklyn bridge, or the English bridges of the Tay, were not more exacting than the construction of any work should be, where Portland cement concrete is so important an agent.

This is easier understood when attention is called to the fact that the errors of to-day are fastened on to-morrow by an immovable mass of stone and iron. And yet, the most pronounced errors are made by men who, though competent, assume that it is near enough. "Right," only, is near enough.

The statement that $20,000 per mile of double track is certain to be sunk by the employment of inexperienced help may, perhaps, appear an extravagant one, but experience justifies the assertion. Of course, the pioneers in all building must take their chances, but now why not profit by the blunders made by others.

It is not true that great accuracy in lines will be required for the successful operation of the cable, and yet an expenditure of $500,000 demands the best efforts of engineers and all other employes.

Errors by civil or mechanical engineers are not to be tolerated. The company gives its engineers all the time they require for accurate preparation of work, and for this reason, the experienced engineer never makes a mistake.

GRADES OF CABLES

are as important as are lines, for, upon these depends your drainage. Use all your influence with those in authority (incompetent though they may be), to secure a grade for all time; because cable roads, like "the laws of the Medes and Persians," change not.

The grade of all four of the rails should be the same at every point. No one ever saw water mounting a rail to seek an outlet in the city catch basins.

With a firm, steady hand and all the apparent conciliation that diplomacy will allow, secure lines of beauty which will certainly be "a joy forever."

You will rarely get a grade too high, especially when the streets are wide and the improvements are yet to be made.

Carefully avoid any mutilations of the city grades by unsightly depressions in the grades of your tracks for momentum at pickups, or where changes of cable occur.

Your momentum is perfectly safe in the hands of an experienced grip-driver, and no other should be allowed to handle the lever alone and without a teacher.

PULLEYS AND DRUMS.

The most sensitive movements of cable power lie in the construction and adjustment of carrying pulleys and drums.

Drums, Pulleys and other Cable Appliances.

The following letter and answers appended need no additional introduction:

Gentlemen:—As purveyors for the street railway world, THE GAZETTE is anxious to get from you opinions, which, when weighed with others, in the same line of thought, will enable it to give to its readers vital truths in regard to the healthy condition of Cable Motors.

Such has been the wondrous growth of cable railways, it would be strange, indeed, if large lines of improvement have not suggested themselves to you. To this end we solicit the favor of an early reply to the following questions:

1st. Size of Drums?
2d. Diameter of Pulleys?
3d. Material of Pulleys?
4th. Pulley Journals?
5th. Distance between Pulleys?
6th. Digression. What is the history of "32 feet between Pulleys?" Is it accidental, or is it a necessity?
7th. Elevating Sheaves?
8th. The kind of Cable, please give details?
9th. Tension Weights, are they scientifically adjusted?

The standard established by your answers will be given in the next issue of the GAZETTE.

Very truly yours,
THE STREET RAILWAY GAZETTE.

The Broderick & Bascom Rope Co., of St. Louis, reply as follows:

First, as to size of Drums, would say that it is important that they should be very large, not less than 15 ft. dia., 18 ft. would be better. We know that some engineers say that it is folly to have such large drums when the terminal wheels can be used 9 or 10 ft. in dia. with safety. A careful investigation will show that the terminal wheel 9 and 10 ft. in dia. has scarcely any wear or effect on the rope. The rope will easily bend around this size wheel without affecting it, but it will not bend or work around a drum of the same dimensions without injuring it very materially. The reason of this is that it requires more wraps around a ten or twelve foot drum to run the road than it does around a fifteen or eighteen feet drum.

The grooves in the drum are constantly wearing, and in a short space of time there is a difference in the wear. The rope, therefore, must travel a greater or lesser distance, as the case may be, when there is a difference in the size of the grooves This has the effect of stretching the rope, therefore chrystalizing it, causing it to break on the drums.

We have no doubt that all splicers or those who have charge of the rope will agree with us that the wires are constantly cracking on the drums. It is a common thing to go into the Power House and hear the wires snapping on the drums. If a larger drum is used, a less number of wraps is required. We have seen ropes of identically the same grade of material go to pieces in sixty days, when using 7, 8 and 9 wraps, and when using 4, 5 and 6 wraps, go to pieces in about six months time, and when using but 2 and 3 wraps, last from ten to fifteen months.

This is on different roads. We have also seen on the same road ropes last longer by a fewer number of wraps. Now if these extra wraps are injurious, then a larger drum that requires but a few wraps, is in our opinion the best drum to use.

Your 2d, 3d, 4th, 5th, 6th and 7th questions we are not familiar with enough to give you an opinion. Your 8th question in regard to cables is one with which we are familiar, having made this a study years before we commenced to make cables for street railways. The size cable in common use is 1¼" dia. Cables are used 1", 1⅛", 1¼", 1 5–16" and 1½" dia. The material should be the highest grade of Crucible Steel. The wires should stand a high tensile strength, a high torsional strength, and a good percentage of elongation. If the wire is of a high tensile strength and of a low torsional strength, it will chrystalize in a very short time, and therefore become worthless. If of a high torsional strength, and a low or medium tensile strength, it will stretch very rapidly, and is apt to break in two when an extra strain is put on it, such as heavy loads at one end, or an accident caused by a grip of one road running into a cable of a cross road, or the gripman failing to let go of the grip at the power house when leaving the incoming rope and taking the outcoming rope. An accident of this kind means many hours delay.

If it were possible to make a wire of a high grade of tensile strength and of a high torsional strength, and of a high percentage of elongation, a rope could be made that could no doubt outwear any rope now in use. The great problem among the wire drawers is to maintain the tensile and torsional strengths and get as high a percentage of elongation as possible, but there must be a limit to the percentage of elongation, unless at the cost of the tensile strength, which is an important factor in the life of the cable.

The style of the cable depends on the position in which the rope has to work, and the work it is expected to do. All cable makers make different styles.

In regard to question No. 9, we feel satisfied that this is not given its proper attention. It is an important factor in the life of the rope. Some are scientifically adjusted, but others we know are not.

Construction Cements.

The safe age of pure Portland may be set at from six to nine months. This allows six months from its manufacture in Europe to its arrival in this and other American cities. Such goods, bought of reputable dealers, may be said to be pure, and yet your inspector must confirm the merchant's claims for purity by as rigid a test as is given other goods not known to be the best. It will be safe to reject goods which are older even though they pass inspection. The demands for cements are so many and of so many grades of importance that all really safe goods will find a market, and an inferior grade may find a safe use.

But certain it is that cable railways cannot for an instant think of using those inferior grades.

Note.—The GAZETTE does not advocate the use of cements except as foundations and mortars. We know what we are talking about when we say that concrete cannot stand the shocks of traffic!

KILLING BY DROWNING.

Cement which is made up so wet as to form a liquid loses its strength, or is "drowned," the silica being carried out of its place and a liquid disintegration takes place, in which the essential chemical composition between the carbonate of lime and the silica is dissolved. The silica falls to the bottom in a free state, joining in an inert mass the crushed stone which preceded it, both utterly useless for the expected service. The consistency of thick paste is a *sine qua non* for the successful mixing of concrete.

It would appear almost superfluous to say that with pure Portland and its associates, you will not only have the finest work obtainable from or with concrete, but the excess in the amount of the minor constituents allowable will more than compensate you for the slight advance in first cost.

MACHINE MIXING.

We will not say that it is impossible to properly mix for concrete by machine, but will say that without the most careful inspection it is impossible. First, because of the liability of killing. Second, the fact that dumping to a depth of forty-two inches will stratify your work in the order of dimensions to-wit: Stone, silica and lime, thus surely neutralizing your best efforts.

THE ASSOCIATE ELEMENTS

Of true Portland, sand, gravel and crushed stone, must be perfectly clean; no loamy or other foreign matter is allowable, and the sand must be as sharp as possible. If pure sand is not obtainable wash the sand clean.

In crushed stone avoid soft, sickly surface stone, a dull dead color, which indicates that organic oxygen has already commenced its work.

DRYING.

Cover the work from the rays of sun that the cement may not dry too quickly.

You will find these directions hard to follow on account of the care requisite for good work, and really impossible to follow without a good honest inspector.

FORM OF TESTS FOR DRY WORK.

Make a bricklet in the shape of an hour glass yet rectangular in form, the center being a cubic inch. Make a cast in the usual way, give it twenty-four hours to dry, then four days in water, dry again, when the form should sustain about 250 pounds before breaking.

Power Houses.

Interview with Leander Haynes, Assistant Engineer of Steam, Chicago City Railway.

QUESTION.—Why do you claim that the automatic cut-off engines are the most economical?

Ans.—Because they use steam only as needed to do the work of the engine on that stroke.

What amount of clearance do you need?

Ans.—The smaller the better, because the load and power are nearer together.

What are valve trunnions?

Ans.—They are found on the automatic only, and are end supports to carry the valves, resting in properly prepared boxes.

Is the Wheelock wonderful in its simplicity?

Ans.—Unusually so; in fact the maker will pay well for the omission of any part of his engine which can be improved thereby.

The valve seats?

Ans.—They are supposed to make a steam tight joint when the engine is working; this is the theory in practice not confirmed.

What are recessed valves?

Ans.—They have a centre recessed, the effect of which is to give the steam a better chance to hold them down, but seldom absolutely tight.

Self packing valve stem?

Ans.—Is produced by two collars ground together so accurately as to form a steam tight joint.

The throttle valve?

Ans.—It starts the machine by admitting the steam into the cylinders.

Dry steam?

Ans.—Dry steam is true steam, and wet is adulterated. Again, dry steam is of so superior temperature as to have the effect to expand the steel or iron of which the engine or port is constructed, the effect of which is to render the joints tight, so much so as to be detected at once. We see very little of wet steam in the Hazleton boilers, on account of the immense heating surface which they afford.

Swivel seat?

Ans.—A link of swivel attached to the valve stem moves as required.

Engines with condensers?

Ans.—In compound engines, they use the steam over and over.

Non-condensing?

Ans.—Use steam only once.

Effective power?

Ans.—The amount of power available for the work, not omitting friction of engine or shafting.

To secure the least frictional resistance?

Ans.—We need great care on the part of the engineer; the best lubricator, and plenty of it.

The use of a relief valve?

Ans.—It admits relief steam into main.

Many thanks, Mr. Haynes, but every faithful and long experienced engineer always finds lines of improvement suggesting themselves from time to time.

What have you in this very interesting line of thought?

Ans.—In cable engines which are run twenty-two hours a day, I am certain that more "elbow room" is essential. Two hours is a very short time for overhauling, and we should be able to get at our work quickly and easily; we always get there quickly, but not so easily as we might. Again, the machines should always be constructed for the work expected. Our work requires plants of massive proportions, while other cities should economise in this particular.

THE Union Passenger Railway Co., of Providence, R. I., has closed a contract with the Julien Electric Traction Co., for the introduction of the storage battery on its line. Thirty cars for this purpose are being built by the John Stephenson Co., of New York, and fully equipped for the purpose.

Curves and Grades.

CURVES ARE COSTLY—GRADES ARE NOT.

Actual experience on the cost of operating cables on curves :

45	foot rad.	curve set at		$1,000 as a unit of cost.
60	"	"	will rate at	750
80	"	"	"	563
100	"	"	"	450
200	"	"	"	250
400	"	"	"	125
1000	"	"	"	50

GRADES NOT COSTLY !

A wise management will arrange the time table for the movement of the cars so that on a 25% grade or even more the loads will be counter-poised, thus simply securing a mutual or reciprocating motion or effect on the steepest grades.

Safety Appliances.

In view of the vast number of accidents that have occurred to life and limb by the operation of the cable roads in California, the operating companies in San Francisco are using extra precautions to guard against accidents. The latest scheme in this respect is one invented by F. McPherson, of San Francisco. It consists of an iron frame five feet in height and as wide as the motor car, over which is stretched a rope netting; the frame is held in position by iron braces at the sides and projects some two feet from the motor car; it has an outward incline over the top of six inches, and along the bottom, which is two inches above the car, runs a strip of rubber. The device acts like the cow-catcher of a locomotive with the exception that it actually catches any person it may run into, in the netting until the car is stopped, whereas in the case of the locomotive the general rule is that anything struck by the cow-catcher flies into eternity.

Another scheme for the protection of life and limb was a contrivance of locked pieces of gas pipe bent into circular form, and stoutly bound together; the upper part of the device projects only a few inches from the frame of the motor car, while the lower part was so arranged as to project more than a foot beyond, and only one inch above the track. This invention is fastened to the motor car by means of two bent pins resting on stiff iron plates fastened under the platform; instead of catching an obstruction this device switches it to one side or the other.

The Foster Street Car Heater.

This heater,* which was tested in Rochester last winter, consists of cast iron furnaces. with no joints above the fire, encased in a galvanized iron casing, provided with a proper cold-air opening. From the furnace the heat passes through an enclosed in conduct and a tin conductor, running parallel with both seats, and lifted three inches from the floor; this is covered by a light cast iron frame, with diamond shaped openings for the escape of the heat, these forming a perfect foot-rest In a single end car the heater is placed under the rear end, a foot from the rear platform.

In the double end car it is placed in the center, beneath the car, a foot from the side. It is claimed by the inventor that the heater is devoid of all gas, ashes or other obnoxious substances, and that, being located as it is, it occupies no passenger space in the car. This heater was thoroughly tested last winter in Rochester, and the local press of that city spoke very highly of it.

As we go to press news reaches us from the Pacific Slope of the incorporation of the Woodland Park Electric Railway, of Seattle, by Guy C. Phinney, Daniel Jones and Benjamin F. Day, who will serve as trustees until the regular meeting of the stockholders on October 15, 1889.

The capital stock of the company has been placed at $100,000 of $10 each.

*Wm. S. Foster, Rochester, N. Y.

Leavitt's Elevated Cable System.

In answer to several correspondents, asking for information relative to the Leavitt Elevated Cable R. R. system, *we will say that it consists of an over-head cable lifted about 15 feet above the level of the ground, and supported by posts set in the center of the vacant strips of ground between the tracks, said posts being supplied with adjustable arms, with carrying wheels or sheaves at the extremes of the arms. In the accompanying illustration in figure one, the one car represents a cable lifted above the carrying sheaves, the other one with the cable down. Figure 2 shows a side view of the grip, together with the apparatus for raising and lowering same.

In place of having the grip above the cable as in the conduit system, the grip is always below the cable in the elevated system, and, consequently cannot get tangled up with loose strands of wire.

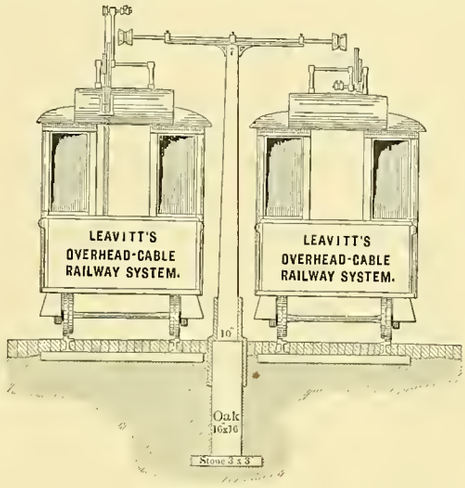


FIG. 1.

A clutch or grip, is connected with the top of the car, that when depressed passes under the carrying sheaves, and when elevated, is made to lift and grasp the cable, in which latter position the clutch passes before the carrying sheaves, so that a cheap, durable and efficient road is obtained, all the parts being easily accessible for adjustment and repairs, and without materially obstructing the view of the street.

It is claimed by the inventor that a road can be built under this system at, practically, a minimum of cost.

He also claims that the car is under perfect control of the gripman, who has only to pull certain cords to detach the car from the cable.

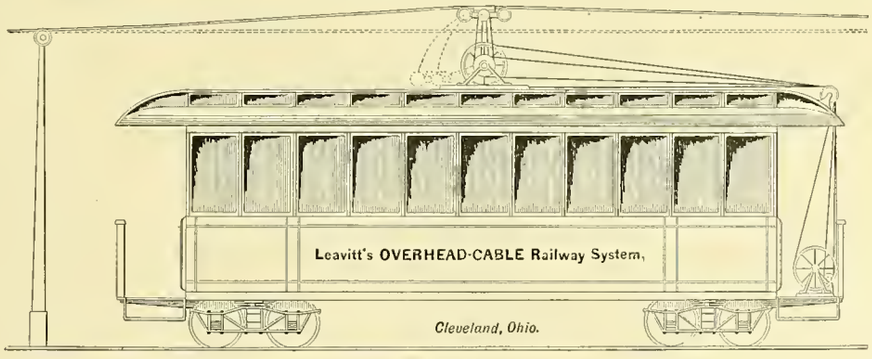


FIG. 2.

One advantage that this system apparently possesses, is that the cable is run clean and free from muddy water and sand, and without coating of oil or tar, as in the case of underground cables.

PAVING for street car barns demands serious consideration. Timber flooring gives temporary results which are highly prized by the foreman ; but if his is a "grey head on green shoulders," he will soon see that the occupation by so many animals quickly unfits the flooring for healthy requirements. Brick of any degree of hardness is short-lived, granite is usually as rough as cobble, so that the main dependence is now being placed in the clean cut stone from the Big Sioux River, at Sioux Falls. As even as planking, indistructible from any cause, true economy points with experienced fingers to the beautiful stone.

* Charles Leavitt, Cleveland, O.

Terra Cotta Lumber.

Quickly and as it were in sympathy with the wonderful improvements in the manufacture of steel, comes the modernized application of the clays to the business of building. Modernized, because history tells us that the tower of Babel and the walls of Babylon were built of burnt bricks, while Nineveh and Egypt used the sun-dried. It is quite well understood that climatic necessities were then, as now, the guide to the selection of building material, especially with the lowly. The revifying of, and the wonderful improvements in the process of clay manufacture, are the result of C. C. Gilman's research, who now comes forward and with the aid of the grasses of the field, the reeds of the sedimentary soils, together with common saw-dusts and asbestos wools, produces, *ad libitum*, most if not all, of the shapes of building material. Together with other thinkers, Mr. Gilman calls his goods by significant names, hence we have porous earthen wares, terra cotta lumber, brick wood, wood stone and cellular pottery. Again with his licenses, from letters patents, he teaches you how to produce in an economical way every variety of goods recognized by your rights, while he continues with other practical minds to evolve new applications, which are yours on the same general terms as before. Herewith are a few of the many applications which, to date, are perfected or in the process of perfection. Fire proofing of buildings, cable and electric railway conduits, sidewalks, foundations for pavements, this application alone is worth millions to our growing cities. Boiler coverings, vault and safe linings, refrigerators, filters, wall tubing, subways, from the river tunnel to the electric conduit, chimneys, furnace linings and drainage tiles. But to our own business of building cable and electric street railways your particular attention is requested. Cable railway conduits have proved so costly when built by common labor, with uncommon and costly Portland cements, that capital, always timid, had well nigh despaired of securing the services of these giant carriers ; and while looking at, and especially for electric railways, they have contented themselves with the old tramway horse roads, and not till the application of Gilman's water proof terra cotta lumber, burnt in forms to suit, was made by the editor of this paper, was it possible to build just four miles of conduit forcable railways with the cost of one mile built of the costly and wasteful Portland cement concretes ; and what is a far more valuable conisderation, the new material makesthe cable railway noiseless, frostless and indestructible.

Labor.

Tasks are as pure gold in the results of labor. A corporation with assets enough to build such works must certainly be able to do work as cheaply as can the best contractors. In some of the remarks by the inventor and engineer it may be thought that too exacting conditions are laid down, but an experience excelled by none and equalled by few warrants such conditions and they are inserted with a full knowledge of what is demanded. Poor economy is not more plainly marked than in the employment of cheap labor, especially of the higher grades--when capital builds wisely it builds well.

Men there are who are specialists. Much of their work may be essential to successful construction. In such cases care should be exercised to prevent waste of material or labor. Broken pitchers hold no water. Errors by experienced men are not to be permitted. Such men are allowed all the time essential to the preparation of large blocks of work and they must know that a line. a grade, a gauge, a haul of material, or a measurement is correct and must know this before labor hours. They must improve. He who builds last builds best. A wise treatment of labor is demanded by considerations of justice and the best personal interests.

The Street Railway Gazette.

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Articles and papers on subjects relating to intermural transit always appreciated; the Gazette's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways.

Announcements.

All cuts and copy for new advertisements, articles, business mention, etc., intended for publication in the Gazette must be at our Chicago office not later than the last day of each month.

Intricate problems and difficult questions relative to the construction, equipment, operation and management of Cable, Electric, Horse, Dummy or Motor roads, will receive prompt attention if sent to the Street Railway Gazette.

During the past month the publishers of the Street Railway Gazette have had to refuse to entertain certain advertising propositions on account of a "write-up" clause being tacked onto them:

While the Gazette is always anxious to obtain cuts and data of new devices suitable for street railway purposes, it must respectfully decline to lend its editorial columns to the puffing or "writing up" of the goods of any manufacturer, whether he is or is not an advertiser in the paper, as we desire to be consistent with our past policy in reflecting the opinions of our clientage, instead of attempting to lead them, and our endorsement of any particular device or system might not only prove detrimental to others, but would certainly be a direct violation of our past and present policy. Therefore all propositions for advertising made on a "no-puff—no adv." basis will be respectfully declined.

Street railway officials will confer a favor upon the Gazette's readers by notifying us of all Elections of Officers, issuance of additional stock, declaring of Dividends, Resignations, etc.

Advertisers and subscribers failing to receive the Gazette each issue, will have the matter at once investigated by so advising the publishers at this office.

The Storage Battery.

We believe that it is pretty generally understood that the overhead system of electrical transmission will, sooner or later, be relegated to the past. We have yet to find an electrician or railroad man who does not think that the overhead wire system has come to stay.

That it certainly affords a much better means of traction than that afforded by animals, that for many reasons, the system is not what is most wanted. The idea of each car carrying its own electricity, ready for immediate use, is certainly a fascinating one, and we do not hesitate to predict that as soon as the storage battery is brought down to a commercial basis it will be almost generally adopted.

According to the best of our understanding almost all the advocates of overhead wire system have, way down deep in their hearts, a sneaking hankering for the storage battery. A very well known gentleman, vastly interested in electrical transmission, recently made the following statement, "What we are looking for is a good, sensible, commercially-practicable storage battery.

We have numerous storage batteries, some good, others indifferent, but all of great value in the laboratory. Now give us something cheap and practical. There is nothing the matter with the overhead and conduit systems, but what is wanted is a system by which we can conform our present cars into electric tramways, and go on running without all this fuss about overhead wires and underground cables, and one hundred confusing details."

The Gazette has always been an earnest advocate of the storage battery, and looks forward to the time when street cars will be complete in themselves and carry their own power, motor and equipment.

Electric *versus* Animal Traction.

The electric street railway business is growing at a tremendously rapid rate throughout this country, and almost every mail brings word of new plants being installed. Where, two years ago, hardly a dozen cars were being run by electricity, to-day there are over one thousand running over five or six hundred miles of road, representing over a hundred different plants. The cause of this enormous growth in one business in so short a time can be readily understood. The desire of all railroad managers is to reduce the running expenses of their roads to the minimum, and it has been found that operating a road by electricity, using the best known system, reduces the expenses to the lowest level. One big bill of expense on a street railway is the depreciation account; and it is a well known fact that the repair on a road operated by horse power, have run as high as 25 per cent., while on roads operated by electricity they are much less. A great many figures have been published in regard to the relative costs of operating cars by electricity and horses. One of the most interesting statements from practical experience, which was published in the Gazette a few issues ago, was from President W. L. Allen, of the Davenport Central Railway Company, of Davenport Ia. This shows a gross increase in earnings of from 48 per cent. to 66 per cent., and a net increase of from 110 per cent. to 320 per cent., from the four months from Sept. 1st to Jan. 1st, 1889, with electricity, compared with the same months of the year before, with horses.

The statement of a street railway president like Mr. Allen is worth a great deal, and his figures prove conclusively that the operating expenses and repairs on a road run by electricity are much less than on the same road operated by horse power. It is, therefore, not surprising that so many street railways in this country are substituting electricity for horse power.

Police Protection.

The various tramways in the suburbs of the city of Berlin are under the strictest police protection. According to these regulations, vehicles are only allowed the use of car tracks in cases of the greatest necessity, and, in that event, they must be promptly vacated as soon as the obstruction to their resuming the public open thoroughfare is removed. These rules are inflexible, and all violations of same are invariably met with a severe fine and imprisonment. All tramway employes have strict instructions from the municipal authorities to report all cases of violation of such ordinances at once. As the damages to which such roads might be subjected to—by unlawful use of the rails by heavily-laden teams, driven by irresponsible drivers—is frequently a serious matter. The authorities have decided that when found guilty, and duly fined, in the criminal court, the arrested party is liable, and can be mulcted for damages in the premises in the civil courts.

Confirmation Strong as Holy Writ.

In the May issue of the Gazette we inserted under the caption of "Electric Lights for Special Hazards," that the fluid should enter and traverse the building through the iron pipe which gas had so long and safely depended on. Now comes the following from Europe:

"The wiring of the parliament building in Vienna has been quite ingeniously accomplished, the principal cable running through one of the many ventilating pipes, the wires being carried through the gas piping, thereby allowing the elaborate decorations on the wall to remain uninjured."

Who shall say that lines of thought do not parallel themselves?

The Johnstown Disaster.

As we go to press, news reaches us of the frightful and wholly unprecedented disaster which has overtaken the town and neighborhood of Johnstown, Pa. On account of a lack of adequate telegraphic communications, the Gazette has been unable to obtain thoroughly reliable data regarding the disaster; likewise did its representative fail to reach the town the next day after the occurrence, or it would have been in a position to give further details to its many readers.

For many days past the daily papers have been filled with accounts of the terrible flood at Johnstown, and the frightful holocaust at the Pennsylvania bridge. Thousands upon thousands of human lives have been lost; tens, aye, hundreds of thousands of dollars' worth of property destroyed—and all, practically, with little or no warning.

One of the first dispatches from the scene of destruction and desolation announced, we are more than glad to report, that Mr. A. J. Moxham, the president of the Johnson Co., was saved, also his wife and family. One of his first acts was to telegraph to New York for a train load of provisions to be sent down with quickest possible dispatch, for the relief of the sufferers.

An officer of the Cambria Iron Co. wired to New York for blankets and clothing for those who needed it. While we most heartily sympathize with those who have been left fatherless, motherless, husbandless, wifeless, childless or homeless, we cannot refrain from pointing with more than ordinary gratification to the fact that the two instances herein referred to, stand out in bold relief, against the popular fallacy of the utter heartlessness and soullessness of monopolies and corporations.

Among the many sufferers no one will have more friends who will sympathize more deeply with his sorrows than Cyrus Elder [Gen'l Counsel of the Cambria Iron Co.], the well-known lawyer and economic writer. His was a beautiful home, where domestic happiness, intelligence and affection made everything lovely. There was harmony in all the elements about it—a sort of ideal family circle. The beautiful house and its contents were washed away in the turbulent currents of the mad torrent. The mother and one daughter are reported among the drowned. The older son and Mr. Elder were, perhaps fortunately, absent from Johnstown when the disaster came. The younger son and another daughter were saved. Thus is the family broken and the home gone. The ruin is not so complete as in many cases, but in few were there so much to be destroyed. Mr. Elder took much pride in the city of his home, and had done much to improve and beautify it and elevate its inhabitants. In addition to his personal loss comes the loss of the city to which he had given, for years, so much of his attention.

A later dispatch reports the finding of the body of Mr. W. E. Hoopes, late secretary of the

Johnson company. We well remember Mr. Hoopes, at Johnstown, and, when in company with Maj. H. C. Evans, at the Washington convention last fall.

He was quite a young man, but one who was full of push and business energy. His thorough knowledge of the rail business made him a most valuable officer of the Johnson Company, while the geniality and thorough courtliness of his manner endeared him to all who knew him.

His loss will be profoundly mourned, and we trust that those who survive him will accept the assurance of the sincerity of our sympathy for them in their sad bereavement.

European Tramways.

The following extracts, compiled from the popular and able treatise of Herr von Lindheim on the tramway interests of the world, will undoubtedly prove interesting reading for many of our readers.

That the tramway has become a sound business venture, as well as a public necessity, is amply proven by the fact that in France, Germany, England, Belgium, Holland, Austria, Hungary and Switzerland there are 221 cities which have tramway enterprises. Of this number 118 are located in England, 23 in France, and 43 in Germany. In the United States the street railways have so far gained public favor and liberal patronage that enterprises of this description are found in all cities with at least 1000 inhabitants. In contemplating these figures it must be borne in mind that, while the era of steam railways dates back fifty years, the tramways can only refer to an existence of from fifteen to twenty-five years.

The development of the steam and tramway interests in 1886–1887 was as follows:

COUNTRY.	Kilos of Railroad.	PASSENGERS CARRIED.	Kilos of Tramways.	PASSENGERS CARRIED.
Belgium	4,532	65,877,467	612	31,275,526
Germany	38,254	295,758,906	843	245,657,503
England	31,105	725,584 370	1,419	416,518,423
France	33,345	?	718	?
Holland	2,865	22,789.502	770	26,118,111
Italy	11,388	?	2,170	?
Austria-Hungary	23,390	66,408,000	228	83,860,529
Russia	27,355	?	187	?
Switzerland	2,797	24,786,925	26	6,677,874
Un'd States	221,010	?	9,553	?

The foregoing statictics suggest a particularly interesting comparison between the steam railway passenger transportation and that extended to tramways. In 1870 the combined street car service of Berlin, Hamburg and Stuttgart carried 5,000,000 passengers over its roads, whereas today one Berlin enterprise alone collects 102,000,000 fares annually. Take Austria, as an illustration. In that empire the passenger traffic has gradually increased from twelve to eighty-three millions. In the United States the enterprising street railway builders who were placed on record as operating 6,000 kilometres of road in 1883, now proudly point to a total of 9,533 kilometres, represented by 642 companies.

The number of passengers transported and the receipts, were the following (annual average):

YEARS	COUNTRIES.	PER KILOMETRE.	
		Pass'g'rs Carried.	Receipts.
1886	Belgium	327,221	francs 36,226
1887	Germany	291,407	" 44,706
1886–7	England	293,571	" 49,377
1886	France	339.226	" 50,884
1887	Austria-Hungary	308,272	" 63,920
1886	Switzerland	233.264	" 34,250

The different seasons, days, and even hours have an influence on passenger traffic and hence materially effect receipts Thus, at Berlin the annual income is indebted to the month of May to the amount of 9 per cent., whereas the tramways of Breslau and Brussels rely upon earning 10½ per cent. during July, and Cologne, Vienna, etc., during the same month count upon 11 per cent. February is generally considered the least productive month in the calendar, averaging from 5 per cent. to 6 per cent. annually. At Berlin, Sundays and festival days, with their 27 per cent. of the annual receipts, are especially cherished. These holidays affect the Brussels tramway earnings 23 per cent, and are probably most appreciated by the Vienna enterprises, whose income it favorably affects from 25 to 40 per cent., rather an enviable showing. Friday seems to retain its unlucky prestige, even in the street railway interests, as it is considered the worst day in the week—always "light."

The following will show at a glance the motive power and rolling stock in the various countries:

COUNTRIES.	CARS.	HORSES.	LOCOMOTIVES.
Belgium	715	1,206	35
Germany	3,345	11,611	111
England	3,494	25,501	484
France	2,780	9 035	38
Holland	735	696	187
Austria-Hungary	1,271	4,848	90
Switzerland	88	272	3
United States	22,940	92,203	248

Pen Sketch of Col. R. D. Frayser.

We understand that Col. R. Dudley Frayser, well known to most of the members of the A. S. R. A. as a financier, has been elected to the presidency of the Memphis City Bank.

In his early days, Mr. Frayser was very delicate, in fact it was an open question as to whether or not he would ever attain man's estate. He grauated with honors at the Kentucky Military Institute in 1861 and went to Knoxville to drill Col. W. H. Carroll's regiment, with which he became so popular that he was elected Lieutenant Col. at the first opportunity. At that time he was not 21 years of age. Under the then regulations of the war department he was not, however, permitted to fill that position at that age, as the next highest in rank was promoted by orders from Richmond, so he continued to fill the place of adjutant, and was practically in command of his regiment at the battle of Mills Springs in Kentucky, and remained in that important position until the reorganization took place at Corinth, Miss, the Thirty-seventh Tennessee then being a part of Marmaduke's splendid brigade. After his first baptism of blood he was again re-elected lieutenant colonel. He was twice badly wounded; once at the battle of Murfreesboro, and again in the terrible charge July 22nd, 1864, in front of Atlanta. He came out of the war without any profession, and at once settled down to reading law under Judge R. J. Morgan, finally entering into partnership with that gentleman.

Col. Frayser is now a man of wealth, is president of the Security Savings Bank; has two or three plantations, is engaged in stock raising, is a heavy stock-holder in the Street Railway Co., and the writer who has been his guest, can testify as to the hospitality of his home in Memphis.

At the Cincinnati convention of A. S. R. A., Col. Frayser was accompanied by Mrs. Frayser, but on account of sickness it was impossible for her to attend the Washington convention; her place, however, was filled by their eldest daughter, whose grace of person and charm of manner, won for her many friends.

Aluminum.

This beautiful metal is to be found in clays and other earths, also in granites. It was first discovered by Wohler in 1828 but was more critically investigated by him in 1846. Whether the French chemist followed Wohler, or made to himself a new discovery is not known, but certain it is that Develle had in the early years of Napoleon III so far perfected his methods as to attract the attention of that patron of art to his work; and not by words only but in deeds did the emperer assist the student—by a gift of 37,500 francs. These means and methods had the natural result to cheapen the product, not only in France but throughout the civilized world. Its cost in the early years was $286 per pound, while now, better metal is furnished for $5 per pound. Ross, in 1855, found a metal in Greenland, which proved rich enough in aluminum as to be an unfailing supply for this and other countries up to the present time. Aluminum is a white metal, in looks resembling zinc, it is not visibly affected by the atmosphere; certain it is that neither hot nor cold water has any perceptible effect upon it. It is low in S. G., being 2.630 and weighing only 25 per cent. as much as silver. It was this peculiarity that caused Napoleon to use the metal as a substitute for silver in the manufacture of military trappings and ornaments—thus obtaining the shadow without the substance, and at a great reduction in cost; a consideration which often had its fascinations for that so-called adventurer. Aluminum gives off a beautiful sonorous sound, sweet as the laugh of childhood and ought to and no doubt will be extensively used as an admixture with copper and brass in the manufacture of fine bells. Aluminum has a yellow alloy resembling gold in appearance but on account of the visible effects of acids is not dangerous. Alloyed with steel or iron, this metal has the valuable effect to preserve those metals in places where oxygen expects to do the most harm. As an ornament it did not at first commend itself, on account of its zinc-like appearance, but, later on, Dr. McAdam, of Scotland, found, by treating it with hot potash, the surface was eaten away, leaving a sheen of frosted silver which quickly restored it to artistic favor. The years pass on in their ceaseless rounds but the beautiful metal remains untouched by Time's effacing.

A Unique Accident.

A few weeks ago a one-horse car of the Grosse Berliner Pferde Eisenbahn Actien Gesellschaft in Berlin was partly consumed by fire, caused by the shelf upon which the oil lamp stood, in the corner of the car, catching fire and burning through—presumably started by a lighted match being carelessly thrown on the kerosene impregnated rest. After the flames had fought their way through the bottom, the lamp exploded, releasing the coal oil only to saturate and envelop the side, interior and even the front platform of the car, in a raging blaze. With frantic screams the horrified passengers added terror to the scene and fought desperately for an exit from the impending holocaust by the rear door. This, providentially happened to be open, and aided by some cool heads all were shortly liberated with but a few burns and bruises to remind them of their narrow escape.

The passengers once rescued, every energy was now directed to the saving of the car. The horse was promptly unhitched, and wet blankets were used to stifle the flames, but all in vain, the heat being too intense. After all available means had been exhausted—this accident having occurred on the Gertraudten bridge at an hour when few were abroad (10 p. m.)—fortunately two firemen, attracted by the flames, appeared upon the scene with hand extinguishers, and to these chemical agencies the flames at last succumbed.

The horse was then hitched to the charred remains of the once gaily painted car and taken to the barn, while the gallant firemen were complimented upon their valuable services, and the rescued passengers received from the immense crowd of spectators, which had been attracted by the novelty of the scene, heartfelt congratulations upon their remarkable escape from the humiliation of being cremated in a bob tail car.

Hints to Inventors.

90% OF ALL INVENTORS FAIL.

1st. Because you cannot stand alone. "It is not good for man to be alone." You must divide with capital. Brains and capital make a good team.

2d. Because you fail to see that elaborate and costly appliances cannot find a market

3d. You must remember that such goods cannot give a satisfactory wear.

Caution. Remember that while you have the merits of your invention elaborately stated, cunning capital asks where are the defects? What objections can be brought up and sustained?

If the two gentlemen who recently called at the office of the STREET RAILWAY GAZETTE for information regarding the Bowman "Still Cable" will call again, we can now show them drawings and details of the system.

Cuts for illustration in the GAZETTE are being prepared, and will, probably, appear in our July number.

Street Railway News.

DOMESTIC.

(See also "New Enterprises," "Extensions," "Elections," etc.)

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a verification of each item received by them in time for each issue:)

ALABAMA.

Oxford—The Oxford Street Car Co. and the Minnelula Co. having consolidated, have increased the capital stock of the joint companies to $75,000.

CALIFORNIA.

Marysville—The street railway company, previously reported as having a charter to operate between Marysville and Yuba City, has commenced to build its road. The city fathers of Marysville threaten to enjoin the work unless flat rails are used in lieu of T rails, as proposed by the company.

San Francisco—A meeting of the superintendents and chief engineers of all the cable roads in this city will shortly be held for the purpose of adopting some scheme for the further protection of human life and limb from accident from the cable cars The calling of the meeting is the direct result of a recent action of the Committee on Health and Police, which reported that it would shortly introduce an ordinance that will compel the cable railways to provide adequate safeguards on the dummies that will assure the safety of passengers and persons on the streets through which the cars run.

GEORGIA.

Atlanta—The Atlanta *Constitution* of May 28th states that the Fulton County Street Railway Co. has increased its capital stock from $50,000 to $100,000, thus insuring the building of the road.

KANSAS.

Wichita—Permission has been granted the street railway companies of this place to erect poles and adopt the overhead wire system here.

MASSACHUSETTS.

Watertown—The Thomson-Houston Electric Company is equipping the line from this point to Waltham.

MINNESOTA.

St. Paul—The cable rope for the East Seventh St. cable line, which recently arrived here from Roebling's factory, Trenton, N. J., is 30,000 feet long and 80,000 pounds in weight. Sixteen new cars for use on this road have already arrived, and Chief Engineer Clift Wise states that the line will be in operation by the middle of June without a doubt.

MISSISSIPPI.

Vicksburg—Electricity is to be adopted as a motor power by the Vicksburg Street Railway Company here.

MISSOURI.

Kansas City—At a recent meeting of the stockholders of the South Side Street Railway Co. it was decided to increase the capital stock of the street railway from $10,000 to $25,000. The road when completed will be operated by the Metropolitan Street Railway Co.

The Kansas City Cable Railway Co. is adding to its stock of cars from the John Stephenson Company, of New York.

St. Louis—At the annual meeting of the stockholders of the Union Depot R. R. Co., of which John Scullin is president, was held last month at the office of the company. No dividend was declared.

NEW JERSEY.

Atlantic City—The electric railroad of the Sprague Co. here, is said to be one of the finest in the world by those who have seen it. Everything about the road is as perfect as the highest grade of engineering work can make it. The perfection of all details of the construction work particularly commands the admiration of all who see it. This work was done for the Sprague Co. by Leonard & Izard, of Chicago, whose long training in electric lighting gives them a decided advantage over others less experienced in work of this kind. With their well trained force of skilled workmen they met successfully the many obstacles which this installation presented. To construct an electric railroad, while horse and steam cars are passing along the track every few minutes, is no slight task, but Leonard & Izard surprised all observers by the rapidity and excellence of their work. The Sprague Co. accepted the work immediately upon completion.

Elizabeth—An important contract was recently closed in this city, whereby the Connelly Motor will be substituted for horses on the line of the Elizabeth and Newark Horse Railroad of this city. In accordance with this contract the entire management of the road, subject to said ordinance, passed into the hands of the Connelly Motor and Equipment Co. of New York City, who will receive all income of the road for the next ten years, paying however, to the railroad company entire interest on its bonded debt, semi-annually, and six per cent dividend on its entire capital stock. At the expiration of ten years the rate of dividend on stock to be fixed anew, either by agreement or arbitration, and similar provision is also made for subsequent periods of ten years. Should the Connelly default in the payment of interest or dividend, for sixty days, the Railroad Company will resume possession of the property.

Trenton—Sunday, May 19th, a fire destroyed all the cars belonging to the Trenton Horse R. R Co. On the following Thursday an order was given to the John Stephenson Co., of New York, for an entire new outfit of 23 cars; promptness of delivery being a necessity.

NEW YORK.

Elmira—Col. D. C. Robinson is developing his street railway system in a manner both creditable and durable. Among other new cars from the John Stephenson Company, limited, he is now adding some similar to those recently put upon the 23d St. line in New York City.

Troy — The Troy & Lansingburg Co. has placed the contract for the construction of its engines, etc., for their electric road.

The Watervliet & Turnpike Street Railway Co. has been granted permission by the Council to erect poles and string wires to enable it to operate its cars by electricity.

Arrangements have been made whereby the terminus of the Watervliet Railroad will be in this city instead of in West Troy as formerly. The proposed improvements of the road will consist of 50-pound steel side-bearing rails and 35-pound steel T rails, electric plant for operating overhead system, twelve new cars, sixteen motor trucks, eight of which will be capable of hauling an additional car.

At a receent meeting of the stockholders of the company, it was unanimously decided to place a mortgage of $350,000 on the property for the purpose of paying the debts and carrying the new improvements, the estimated cost of which is in the neighborhood of 165,000. The new issue of bonds will be handled by Brewster, Cobb & Estabrook, of Boston.

OHIO.

Cleveland—The East Cleveland Street Railway Co. will probably have its cars operating by electricity down town by the 1st of July. The line to Collamer, three miles east of Lake Avenue Cemetery, will soon be finished, and cars over that division will also be operated by electricity.

The South Side Railway Co. has just received its new equipment of electric cars from the John Stephenson Company, fitted up with motors and appliances for the operation of the Thomson-Houston company's overhead electric system.

The reorganized Bank St. R. R. Co. has asked for a lease of the property opposite the bridge leading to the Union Depot at the foot of Bank St., for the purpose of building a waiting room and office there. The company is anxious to adopt the storage battery, but if this cannot be arranged the overhead system will be adopted. The company expects to have its line in operation within the next month or so.

Greenville—Construction on the line projected to run from this point to Newark has been commenced, and work on the same will be pushed to completion.

Mansfield — The Mansfield Street Railway Electric Company has sued Messrs. Neftel & Cothout for failure to fulfill contract, the company claiming that the parties only built part of the road, although they had received full payment under the contract.

[Personally we know nothing as to the merits of the case.—Editor.]

OREGON.

Portland—The Portland Cable Railroad Company has let the contract for engines, boilers and all the machinery necessary for its road. The outfit is to be a duplicate of the Geary street, San Francisco, machinery, and is to be first class in every detail. Work on the road has been begun and the orders are to push it to conclusion as rapidly as possible.

PENNSYLVANIA.

Pittsburgh—The Pittsburgh Union Passenger Railroad, and the Pittsburgh and West End Railroad Company have accepted the provisions of the new street railway act.

The Second Avenue Street Railway Company of this city has accepted the provisions of the new street railway act.

Reading—The new cars from the Stephenson Car Works, New York, recently put on the East Reading Road are probably the most comfortable electric cars now in use. They have the new Stephenson trucks which take all the machinery and appliances, and the body rests upon super-rubber springs, thus completely insulating it from all noise, jar or shock.

RHODE ISLAND.

Newport—Work on the Street Rai way at this point has been commenced, and will be pushed through to completion with the least possible delay.

TENNESSEE.

Memphis—The Citizens' Street Car Co. and the Memphis Street Car Co. have consolidated, and will, in the future, be known as the Consolidated Street Car Railway Co. with the privilege of increasing its capital stock and changing its motor power.

Nashville—We understand that the Nashville Street Railway Company will probably operate its road by electricity in the near future.

TEXAS.

New Birmingham—As soon as the New Birmingham Iron & Land Company grants the necessary right of way to the New Birmingham & Rusk Street Car Co, formerly reported in the Gazette as having been incorporated, work will be commenced along the line of the road. The street car company has arranged for the purchase of most of the material for its tracks.

San Antonio—The street car line at this point has been bought up by the Fort Worth Line and Construction Company, and will at once adopt electricity as a motor power.

Waco—Permission to adopt electricity as a motor power has been asked by the Waco Street Railway Company.

UTAH TERRITORY.

Salt Lake City—The John Stephenson Company, Limited, of New York, is now building a number of cars for the Salt Lake City Railway Co. They are to be supplied with electric motors by the Sprague Company.

VIRGINIA.

Charlottesville—The storage battery is going to be thoroughly tested on the line of the Charlottesville and University Street Railway Company.

WASHINGTON TERRITORY.

Spokane Falls—The Thomson-Houston Electric Railway, four miles in length, at this point will be in operation by the 1st of August; cost of the road will be in the neighborhood of $100,000, and the operating company will be known as the Ross Park Electric Street Railway Company.

Walla Walla—The street railway company here, previously reported in the Gazette, will operate its line by electricity.

WISCONSIN.

Ashland—Superintendent Hopper of the Ashland Street Railway Company, who has been actively connected with that corporation since its inception, has resigned. His successor has not been appointed.

FOREIGN.

AUSTRIA.

Regensburg—The tramway to Donaustauf and Walhalla is rapidly nearing completion, and

the road will probably be completed by the end of this month.

Vienna—The Vienna Funeral Tramway project is now assuming definite proportions. The road is to be built and equipped within six months. For the grading, which will be necessary, the municipal government will devote 50,000 florins. The cars are to be adapted for the carrying of the dead, as well as for the transportation of passengers.

BELGIUM.

Brussels—The Court of Appeals of Brussels has decided that the laying of tracks, and operating of street car lines, does not interfere with usual street traffic; and, furthermore, do not cause any material annoyance to residents on such routes; and, hence, no action for damages on such grounds will lie against such enterprises.

Limoges—The tramway which is to use compressed air as its motive power, is now in course of construction; but the progress is very slow.

BRITISH COLUMBIA.

Voncouver—The Street Railway company has awarded the contract for the construction of its road, and the line will probably be in operation by the middle of August.

Victoria—The City Trustees have guaranteed, for twenty years, five per cent. interest on $40,000 of the bonds of the National Electric Tramway and Lighting company, of which Mr. Mr. J. H. Turner holds the franchise. About $75,000 will be expended on the road.

ENGLAND.

Liverpool—The tramway companies of this city have received permission to run storage battery cars on their lines, and the probabilities are that horses will be entirely dispensed with within the next year or two. The Electric Traction company's system of electric gearing has been adopted.

London—The twenty-third ordinary general meeting of the shareholders in the City of Buenos Ayres Tramways company, was held at the office of the company, No. 1 Great Winchester Street, on March 29. The capital of the company was increased £540,000 by the addition of £60,000 dividend in 12,000 shares of £5 each, and a dividend of 4s., and a bonus of 1s. per share was declared free of income tax. The sum of £10,000 was placed to the contingent fund, and £5,000 to the new contingent, and £1,000 to the permanent renewal fund.

The third ordinary general meeting of the Buenos Ayres & Belgrano Tramways company was held at the office of the company on Thursday, April 25. The gross receipts for the year were £96,000 as against £83,000 last year, and £65,000 in 1886, giving the gross receipts an increase of six per cent.; the working expenses were £46,000 as against £88,000 last year, and £33,000 in 1886; 44,795,000 passengers were carried during the year as against 4,100,000 in 1887, and 3,200,000 in 1886. A dividend of seven and one-half per cent. for the half year on the ordinary shares was declared.

FRANCE.

Clermont—Notwithstanding all obstacles, red tape, etc., Mons. Claret indefatigably pushes forward the completion of the tramway from Montferrat to Royal. The road is nearly completed, the cars being ready for delivery, and the dynamos, machinery and boilers are now being placed in position.

GERMANY.

Berlin—The Neue Berliner Pferdebahn Gesellschaft reports that its income from passenger traffic for March was 117,626.80 marks, an increase of 32,611.05 marks over the same month of last year. From January 1 to March 31, inclusive, the amount received from same source was 325,715.55 marks, a clear gain of 81,141.40 marks over same period in preceding year.

Biebrich—The two locomotives ordered for the Biebrich-Wiesbaden Steam Street Railway have arrived.

Bochum—The construction of the Bochum-Herne Strassenbahn has been undertaken by the Darmstadt Commercial and Industrial Bank.

Bremen—The annual report of the Bremerhafener Strassenbahn for 1888 shows that 958,393 passengers were carried, an increase of 83,690 over 1887. The earnings during that period were 9,923.65 marks in excess over the previous year. An annual dividend of four and one-half per cent. was declared.

Elberfeld—Work has been resumed on the street car line from Elberfeld to Sonnborn.

Gera—A street railway will shortly be built here by Messrs. Horstmann & Co., of Hanover. The enterprise will be exempt from municipal taxes, etc.

Halle—The annual statement (1888) of the Hallesche Strassenbahn Actiengesellschaft shows an income of 172,039 marks, against 143,439 marks in 1883 and 169,171 marks in 1887. The profits last year amounted to 41,718.80 marks.

The suggestion of the mayor to expend 153,000 marks for the erection of a local general street railway depot, in lieu of 95,000 marks, as originally proposed, was finally compromised at 140,000 marks.

Hamburg—The Hamburger Strasseneisenbahn Gesellschaft has declared a dividend of five and one-half per cent for the year 1888. During this period 25,595,719 passengers passed over their lines (an increase of 1,879,191 over 1887) paying 3,335,502 marks in fares (a gain of 223,685.85 marks over the preceding year). This road employs 1,250 horses and 19 engines, to move 299 one and two-horse cars.

Heidelberg—The Heidelberger Pferdebahn Gesellschaft has decided upon a single fare reduction from 10 to 5 pfennige. A commutation ticket at 3 marks per month is in contemplation.

Heilbronn—The application of a Berlin firm for a street railroad franchise has been favorably considered by the municipal government. The project would be considered a good investment, even if the line only extended from the railroad depot to the city hall.

Landshut—The city council has given Messrs. Gerstle & Co., bankers, permission to commence work on their projected street railroad line.

Leipzig—The press is clamorous for reduced fares on street car lines, citing instances where a single fare is 10 pfennigs, while a line four times longer charges but 20 pfennigs. They claim that 5 and 10 pfennigs for the above service, respectively, would be sufficient, and would, moreover, induce greater travel and increased revenue.

Magdeburg—At a general meeting of the Magdeburger Strasseneisenbahn Gesellschaft, a dividend of 50 marks per share was declared. This is equal to ten per cent.

Work has begun on the extension of the Magdeburger Trambahn to Alten-Neustadt. As all necessary material is on the ground, its early completion can be looked for.

Munich—The Munichener Trambahn has introduced a new style of car. The platforms are much larger than their regulation sizes. On either side are wire doors. The mode of egress is only from the right hand side, the other door remaining continually locked. Thus passengers cannot possibly incur any danger from cars on neighboring tracks. The front platform is limited to contain six passengers, whereas the conductor must only allow five on the rear.

Schleswig—The Nordseebad Westerland and the Sylter Dampfspurbahn will shortly be merged into a stock company.

Stuttgart—The Stuttgarter Pferde Eisenbahn Gesellschaft have increased their capital by 800,000 marks, that being the consideration paid the Neue Stuttgarter Strassenbahn, Lipken & Co., for their street railway enterprise, which is thus absorbed by the former company.

Trier—Work on the cable road to the Krahen mountains at Andernach is being rapidly pushed forward. The system similar to that in use by the Malger road at Ems has been adopted.

Wiesbaden—The newly built street railway has been formally accepted by the projectors, and travel has begun. Its construction and equipment has given satisfaction to all concerned.

HUNGARY.

Pesth—The annual statement for 1888 of the Pesther Strasseneisenbahn Gesellschaft shows a gain of 199,345 florins.

ITALY.

Borgo-St. Donnino—Mr. Luigi Carazza has been granted the privilege to build a street car line from Borgo-St. Donnino to Salsamaggiore.

Cesana—The city council of Cesana has unanimously approved of a franchise for the building of a street railway from Cesana to Cesenatico, and has authorized work on same to be commenced at once.

Cusano—A franchise for the building of the steam tramway, projected by the Lombardy Road Railways company, limited,—an English corporation—has been accepted by the authorities. This line will extend from Cusano-Monza to Carate (Brianza). It will be twenty-one kilometers in length, and pass through the villages of Cinisello, Balsamo, Vedano, Blassano, Macherio, Savico and Albiate.

Milan—The North Milan Steam Tramway company has purchased, and will in future operate, the Cagliona and Saronne branch of the Rome-Milan and Bologna Tramway company.

The Societa dei Tramvie ed Omnibus di Milano has declared a dividend of five per cent. for the year 1888.

The petition of the Rome-Milan Bologna Tramway Co. for an extension of 10 years (1930 to 1940), on the franchise of its steam tramway line from Milan to Gallarate has been granted, despite considerable opposition in the city council. The company was also allowed to discontinue its line between Saronne and Cradate.

Parma—At a special meeting the municipal council accepted the proposition of Mr. Luigi Carazza to build and equip the following steam tramways: Parma to Langhirana, Parma to Traversetelo, Parma via Busseto to Sarogna, Parma to Zibello via St. Secondo and Busseto, and finally from Sarogna to Borgo-St. Donnino.

A subsidy of 2,500 lires was voted, due in two equal payments. The first half upon the completion of the road and the remainder when properly equipped and in running order. All benefited villages to pay on this basis. Work to commence toward the latter part of 1890 and to be completed within two years.

Stresa—The newly organized Lago Maggiore Steam Navigation Co. have decided to build a cable tramway from Stresa to the Italia Rigi. Count Borromeo, who is the owner of vast interests in those mountains has granted the company the right of way through his possessions.

Piossasco—The Board of Public Works has sanctioned the construction of a steam tramway between Piossasco and Cumiano.

Voghera—It is now definitely settled that the tramway between Voghera and Rivanazzano will be built before the year is out. Civil Engineer Belcredi, who has charge of the construction o the road, is confident that all difficulties anticipated in grades, etc., can be surmounted.

MEXICO.

Mexico—The John Stephenson Co., of New York, is supplying cars for many of the cities of Mexico, in many cases designed to connect these cities with branches of the great trunk roads which are now being extended through the country.

NORWAY.

Christiania—The annual report for 1888 of the Christiania Tramway Co. is very encouraging, showing a gain of 36,455 kr. The income of this road for that year amounted to 207,648 krs., representing the fares of 1,661,188 passengers. Length of road 8,029 metres.

POLAND.

Posen—The annual report for 1888, of the Posener-Pferdeeisenbahn chronicles a disastrous year. The continued snows and inundations (in one instance 1,110 metres were 14 days under water), necessitating continual repairs and expense, were the chief factors of misfortune. A dividend of 1 per cent. was however declared.

SCOTLAND.

Edinburgh—A strong effort is being made to have electricity adopted as a motive power in this city. The grades are very steep here, but it is thought that electricity will overcome it without difficulty.

[We do not know the highest percentage of grade of Edinburgh, but should it run over ten to twelve per cent., would not the adoption of a cable system be more practical and economical? Ed.]

SWEDEN.

Stockholm—The Stockholm Tramway comprises 13,040 meters. In the past year the number of passengers carried over its lines amounted to 6,124,607, representing 620,605.77 kr. The annual dividend was placed at eight per cent.

New Enterprises.

ALABAMA.

Anniston—A company to build a street railway is being formed by the Corning Land and Loan company.

Elba—A project is on foot for the construction of an electric railway to operate between this point and Troy.

CALIFORNIA.

Fresno—A petition for a street railway franchise, to build a line along Inyo street, has been presented by the Fresno R. R. Co.

San Diego—It is now almost an assured fact that the cable railway will be built here at an early date. Mr. Geo. D. Copeland, President of the Electric Rapid Transit company, has been the leading spirit in this enterprise, and of the 1,500 shares of stock issued he is the owner of all, with the exception of 62½ shares. We are informed that Mr. Copeland has decided upon the adoption of the Parks-Hunt cable system of Philadelphia, which, it is claimed, can be put in operation for $10,000 to $15,000 a mile for the cable and conduit, independent, of course, of the price of the engines, power plant and cars. Will probably be from five to six miles in length.

[Regarding the actual working of this new system we cannot give any definite data at the present writing. The inventors claim that it is much cheaper to build and safer to operate because the grip is worked from a lever on the car, instead of from a separate grip car; the grip has two clutches which can be worked at will, so that if one fails to hold, the other will grip the cable; in this system the conduit is only 6″x22″, instead of 24″x36″, as in San Francisco, the brakes are operated by an air cylinder, arranged under the car, so that all sudden stops and starts are avoided. To take up the noise of the cable the grip is lined with raw-hide, as also are the pulleys, and it is claimed that this protection to the cable makes it wear a great deal longer than under the old system.—Editor.]

San Francisco—A petition has been laid before the Board of Supervisors from Maurice Dore, O D. Baldwin, Behrend Joost, H. M. G. Dabler and Constantine E. A. Foerster, praying for an ordinance granting them a franchise to construct and operate a street railway in this city. The petitioners agree to pay the city and county treasurer two per cent. upon the gross annual earnings of the company, to build the road within three years, and to expend the sum of $15,000 on the road. The first is provided that the franchise is granted to continue in force 25 years.

The California street cable road is about to undergo some great changes and improvements. The road is controlled by the Market Street company. It is now proposed to extend the California street line across Kearney street, its present terminus, and carry it on down California street to Market, where it will switch on the Market street tracks and proceed to the ferries. The western terminus will remain as at present, at First avenue and California street. In addition to this extension a branch is to be built to cross the city from north to south. Beginning at the corner of Jones and McAllister streets, the line will extend over the former street northerly to Pine, thence westerly along Pine to Hyde, and then northerly along Hyde to the bay.

The cars which are now used on the line will probably be taken off and those of the Market street pattern substituted for them.

In accordance with the law, the company filed new articles of incorporation with the County Clerk yesterday, covering the proposed changes and additions. The capital stock is increased to $1,000,000. The Directors are as follows: Charles Mayne, Robert Watt, Jerome Lincoln, Charles W. Randall and Calixte Denervand.

It is rumored that the price paid by the California street company to the Omnibus line for right of way on California street to Market was $80 000.

There is also a rumor that the Geary street road is about to undergo changes similar to those of the California street line, but not so extensive. Instead of stopping at Kearny street, the cars will switch onto Market and proceed to the ferries like the other branches. The cars will also be transformed into combination cars like those on the Market street line.

COLORADO.

Trinidad—A twenty years' franchise for a motor line to run through all the important streets of this city has been granted to A. B. Eads, Frank A. Miller, of Denver, H. B. Alexander, T. B. Collier and Lorry Horn of this city. Two and one-half miles of the line have to be built by first of next January.

GEORGIA.

Waycross — We understand the Waycross Street Railway company has been chartered by J. S. Sharp, S. W. Hicth and Warren Lott.

KANSAS.

Norton—It is understood that an electric railway will be built at this point in the near future.

KENTUCKY.

Paducah—The Paducah Street Car company has been granted a franchise for the construction of its street car line.

MARYLAND.

Baltimore—The North Avenue Railway Co., of Baltimore City, has been incorporated by Messrs. Isaac S. George, Frank Slingluff, Miles White, Jr., Boston Fear, Louis Johnson, John M. Denison and Wallace King.

The company is formed for the purpose of constructing and operating a passenger railway in Baltimore, under a 40-year charter; it has capitalized at $12,000, divided into 120 shares of $100 apiece.

At a recent meeting of the Board of Governors of the West End Improvement Association, the propriety of building a cable road in the western section of the city was discussed. Indications are that the project will eventually obtain.

The North Avenue Railway Co. has been charted by Isaac S. George, Frank Slingluff, J. M. Denison and others. The capital stock is $12,000.

MASSACHUSETTS.

Pittsfield—The street railway here will probably adopt the Thomson Houston double trolley electric system on its line in the near future.

Springfield—The Street Railway Co. has commenced to build the Mittinneague extension of its West Springfield line.

MICHIGAN.

Detroit—The National Electric Traction company, of this city, has been incorporated with a capital stock of $100,000, for the purpose of manufacturing and dealing in all articles in the construction, equipment and operation of electric railways. $10,000 of the capital stock has been paid in, and the stock is held as follows: Hugh McMillan, 800; W. A. Jackson, 920; Frank E. Snow, 800; William H. Wells, 200; Carlos Warner, 200; Cornelius Corbett, 200; Frederick Marvin, 200; George H. Lathrop, 120; Frederick A. Forbes, 100; Barrett B. Mitchell, 80; John F. Talbot, 100; Hibbard Baker, 200; and John M. Nicol, 200.

MINNESOTA.

Minneapolis—About two years ago the Hon. W. D. Washburne conceived the idea of furnishing Anoka with rapid transit, but, finding that neither the Northern Pacific Railway company nor the St. Paul, Minneapolis and Manitoba Railway would make any concessions, Mr. Washburne decided to abandon the idea. The enterprise has, however, been resurrected, and is now in the hands of Mr. C. C. Garland, of the Garland Banking Co., of this city, Mr. Hildreth, owner of the Anoka Street Railway company, and other well-known capitalists. The line, if built, will be about 18 miles in length, and dummy motors will probably be used. Mr. Thomas Lowry, it is understood, is personally favorable to the scheme.

St. Paul—A project is on hand to build a Motor Line from this point to Bald Eagle lake and White Bear lake. If the scheme is carried out the system will probably be known as the White Bear Beach Motor Line.

MISSOURI.

Kansas City—It is more than likely that the Broadway Line, of this city, will soon be operated by electricity. The highest grade along the line is about ten per cent., which electricity will certainly overcome.

NEBRASKA.

Dakota City—The Covington, South Sioux City & Dakota City Street Railway, running from Covington to South Sioux City, has completed arrangements to change its motive power from horses to electrical.

NORTH CAROLINA.

Concord—The Right to build an electric railway at this point has been secured by local capitalists here.

OHIO.

Cincinnati — The Electric Storage company of this city has been incorporated at Columbus, with a capital stock of $100,000.

Clevelond—It is quite possible that the Cross Town Line of electric railway will be built in the near future on Wilson Ave. from Scoville Ave. to the lake. Mr. George Hester is interested.

Lancaster— The Lancaster Street Railway Company has been incorporated with a stock of $30,000.

OREGON.

Independence—An exclusive franchise over the streets of this city has been granted to the Monmouth & Independence Street Railway Co., conditional of its having the line in operation in one year.

Pendleton— The Pendleton Street Railway Co. capitalized at $25,000 with its principal office in this city, has been incorporated by Messrs. J. E. Bean, F. J. Donaldson, John Gager, Geo. W. King, J. H. Raley, J. D. Murphy, Louis Reith and J. P. Wager.

PENNSYLVANIA.

Allegheny—The Allegheny & Millvale Street Railway company has been chartered with a capital stock of $24,000 to build a line of street railway, using either electricity, animal or cable power. The line will be four miles in length.

The president of the company is L. H. Matthews, Pittsburgh, and the directors Charles M Boyd and Adam Brown of Pittsburgh, and Wm T. Lindsay and Jas. McAfee of Allegheny.

The Belleview & Pittsburgh Street Railway company, of this city, has been incorporated with a capital stock of $48,000.

The Allegheny Street Railway Company has been chartered for the purpose of constructing and operating a line two miles in length, of either electricity, animal or cable power. The capital stock of the company is $12,000. It is proposed to commence the line on California avenue at Superior avenue in this city, thence along California avenue and California Extension avenue to Jack's Run. The line will be double track.

Beaver Falls—A movement is on foot among local capitalists to build an electric street railway between this place and Beaver via Brighton. The Westinghouse Electric Co. has offered to build the road for $8,000 per mile.

Harrisburg—A capital stock street railway company, capitalized at $48,000, has been incorporated by Messrs. John S. Sible, Harry C. Ross, Jacob Hess, E. Z. Wallower, J. Nelson Clark, T. L. Willets, E. J. Smith, T. H. Heist, J. R. Shoemaker and H. J. Shoemaker, each of whom holds thirty-two shares of stock.

Lebanon—Col. A. Frank Seltzer and Charles H. Killinger have applied for a charter to build a street railway in this clty.

McKeesport— The Dravosburg, Reynoldton and McKeesport Passenger Railway company has been charted with a capital stock of $20,000, to build a line three miles in length, from McKeesport via 18th avenue, Shaw avenue, Sinclair street, 4th avenue, Walnut street, and 3d avenue to the Youghiogheny river, across the Reynoldton and McKeesport bridge, to Sinclair street in Reynoldton borough, and thence along Sinclair street to Ferry, to the Monongahela river, and across the river to a point in Mifflin township opposite the terminus of Ferry street, to a point of the public road running parallel with the river.

The directors of the company are E. P. Douglass, O. S. Weddell, E. J. C. Smith and Z. L. Spangler, of McKeesport; Thomas Reynolds as president.

Philadelphia—The Chelten Avenue Passenger Railway, of this city, has been charted to build a line six and one-half miles in length. The capital stock of the company is $39,000. The president of the company is Thomas C. Barr, and

the directors W. H. Shelmerdine, Jno. J. MacFarlane, E. J. Moore, Howard A. Stevenson, Samuel Moore, Jr.

The Fairhill Passenger Railway Co., capitalized at $9,000, to build a line one and one-half miles long has also been chartered, and likewise the Centennial Passenger Railway Co.. with $15,000 capital, to build a line two and one-half miles long; likewise the Montgomery avenue and Berks Street Passenger Railway company, capitalized at 21,000, to build three and one-half miles of road; and the Southwestern Passenger Railway Co., with a capital stock of $36,000. The officers and directors are the same for all these companies, with the exception of the last named, in which Edward Samuel takes the place of J. MacFarlane as director.

The Point Breeze Street Railway company, of this city, capitalized at $72,000, to build a road six miles in length, has been incorporated. The stockholders of the road are William H. Brooks, of Philadelphia; Thomas M. Jones, George R. Pine, Alfred Callender and Edward Houser, of Harrisburg.

The Citizens' South Philadelphia Street Railway Co. has been chartered with a capital stock of $30,000.

The Citizens' North Philadelphia Street Railway Co. has been chartered with a capital stock of $36,000.

A charter has been issued to H. H. Weiand, of Falls of Schuylkill, under the name of the Enterprise Street Railway Co., of Philadelphia, with a capital of $500,000. The line, when built, is to be between 14 and 15 miles long. Geo. W. Boileau is president, and the directors are Thos. S. Ewing, L. P. Ernst, R. P. Hembanks and H. A. Weiand.

The North End Street Railway company, capitalized at $24,000, has been incorporated.

The Fairmount Palace Car Street Railway company, of this city, capitalized a $48,000, has been incorporated.

The South End Street Railway company, of this city, has been incorporated at Harrisburgh with a capital of $36,000.

The Park Street Railway company, of this city, has been incorporated with a capital of $24,000.

The Marshall Street Railway company, of this city, has been incorporated with a capital of $250,000.

The Cathrine & Bainbridge Streets Railway company, of this city, has been incorporated at Harrisburgh with a capital of $150,000.

It is only reasonable to suppose that the incorporation of all these roads is the direct result of the signing of the bill of Gov. Beaver for the "incorporation and government of street railway companies."

Pittsburgh—The Pittsburgh and Knoxville Street Railway company has been incorporated with a capital stock of $12,000, to build a street car line about two miles in length. The stockholders of the company are J. H. McRoberts, J. F. Grimes, George H. Calmes, of Pittsburgh; and James McLaren and James G. Barbour, of Allegheny.

At a recent meeting of the Board of Directors of the Pittsburgh Union Passenger Railway Co., a resolution was adopted providing for the building of a branch line, beginning at the corner of Liberty street and Fifth avenue, along Liberty to Fifth street, to the Allegheny river, over the proposed bridge to Arch street, Allegheny, via Ellsworth avenue, West street, Gervey alley, to Webster street again, to Taylor avenue, Irving avenue to Washington avenue, where it will connect with the main line.

Chattanooga—A permit to construct an electric street railway in t is city has been applied for by S. R. Read, W. H. Hart and W. B. Micher.

TEXAS.

Dallas — The Dallas City Suburban Street Railway Co., capitalized at $100,000, has been incorporated.

An interest in the North Dallas circuit railway has been purchased by J. N. Simpson, Frank Cockrell and N. A. McMillan. These gentlemen will probably extend the line in the immediate future.

Jefferson—We understand that a project is on foot for the construction of an electric railway at this point.

VIRGINIA.

Richmond—Black's System Co. has been incorporated with a capital stock of not less than $10,000 or more than $200,000, for the purpose of operating an electric street railway by underground wires. W. P. De Saussure is president, S. B. Witt secretary, and Daniel Stephens treasurer.

The Richmond Street Railway Co. will rebuild four miles of its track, using a heavier rail.

We understand that J. C. Robertson, of Baltimore, will probably build a street railway here, if permission is granted him to run cars over the James river bridge.

Roanoke—The Roanoke Street R. R. Co. has been bought by Mr. M. M. Rogers and others.

WASHINGTON TERRITORY.

Seattle—The Queen City R. R. Co., of this city, has been incorporated with a capital stock of $720,000, in 7,200 shares of the par value of $100 each. A list of the trustees of this road will be found under the head of elections in this issue.

Tacoma—Mr. R. F. Radbaugh and associates have been granted a right to complete a street railway to South Ninth street. As these gentlemen are heavy stock-holders in the Tacoma & Fern Hill Street Ry., the grant is practically made to the latter company.

WEST VIRGINIA.

Charleston—A franchise for a street railway has been asked for by the Charleston Electric Light Co.

A franchise has been granted E. B. Dyer and others to build a street railway here. When the company is formed it will be known as the Charleston Street Railway Co.

Extensions.

Cincinnati, O.—An ordinance has been introduced by the Board of Public Affairs providing for the extension of the Mt. Auburn Cable road, with double track, from the intersection of Highland Ave. and McMillan St., east on McMillan to Lane, north on Lane to Lincoln Ave., and east on the Avenue to Woodburn Ave.; also another extension from the junction of Lincoln Ave. and Lane St., north on Lane to Shillito, west on Shillito to Burnet Ave., there to connect with the main line.

The two branches, which will be of immense importance, forming, as they will, a net work upon the hills, will probably use the electric motor. The ordinance gives the company the right to the use of the streets for twenty-five years and compels it to furnish $25,000 bonds to comply with its contract.

Altoona, Pa.—Indications point to the adoption of electricity on the line of the City Passenger Railway Company at this point, and the line will probably be extended considerably in the immediate future.

Austin, Tex.— The Austin Street Railway Company's property, franchises, etc., have been purchased by T. J. Hurley and others of Fort Worth, for $120,000. It is the intention of these gentlemen to extend the road for five or six miles, to adopt electricity as motive power, and to bring the property up to a high standard of excellence.

Detroit, Mich.—At a recent meeting of the Grand River Avenue Street Car Company it was decided to increase the capital stock to $250,000 for the purpose of building the line on Crawford street.

Dubuque, Ia.—The street car line here is to be extended at once from its present terminus to the old fair grounds.

Huntington, W. Va.—The line of the Huntington Electric Light and Street Railway Company is to be extended at once for a distance of about two miles.

Oxford. Ala.—The Anniston, Oxford & Oxanna Street Railway Company has increased its capital stock to $75,000 for the purpose of extending the road and putting on dummy engines.

Pittsburgh, Pa.—The Second Avenue Railway Company has completed its extension to the extreme lower end of the exposition building.

We understand that this company will at once commence the extension of its lines to Glenwood, over the right of way granted by councils nearly a year ago, and the company expects to have a line in operation over the Point to Glenwood, a distance of over seven and one-half miles, in full operation by the end of August. It is generally understood that horses will be dispensed with and electricity adopted as a motor as soon as the tracks are completed to Frankstown.

The company has expended over $40.000 this year in extensions and improvements, and expects to expend a further sum of $112,000 in completing the road and equipping it.

Syracuse, N. Y.—The People's Railway company has been granted an additional franchise to build a double track extension on Wolf street to North Salina street. The company is required to pave between the rails with sandstone block.

Woonsocket, R. I.—The bill authorizing the Woonsocket Street Railway Company to extend its tracks into Blackstone has passed both branches of the Massachusetts legislature, and is now operative. The bill insures decided advantages to the citizens of both communities, and should be a good thing for the street railway company. Rails for the extension already been purchased, and work will probably be begun at once.

Elections.

Baltimore, Md.—The Baltimore City Passenger Railway company has commenced to extend its service in Northeast Baltimore, in conformity with the provisions of an ordinance recently passed by the city council. It is expected that work on the same will be completed in about eight weeks.

Boston, Mass.—Mr. T. H. Monks has been elected general manager of the West End Street Railway company, of this city, vice Mr. Frank D. Longstreet, who recently tendered his voluntary resignation.

Detroit, Mich—At a recent meeting of the Grand River Avenue Street Car company, Mr. Hugh McMillan was elected Vice-president of the company.

Elizabeth, N J.—At a recent meeting of the stockholders of the Elizabeth Street Railway company, the following named gentlemen were elected Directors for the ensuing year:

Frederick L. Heidritter, John Kean, Jr., H. Heyward Isham, August Heidritter, Jr., James C. Ogden, Foster M. Voorhees, Patrick H. Gilhooly, Frederick C. Marsh, Edward C. Woodruff, Louis Quien.

Rochester, N. Y.—The Rochester City and Brighton Street Railway company have elected the following officers:

President—Patrick Barry.
Vice-president—William C. Barry.
Secretary—C. C. Woodworth.
Executive Committee—Patrick Barry, C. B. Woodworth, Geo. Ellwanger.
Directors—P. Barry, C. B. Woodworth, Charles F. Pond, Charles S. Baker, Charles P. Barry, Geo. H. Ellwanger, S. E. Woodworth, John H. Barry, W. D. Ellwanger.
Inspectors of Election—William A. Waters, O. F. Durney.

Harrisburgh, Pa.—The Harrisburgh City Passenger Railway company has elected the following named gentlemen for the ensuing fiscal year:

President—Henry A. Kelker.
Vice-president—William K. Alricks.
Treasurer—Rudolph F. Kelker.
Directors—Hon. David Fleming, George W. Reily, William R. Gorgas, John T. Ensminger, J. G. M. Bay, George F. Rohrer, Harris Cohen, Jacob Haehnlen, John Whitman.

Montgomery, Ala.—Col. Mitchell, late postmaster at Opelika, has been appointed Superintendent of the Street Railway company, vice Geo. B. Shelhorn, resigned.

Olympia, Wash. Ter.—The Olympia and Turnwater Railway and Electric Power company has elected the following officers:

President—George D. Shannon.
Vice-president—E. M. Wilson.
Secretary—S. C. Woodruff.
Treasurer—N. H. Owings.

St. Louis, Mo.—At the annual meeting of the

stockholders of the Union Depot Railroad company, the old officers of the company were re-elected to office, and John Scullin, J. Harris Scullin, Jas. H. Roach, Jas. Scullin and Jas. Freeman were elected directors.

Seattle, Wash. Terr.—The following named gentlemen have been elected to serve on the Board of Trustees of the City Railroad company of this place for the first six months:

William Van Fleet, of New Jersey; William Paley Stewart, of New York; Francis Peabody, of Massachussetts; William Collier, George W. Tebbetts, Addison Smith and J. Luttrell Murphy, of Washington.

Sheffield, Ala.—At a recent meeting of the stockholders of the Sheffield Street Railway company, the following named gentlemen were re-elected to office:

President—H. B. Thompkins.
General Manager—W. S. White.
Secretary—S. B. McTyer.
Treasurer—C. B. Woolson.

Spokane Falls, Wash. Terr.—The following named gentlemen have been elected as officers of the Ross Park Electric Street Railroad company in this city:

President—G. B. Dennis.
Vice-president—E. J. Webster.
Secretary—C. L. Marshall.
General Manager—H. N. Belt.
Treasurer—S. Heath.

Trustees—G. B. Dennis, S. Heath, Cyrus Bradley, R. W. Forrest, C. R. Burns, A. P. Wolverton, I. S. Kaufman, W. H. Marshall, T. F. Conlon and H. N. Belt.

Correspondence.

TOPEKA, KAN., June 6.

Electricity is rapidly coming to the front in Kansas. The latest developments in this line is that of the Topeka City Railway, which is about to substitute electricity for horse power. President O. H. Dorrance, Secretary Geo. H. Nolte, Attorney J. W. Gleed and G. F. Parmalee, one of the largest stockholders, have recently been in New York on business relating to this new business, and it is now known that the Topeka Belt Railway and the Topeka City Railway have been mortgaged to the Farmers' Loan & Trust Co., of New York City, for $500,000. This money will be used in applying electricity to the sixteen miles of street railway owned by the company, the erection of a large power house and round house, capable of storing 100 motors, and an equal number of tow cars. A portion of the half million dollars will be spent in improving and beautifying Marten's Hill, a pleasure resort owned by the company, lying about three miles west of the city. A large hotel will be built, and the grounds made second to none in the west The company has other lines projected, which will be built the coming season. It is thought the storage battery system will be used.

The East Side Circle railway in Topeka is passing through a mild attack of "strike," the employes demanding higher wages.

The bondholders have foreclosed the mortgage on the Rapid Transit railway at Atchison, and the road is advertised for sheriff's sale June 4th. The amount of the judgment is $30,430. Paul Challiss has been appointed Receiver.

Lawrence will build a street car line to the University this summer.

The Hays City Electric Illuminating and Power company has been chartered to do business. The business will be transacted at Hays City, Kan., and Kansas City, Mo. Capital stock, $25,000. Directors, W. A. Meyers, J. H. Cavender, Otto Schwaller, Harry C. Freise and several others.

The Witchita & Suburban Electric railway is nearly completed and by this time will be running.

The stockholders of the South Side Street Railway Co., of Kansas City, held a meeting recently and voted to increase the capital stock from $10,000 to $25,000. The road will be completed by June 1st, and will be operated by the Metropolitan Street Railway Co. The car stables will be built on 27th street, near Cleveland avenue. The line owned by the South Side company extends from Eighteenth, on Indiana avenue, to Twenty-seventh, and thence east to Cleveland avenue.

The Kansas City, Kan., Circle Railway company has organized by the election of E. S. W. Drought, president; A. P. Ponds, vice-president; N. McAlpine, treasurer; and J. Spencer, secretary. This line will be built around Kansas City, Kan., to connect with the Belt line, of Kansas City, Mo.

All the plans for the New Belt line, at Kansas City, Mo., have been completed by Engineer Knight, and work will begin some time this summer. The officers of the company are: E. F. Rogers, president, and L. G. A. Copley, secretary and treasurer. The road will begin at Quindaro and run south, passing to the west of the city, then along the Kaw river to Alcutt's packing house; from this point it follows the Belt railway to Sixteenth street, where it turns south and crosses the Kaw. It crosses the Southwest Boulevard east of Rosedale and passes through a tunnel near Westport; passing south of Westport, it follows the bank of Brush Creek, and turning northeast crosses the Blue river and runs along the Kansas City & Southern and the Missouri Pacific, connecting with them at Centropolis; it then crosses the Kansas City and Independence dummy line and the Belt line; then crossing the Blue again and the Chicago & Alton, and going north across the Paola branch of the Missouri Pacific, it connects with Chicago, Milwaukee & St. Paul at the south end of the Missouri river bridge. The distance is twenty-four miles, requiring eight miles of new track. $2,000,000 will be expended.

R. E. C.

The Dean-Wells Bill.

Regarding the bill recently passed by the Illinois Legislature, authorizing the changing of the motive power of street railways from animals to electricity, cable or otherwise, the following is the full text of Gov. Fifer's veto, which reached us upon the eve of going to press:

STATE OF ILLINOIS, EXECUTIVE DEPARTMENT,
June 4, 1889.

The Hon. Isaac N. Pearson, Secretary of State—Sir: I transmit to you herewith House bill, No. 368, for an Act authorizing horse and dummy railways to change their motive power, to be filed in your office without my approval. My objections to this bill are as follows: This bill pre-supposes that the municipal authorities of the several cities of the state have now authority to determine the motive power which street railway companies may employ in moving cars upon their streets; and the only effect of the bill is to take such authority from adjacent property owners and from city councils, and to vest it in the street railway corporations themselves The question presented is, whether such a change in the policy of our law is wise and salutary, or the reverse. The policy of the law in this has been to leave a large discretion to those authorities and local residents whose immediate convenience, safety, and property interests are to be affected by the construction and operation of street railways. So fundamental was this principle considered, that the framers of the Constitution of 1870 inserted therein the following provision:

"No law shall be passed by the General Assembly granting the right to construct and operate a street railroad within any city, town, or incorporated village, without requiring the consent of the local authorities having the control of the street or highway proposed to be occupied by such street railroad." Article 11, section 4.

Further pursuing the same general policy, it was enacted by the Legislature in the general act to provide for the incorporation of cities towns, and villages.

"The City Council or Board of Trustees shall have no power to grant the use of or the right to lay down any railroad tracks in any street of the city to any steam, dummy, electric, cable, horse, or other railroad company, whether the same shall be incorporated under any generalor special law of the State, now or hereafter in force, except upon the petition of the owners of the land representing more than one-half of the frontage of the street, or so much thereof as is sought to be used for railroad purposes, and when the street or part thereof sought to be used shall be more than one mile in extent no petition of land owners shall be valid unless the same shall be signed by the owners of the land representing more than one-half of the frontage of each mile and of the fraction of a mile, if any, in excess of the whole miles, measuring from the initial point named in such petition, of such street or of the part thereof sought to be used for railroad purposes." Article 5, section 1, paragraph 90.

Clearly the power of determining the kind of motive power to be used now resides, in cities incorporated under the general law, in the City Council, as moved and acted upon by owners of adjacent property. It may even be doubted whether the bill now under consideration is in harmony with the above provisions of the constitution. That it is a violation of the spirit of the constitution is clear and evident. If it is wise to require street railway companies to procure the consent of property owners and of local municipal bodies before constructing their roads in the first instance, why is it not wise also to require such consent to embrace the particular kind of motive power to be employed? I perceive no sound reason for any distinction. It is easily conceivable that street cars propelled by horses might be safe, convenient, and proper on some streets and in some places where electric or cable motors would be highly dangerous and derogatory to the interests of those whose rights can be affected. The nearer such questions are to be brought to the sound judgment of those who are locally most concerned, the better, in my judgment, the law is; and the fact that an appeal is thought necessary from local authorities to a distant legislative body to grant this sweeping general power to a street railway corporation is itself the strongest evidence that the bill ought never to have been passed. In my judgment the principle of the bill is vicious, as taking an important power from the people and vesting it in corporations. My approval is, therefore, withheld. JOSEPH W. FIFER,
Governor.

THE first completed electric railroad in Scotland is that running from Carstairs, on the line of the Caladonia Railway to the Mansion House of Carstairs, a distance of about a mile and a quarter. The gauge is only 30 inches, and the highest grade along the line is one in seventy-five. A four-wheel car is used for passenge-traffic, equipped with the Gramme apparatus ber tween the two axles under the car, and capable of developing 14-horse power; motion is communicated to the wheels by a noiseless chain passing around a toothed wheel on the motor and a larger one on the axle. A cone friction gear permits the full speed being attained more quickly, and of keeping it under perfect control. On each side of the line is an iron conductor to carry the insulator, and the current is transmitted to the motor by brushes fixed on either side of the car.

Gustave Provost, an ingenious employe of the National Iron Works, in San Francisco, Cal., has recently patented a new cable car signal, or automatic switch, operated by the pressure of the grip of the projecting arm in the slot; this moving a chain passing through pulleys and connecting with the signal lights. It is so constructed that signal lights on top of a pole are reversed at the approach of the cars, and closed when the car passes a given point. The lights are transposed by a reverse movement of the chain which is caused when the grip strikes a projecting arm on the opposite side of the street.

The J. M. W. Jones Stationery & Printing Co., which recently occupied the premises at the corner of Dearborn and Monroe streets, Chicago, have moved over to their new six story building, Nos. 76 to 82 Sherman street, and are now fully prepared to fill all orders for street car tickets, railway and commercial printing, and light railway supplies, lithographing, etc., with promptness, and our readers will do well to consult with this well-known concern, when in the market for anything in their line.

Patents.

The following is a complete list of such patents as relate to Street Railway interests, issued between April 2 and May 28, especially prepared for the STREET RAILWAY GAZETTE by John C. Higdon, solicitor of Patents and Trade-Marks, Room 29, St. Cloud Building, opposite U. S. Patent Office, Washington, D. C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

Issue of April 2, 1889.

400,724. Trolley for Electric Railways, D. A. Ainslie, Richmond, Va.
400,725. Trolley for Electric Railways, D. A. Ainslie, Richmond, Va.
400,748. Splicing Cables, J. Collins, San Francisco, Cal.
400,830. Electric Car, Electric Car Co. of America, Philadelphia, Pa.
400,838. Dynamo Electric Machine, T. A. Edison, Llewellyn Park, N. J.
400,560. Car Starter, R. O. Gercke, Augusta, Ga.
400,482. Conduit for Cable Railways, Phillips Economical Cable-Grip Construction Co., Chicago, Ill.
400,497. Car Track Sweeper, C. Shreve, Chicago, Ill.
400,809. Alternating Current Electric Reciprocating Engine, C. J. Van Depoele, Lynn, Mass.
400,525. Electric Railway Signaling, W. H. Waddell, Lexington, Ky.

Issue of April 9, 1889.

400,973. Armature for Dynamo Electric Machines, E. Thompson, Lynn, Mass.
400,890. Regulation of Electric Motors, Electric Cutting Machine Co., Chicago, Ill.
400,977. Paving Block, R. B. Berrie, Lexington, Mo.
401,159. Bearing for Street Car, D. G. Grant, Syracuse, N. Y.
400,916. Current Collecting Device for Electric Railways, R. M. Hunter, Philadelphia, Pa.
400,926. Electric Railway, R. Lundell, New York, N. Y.
401,205. Heating Street Cars, W. H. Patton Pueblo, Colo.
401,221. Electric Railway, U. S. Electric Co.' Denver, Colo.
400,971. Alternating Current Electric Motor, E. Thompson, Lynn, Mass.
401,230. Regulator for Dynamo Electric Machines, C. J. Van Depoele Chicago, Ill.

Issue of April, 16, 1889.

401,638. Ticket Box for street railway cars, S. H. Caughy, Baltimore Md.
401,691. Rolls for Rolling Three-Flanged Slot Rails, Johnson Steel Rail Co, of Kentucky.
401,692. Rolls for Rolling Bulb Webbed Slot Rails, Johnson Steel Rail Co, of Kentucky.
401,693. Rolls for Rolling Z-shaped Slot Rails.
401,340. Combined Car-Starter and Brake, S. B. Fyler, East Syracuse, N. Y.
401,352. Street Railway, L. M. Hosea, Cincinnati, O.
401,574. Car-door Fastening, P. H. Murphy, East St. Louis, Ill.
401,515. Underground Conduit for Electric Railways, F. H. Reed, Jersey City, N. J.
401,472. Electric Railway Track Alarm, T. Taylor, Cedarville, Cal.
401,668. Dynamo Electric Machine, U. S Electric Lighting Co., New York, N. Y.
401,669. Dynamo Electric Machine, U. S. Electric Lighting Co., New York, N. Y.

Issue of April 23, 1889.

402,064. Switch for Electric Motor Trolleys, W. Christy, Akron, O.
402,066. Dynamo Electric Machine, C. Coerper, Prussia, Germany.
402,007. Splice-box for Electric Cables, Electric Cable Construction and Maintenance Co., of Pennsylvania.
402,080. Electric Car, J. W. Henderson, Philadelphia, Pa.
401,842. Cable Grip, T. W. Lemieux, Duluth, Minn.
402,028. Letter Box for Street Cars, G. B. McAllister, Baltimore, Md.
401,895. Cable Grip, S. F. McDill, San Francisco, Cal.
402,035. Passenger Register, A. Romain, New Orleans, La.
401,970. Electric Motor for Tramway Vehicles, W. D. Sandwell, London, Eng.
401,796. Electric Railway System, S. H. Short, Columbus, O.
401,797. System of Elevated Conductors for Electric Railways, S. H. Short, Columbus.,O.
401,801. Commutating Device, D. W. Thompson, Englewood, Ill.
401,986. Sheave-Supporting Frame for Cable Railways, J. Walker, Cleveland, O.

Issue of April 30, 1889.

402,305. Cable Grip, C. S. Chapman, Kansas City, Mo.
402,445. Fare Register, J. L. Harley, Baltimore, Md.
402,523. Sand-Box for Street Cars, G. H. Hathaway, Boston, Mass.
402,533. Tunnel-Yoke for Cable Railways, Johnson Co., of Kentucky.
402,470. Street-Railway Crossing, A. J. Moxham, Johnstown, Pa.
402,544. Cable-Lifter for Railway Cars, D. W. Smith, St. Louis, Mo.
402,361. Grip-Car, C. T. Snedekor, New York, N. Y.
402,490. Elevated and Suspended Cable Railway, G. R. Taylor, Louisville, Ky.

Issue of May 7, 1889.

402,890. Electric or Cable Railway Car, S. A. Bemis, Springfield, Mass., and L. Pfingst, Boston, Mass.
402,832. Electric Railway, R. M. Hunter, Philadelphia, Pa.
402,836. Insulator and Holder for Electric Railways, B. Jennings, San Jose, Cal.
402,741. Conduit Yoke for Cable Railways, J. B. Johnson, St. Louis, Mo.
402,839. Conduit for Driving Mechanism of Street Railways, Judson Pneumatic Railway Co., Minneapolis, Minn.
402,933. Street Railway, Judson Pneumatic Railway Co., Minneapolis, Minn.
402,934. Street Railway, Judson Pneumatic Railway Co., Minneapolis, Minn.
402,745. Street-Railway Car, S. D. King, Pittston, Pa.
402,963. Cable Railway, A. R. Parkeson, Monongahela, Pa.
402,990. Commutator Brush-Controller for Electric Motors, W. L. Silvey, Lima, O.
403,009. Slotted Conduit for Electric Motors, C. J. Van Depoele, Chicago, Ill.
402,875. Cable-Railway Crossing, Weir Frog Co., Cincinnati, O.
403,018. Field Magnet for Dynamos, S. S. Wheeler, New York, N. Y.

Issue of May 14, 1889.

403,319. Wire Cable, T. C. Batchelor, West Kensington, County of Middlesex, and A. Latch, South Shields, County of Durham, Eng.
403,326. Sheave or Pulley for Cable Railways, T. J. Burridge, St. Louis, Mo.
403,092. Connector for Electric Railways, L. Daft, Plainfield, N. J.
403,192. Electric Railway, R. M. Hunter, Philadelphia, Pa.
403,214. Street Car, G. M. Pullman, Chicago, Ill.
403,299. Track-Brake for Cars, J. Stephenson, New York, N. Y.
403,301. Draw Gear for Cable Cars, J. Stephenson, New York, N. Y.
403,302. Car-Truck Guard, J. Stephenson, New York, N. Y.
403,303. Cable-Grip Carrier, J. Stephenson, New York, N. Y.
403,394. Cable-Car Truck, J. Stephenson, New York, N. Y.
403,395. Cable Grip Car, J. Stephenson, New York, N. Y.

Issue of May 21, 1889.

403,728. Cable-Railway Conduit Mold, I. Bishop, San Francisco, Cal.
403,512. Cable-Railway Mechanism, T. Bradwell, Chicago, Ill.
403,650. Gripper for Cables, E. Dainty, Coal Bluff, Pa.
403,741. Street-Railway Track, R. Dansinger, Albany, N. Y.
403,651. Grip-Slot Closer for Cable Railways, C. Davis, Kansas City, Mo.
403,582. Device for Starting Cars, E. Fales, Cleveland, O.
403,754. Electric Railway, R. M. Hunter, Philadelphia, Pa.
403,894. Chock Block for Tram Cars, J. W. Sims, Cincinnati, O.
403,786. Electric Railway, F. M. Speed, San Francisco, Cal.
403,800. Slotted Conduit for Electric Conductors, C. J. Van Depoele, Chicago, Ill.
403,801. Electric Railway, C. J. Van Depoele, Lynn, Mass.

Issue of May 28, 1889.

404,149. Trolley for Electric Railways, D. A. Ainslie, Richmond Va.
404,069. Clamp for Electric Motors, Belding Motor & Mfg. Co., Chicago, Ill.
404,289. Track Brake for Street Railway Cars, P. N. Kling, St. Louis, Mo.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents.

Expired during May.

126,449. Car for Street Railway, E. L. Dorsey.
126,779. Ventilator for Cars, T. W. Freeborn.
126,485. Car Seat, Phillips & Coleman.
126,993. Car Starter, W. M. & W. E. Strattan.
126,971. Sheave for Wire Rope, R. Long.
127,095. Turntable for changing Car Trucks.
127,164. Pneumatic Brake and Car Starter.

Will Expire During June.

127,525. Street-Car Brake, J. Stephenson.
127,524. Axle Box for Street Car, J Stephenson.
127,531. Car Starter, W. M. Watson.
127,808. Fare Box, J. B. Slawson.
127,869. Portable Fare Box, J. S Hagerty.
127,877. Street-Car Signal, J. C. Harris.
129,979. Car Brake, W. Kimball.
128,165. Car Pushing Device, R. Odenath.
128,428. Car Seat, P. I. Schopp.
128,292. Car Spring, J. W. Evans.
128,348. Hub and Bearing for Car Wheels, Warstell & Pirrung.

Business Mention.

The Thomson-Houston Electric Co. has closed contracts with the Fulton County Street R. R. Co., of Atlanta, Ga., for eight cars, operating over eight miles of road; with the Attleboro & North Attleboro R. R. Co., of Attleboro, Mass., for five cars; with the Auburn Street R. R. Co., of New York, for three cars; and with the Americus Street R. R. Co., of Americus, Ga., for four cars.

It has also received orders from the Boston Street R. R. Co. for four motor trucks, and from the Julien Electric Traction Co. for fifty motors.

A CONTRACT for the yokes and all iron work except the slot rails for the 4th street cable road in St. Louis, Mo, has been awarded to the Green Car Wheel Co., and the Murray-Judge Co., of that city. We understand the contract involves the expenditure of $193,000. A contract for the slot iron has been given to the Johnson Iron Co., of Pittsburgh, and contract for construction after the material is laid down, amounting in all to $208,000, has been secured by Allan and Vieths.

THE Troy and Lansingburgh Railroad Co. has awarded to Kelly and Knowlson, of Troy, a contract for the construction of two 18"x42" Corliss engines, of 180 horse power each, with large duplex pumps and tank.

THE Union Iron Works, of San Francisco, have secured the contract for the engines, boiler and machinery necessary for the power house of the Portland Cable Railway Co., of Portland, Oregon. It is understood that the price is in the neighborhood of $58,000.

THE Wrought Iron Bridge Co., of Canton, O., recently secured the contract for the structural

iron work or the steel viaduct for the Denver Cable Railway Co., of Denver, Colo. The contract will call for over 1,000 tons of steel structural work, and over 1,000,000 feet of lumber. The contract price is $100,000, and will require 75 cars to carry the steel work to its destination.

THE contract for the engines for the West Chicago Street Railway Co. (cable) has been given to the Providence Steam Engine Co., of Providence, R. I. The engines are to be 2-horse power.

THE contract for the rails, wheels, sheaves, pulleys, etc., amounting in value to over $100,000, to be used in the construction of the Portland (Oregon) Cable Company, has been given to the Dunham, Carrigan and Hayden Company, of San Francisco.

Personal.

John A. Brill, Vice-President of the J. G. Brill Co., was in Mexico according to latest accounts.

J. H. McGraw, of the *Street Railway Journal*, recently favored the office of the GAZETTE with a call.

It will afford the many friends of Mr. F. T. Lernerd no little pleasure to learn that he is now directly connected with the Peckham Street Car Wheel Co, of New York, and as Mr. Lernerd has the reputation of being one of the best salesmen in the country, his company will undoubtedly get a great many of its goods upon the market through him.

Mr. Bernard H. Schmidt, who was reported in our May issue as having been appointed Western Selling Agent for the J. G. Brill Co., has established his headquarters in Room 208, Phenix Building, in this city. He informs us that he has already booked several good orders, and thinks the prospects for western business are most favorable.

As many of the prominent street railway companies are now having electric lighting plants installed for the purpose of lighting their stables, barns, car houses, etc., with electricity, with a view of reducing the danger from fire, we think it would be of some interest to many of our readers to know something regarding the progress made in this useful and important industry; so we give below a record of sales of arc and incandescent lamps made by the Thomson-Houston Electric Co. within the past few weeks:

Adams, Mass., 45 arc; Sanford Woolen Mills, Medway, Mass., 100 inc.; Monroe County Insane Asylum, Rochester, N. Y., 600 inc.; Saxon Woolen Mills, Franklin, Mass., 200 inc.; New England company, Bath, Me., 300 inc.; Buffalo, N. Y., 190 arc; Lowell, Mass., 1,000 alt.; Leominster, Mass., 50 arc, 600 alt.; Leicester, Mass., 600 alt.; Hudson, N. Y., 45 arc; Portland, Me., 45 arc; Manchester, N. H., 100 arc; Revere, Mass., 600 alt.; Findlay, O., 1,000 alt.; Woonsocket, R. I., 1,000 alt.; Pitman, Mass., 500 alt., 50 arc; Rockland, Me., 30 arc; Savannah, Ga., 250 arc; Malden, Mass., 500 alt.; Upper Sandusky, O., 60 arc; Columbus, Ga., 1,000 alt., 100 arc; Thomasville, Ga., 50 arc.; Perry Paine Building, Cleveland, O., 1,000 inc.; Falls City Jean & Woolen Mills, Louisville, Ky., 200 inc.; Stearn & Silverman, Wheeling, W. Va., 20 arc; Mowry Building, Syracuse, N. Y., 200 inc.; New Haven, Conn., 45 arc; Washington Court House, O., 50 arc; Cambridge, Mass., 1,000 alt.; Hudson River State Hospital, Poughkeepsie, N. Y., 800 inc.; Bedford, Pa., 50 arc, 600 alt.; Stamford, Conn., 1,500 alt.; Fernandina, Fla., 50 arc.; New Decatur, Ala., 50 arc; Chester, Pa., 30 arc; H. W. Smith, Bangor, Me., 50 inc.; T. J. Stewart, Milo, Me., 50 inc.; Riverside & Oswego Mills, Providence, R. I., 400 inc.; Morse & Whyte, Cambridge, Mass., 200 inc.; Jewell Milling Co., Brooklyn, N. Y., 200 inc.; James Walker & Co., Basin Mill, Me., 50 inc.; Fort Paine Coal & Iron Co., Fort Paine, Ala., 400 inc.; J. B. Mason, Providence, R. I., 50 inc.

Reviews.

Table Talk for June shows its usual seasonableness and attractiveness in the June number. The contents open with "Venus and the Rose," a poem of pretty conceit in blank verse, by Joseph Whitton; then Mrs. Ruskin gives some information on the "Picnic," showing how that diversion can be carried out with the most enjoyment and the least trouble. Tillie May Forney's "Fashionable Luncheon and Tea Toilets" follows; then "A Rhapsody of Fruits;" "A Poetic Bouquet;" "The Career of an Anglomaniac, IV.;" "Capricious Washington;" Mrs. Rorer's invaluable list of "Menus for June;" "Fashionable Crazes;" "Foreign Gastronomic Notes;" "Housekeeper's Inquiries" (in which Mrs. Rorer manages to crowd so much that is useful to the house wife); "Household Decoration;" "Culinary Maxims;" a short essay on "Beauty;" "Crumbs from the Editorial Table;" "Open Letters;" "Solution of the All-Fools' Problem;" a new "Vacation Problem;" "Woman's Exchange Movement," etc. Table Talk succeeds in making itself readable from cover to cover, and its popularity is scarcely a matter of wonder. Published by the Table Talk Publishing Co., 402, 404 and 406 Race street, Philadelphia. $1.00 a year, 10c. single copy.

NOTICE.—ST. LOUIS, MO., APRIL 22, 1889.—A meeting of the stockholders of the People's Railway Company will be held at the office of said company, No. 1810 Park Avenue, in the city of St. Louis, State of Missouri, on the first day of July, 1889, for the purpose of considering and acting upon the following propositions, that is to say:

First. A proposition to increase the capital stock of said company from $800,000, the present amount thereof, to the sum of $1,000,000.

Second. A proposition to authorize the issue by said company of its 10-20 6 per-cent. bonds for the aggregate sum of $1,000 000, the payment of the principal and interest on said bonds to be secured upon the property and franchise of the company, the said bonds to be used for the purpose of altering and extending the railroad of the company and changing the motive power thereof, and for such other purposes as said meeting may determine.

Third. To consider and act upon any other matter which may be properly brought before said meeting.

Said meeting will be convened at 9 o'clock A. M., on said 1st day of July, 1889.

CHARLES GREEN,
President.

JOHN R. LIONBERGER,
JOSEPH P. WHYTE,
JAS. F. HOW,
JAMES CAMPBELL,
Directors.

JOSEPH PEGRY, Secretary.

The Street Railway Gazette.

VOL. IV. JULY, 1889. No. 7

ELECTRIC RAILWAYS.

The Sprague Improved Electric Railway Motor.

We publish in this issue two views of the Sprague Improved Electric Motor for street railway work. This motor represents the experience of several years in the electric street railway business, and it is intended to meet all the exigencies in this this kind of work. In its manufacture, every detail of mechanical and electrical construction has been carefully attended to,and the most recent improvements which experience could suggest have been adopted to meet the necessities of street car service.

The armatures are of the same type, and have been proved to be water-proof and incapable of injury, by moisture. In a recent test upon one of these armatures, made at the Sprague factory at Schenectady and described in this paper a short time ago, one of these armatures was placed successively in a tub of fresh water and allowed to remain there for twenty-four hours, and in a tub of salt water and allowed to remain there for the same time. After each of these baths the armature was placed in position in the motor and the machine was worked to one-third above its normal load as measured by a dynamometer for several hours without developing any trouble whatever. The tests proved that these machines can be relied upon under all conditions of weather, and that they can not be harmed by moisture or by water splashing upon them from the road bed.

Another important improvement which has been adopted in this machine is that the field magnet coils are completely incased in metallic covers, which fully protect the wire from all outside damage. These casings are hermetically closed, so that it is impossible for any moisture to affect the coils. Moreover, besides acting as protectors against any moisture, these casings also have an important electrical action in protecting the coils, since, by inductive action, they reduced to insignificance whatever extra current might be generated in the coils upon breaking the circuit.

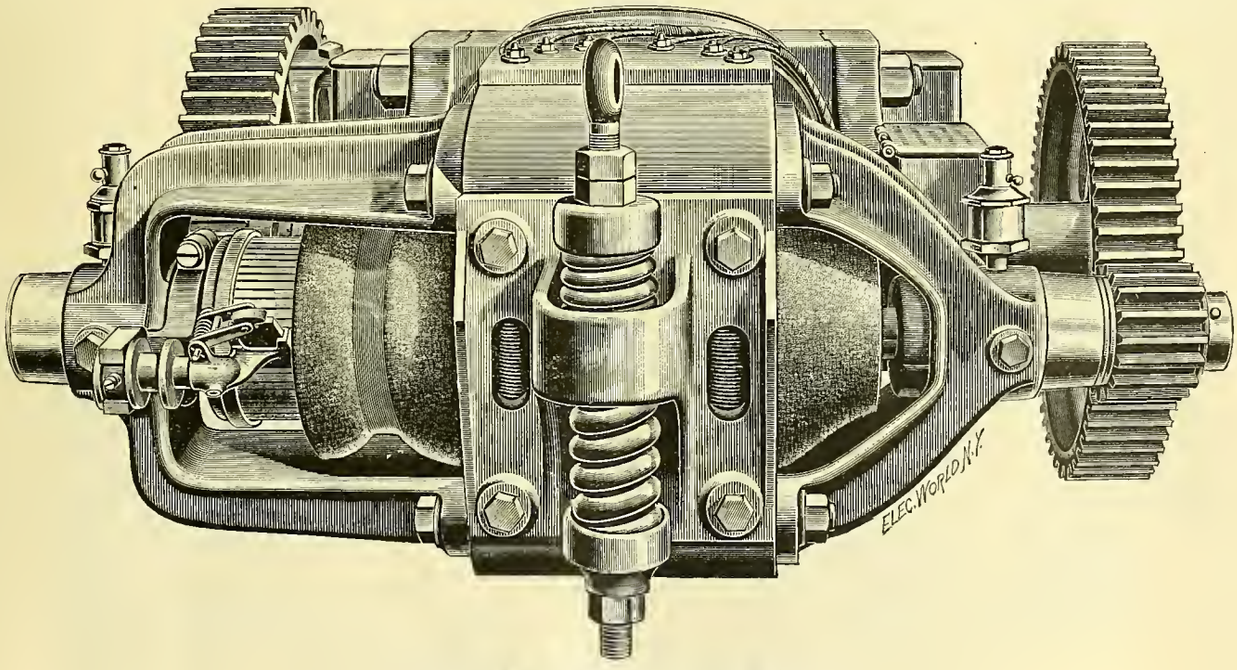
The style of brushes used upon these motors is of a new design, which has been shown to give excellent results in this kind of work. These brushes, instead of cutting the surface of the commutator, as brushes of copper and other materials have been proved to do, acts as a lubricant, keeping the commutator smooth, and, at the same time, giving very good electrical connection.

The Sprague method of flexibly suspending the motors and of controling the speed of the motor without the use of any wasteful resistances, is also adopted with these motors.

In designing this motor great care has been taken with regard to its strength and durability, and in reducing its weight to a minimum. For this purpose, and with this object in view, cast iron has been dispensed with in the cores and yoke of the field magnets, and wrought iron substituted therefor.

Other details of construction, such as devices to reduce the amount of care and attention required to a minimum, have been adopted, with a view of making this motor the peer of any others, if not their superior, for the same kind of work and service.

These motors are already in operation at Wichita, Kas., Marlboro, Mass., Cleveland, O., Erie, Pa., Atlantic City, N. J., and at one or two other places where they have been installed. They have been shown to give very good results, and, in the future, this type of motor will be used in all of the Sprague installations of electric railways.



SPRAGUE IMPROVED ELECTRIC RAILWAY MOTOR.

Only one intermediate shaft is used between the armature pinion and the main gear, and the entire reduction is about 12 to 1. The gears, and all parts of the motor are made very strong and durable, as can be seen in the case of the gears in the engraving, where the general appearance of durability and strength is decidedly marked.

The main gears are of the split gear pattern, so that, in case of necessity, they can be easily removed from the shaft, without dismounting the machine. The pinion and all the bearings are also constructed so that they can be easily removed, if necessary, and all the bearings are made completely dust-proof and very durable.

A Remarkable Record.

We understand that since the Sprague Electric Ry. (which was installed by Leonard & Izard, of Chicago) has been in operation at Atlantic City, N. J., up to June 12th, 1889 the electric cars there have made six thousand four hundred and sixty-four trips. During this time there was not a single trip lost from any cause whatever, although all the cars were in constant service; there were no reserve cars. This is the first road in the country to operate all its cars by the Sprague Improved Electric Motors.

The system of street railways at Atlantic City is controlled by the Pennsylvania R.R. company. The equipment of this road is first class throughout, and all the latest improvements in electrical railway science are in use here. The poles are of iron over the entire length of the line, and are noticeable for their lightness, and are very tasteful looking. The poles are placed between the two tracks, and by means of brackets on each side, support the trolley wire above the centre of the track. These carry the small silicon-bronze trolley-wire, which is used as a working conductor upon all the Sprague roads.

Since the road has been in operation it has been visited by a large number of street railway managers from all parts of the country, who have come to Atlantic City to investigate the operation of the road in reference to the subsequent adoption of electricity as a motive power upon their own roads. These visitors have thoroughly inspected the road, the management affording them every opportunity for so doing, and universal admiration has been expressed in regard to the smoothness of operation of the cars, and the general appearance of stability and strength of the motors.

The view which we publish in this issue shows one of the cars in operation on Atlantic Avenue, and gives a very good idea of the kind of pole used upon this line. It will be noticed that the whole effect of the pole is quite light and artistic, and the brackets are quite ornamental in their character, making the appearance of the whole very pleasing to the eye. Such a pole as this is especially adapted to double track work in cities, since it is very strong, durable and light, and does not occupy much space.

Electric Railway in Atlantic City, N. J.

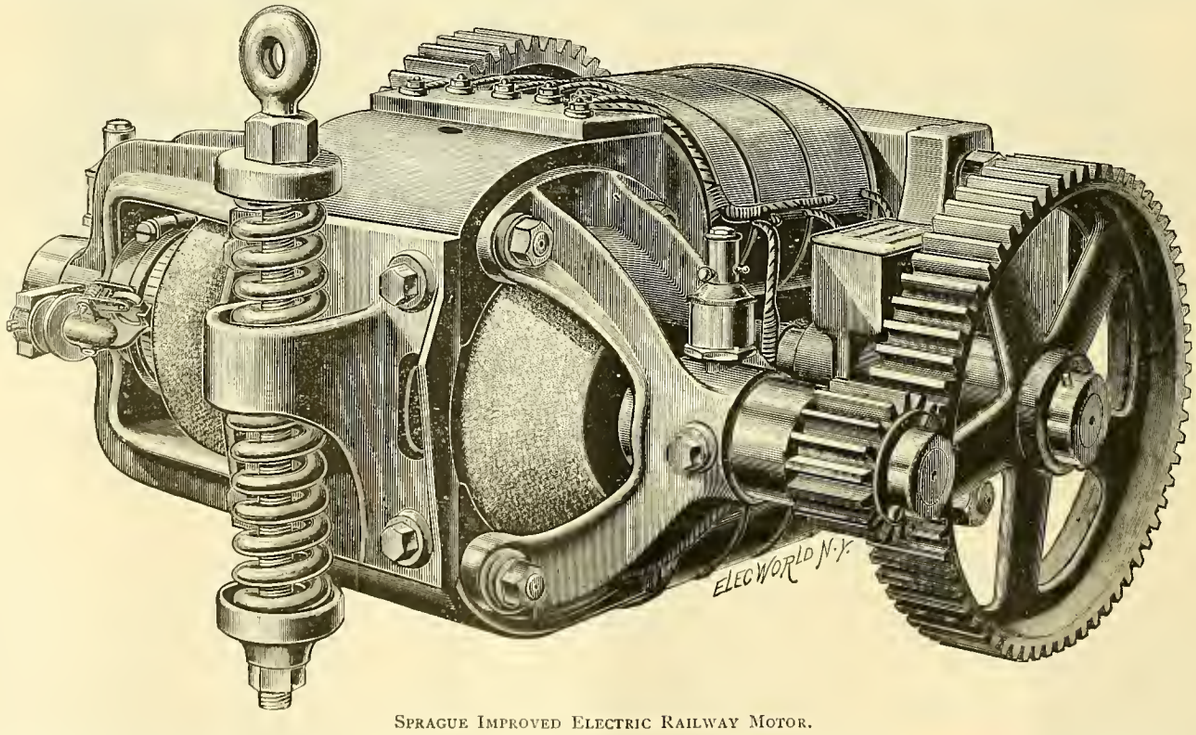
Most of the cars upon this line, which are equipped with electric motors, tow one additional car, without motors, doubling the number of cars operated. On pleasant days these cars are crowded with large numbers of passengers, which are carried at the rate of 15 to 20 miles an hour without trouble, in spite of the fact that many of the electric cars are only equipped with one 15-h.p. motor as yet. In trial trips as high a speed as 25 miles an hour has been obtained on this road by the electric cars, though in practice they are run at a very much lower rate of speed, so that all travel may be done without danger.

A Pioneer Electric Railway Re-organized.

One of the first companies in this country to adopt electric power on its lines was the Washington Street Asylum and Park Railway at Binghamton, N. Y., which has recently contracted with the Sprague company to change its entire equipment to meet the latest and most approved ideas in electric railway science. The first equipment was installed about two years ago and the changes that are now being made illustrate the advances which have been accomplished in electric railway practice, and they show the difference between the ideas which were prevalent two years ago and the leading ideas as illustrated in the motor appliances of to-day.

The appearance of the motor car is changed in a marked degree. The cab, which occupied the front of the car, according to the old style of electric railway and which contained the electric motor, will be entirely dispensed with, and the motors will be placed underneath the cars, as in all the modern electric systems. The overhead over-running trolley and the method of carrying all the current over the track on a single conductor have been abandoned for the latest Sprague methods in this regard. The motor power will also be under much more complete control of the driver than under the old methods, and all control of the motors and all switching will be done by a single movement of one switch at the platform, so that the car can be propelled either forwards or backwards with equal ease and facility.

We understand that the management of the railway company has closed a contract for power at nearly one-half less than the amount called for by the previous contract, and it is deeply interesting to note the increase of the efficiency of the motors as indicated hereby.

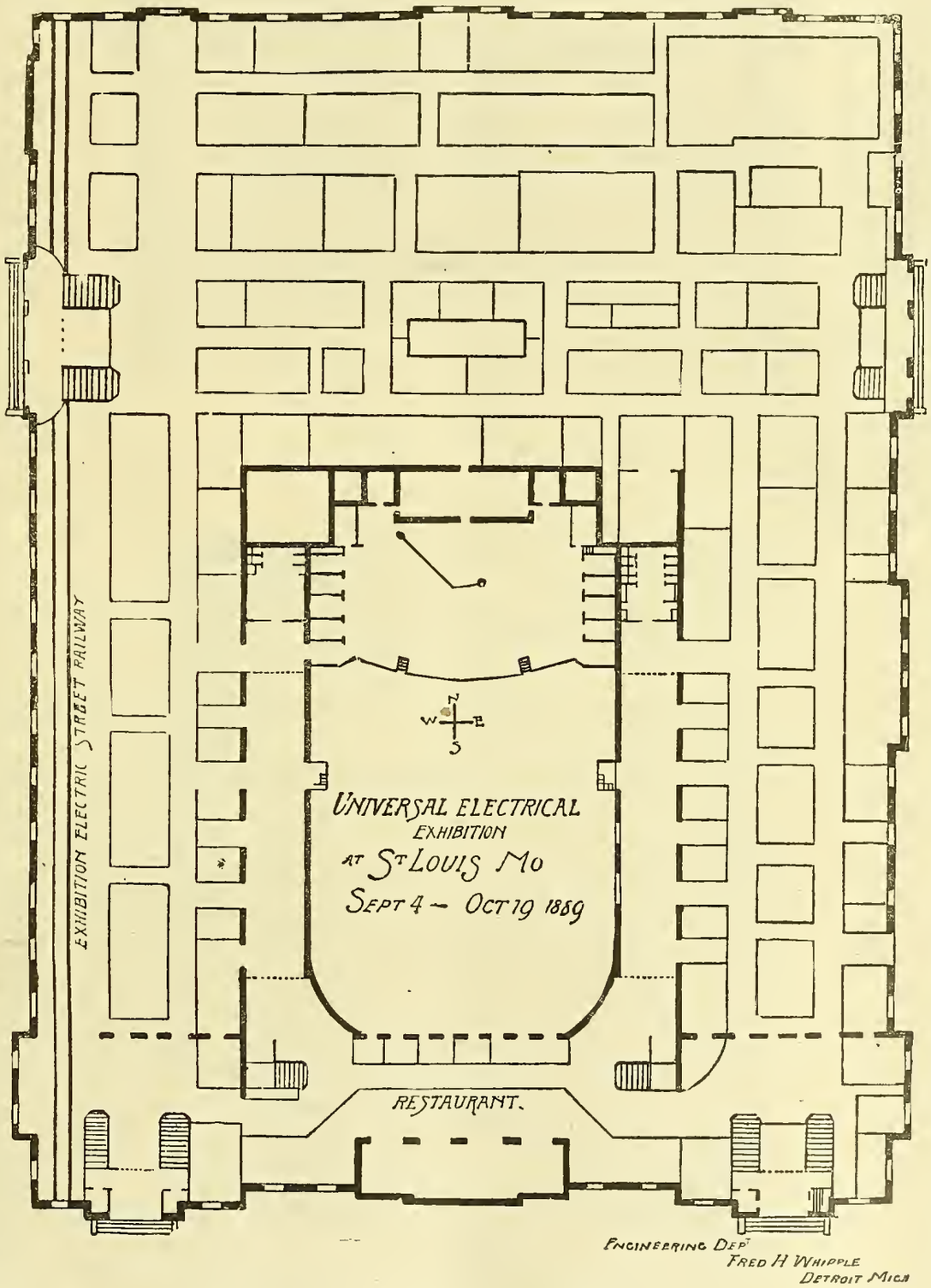


Sprague Improved Electric Railway Motor.

Universal Electrical Expositon.

Mr. Fred H. Whipple, who was recently appointed general manager of the Universal Electrical Exposition which is to be held in St. Louis in September, has issued the following circular:

"The general management of the Universal Electrical Exhibition, to be held under the auspices of the St Louis Exposition and Music Hall association, commencing Sept. 4, 1889, and continuing for a period of six weeks, has been placed in my hands. The association is prepared to make this electrical exhibit the greatest that has ever been held in the United States, and for that purpose unlimited facilities are offered for the operation and display of the products of the electrical and mechanical world. There will be no charge whatever made for space or power, and all articles will be returned on the railroads free of cost. There are 75,000 square feet of floor space set apart for this exhibit, and every aid will be given exhibitors to make an attractive display. As an educational medium, and as a means of putting the products of electric science in a business way before the people of the entire South and West, and Southwest, a grand army of buyers in themselves, this exhibition offers unexcelled advantages. Gilmore's famous band will furnish music during the entire six weeks of the exposition, and the most elaborate excursion arrangements have been made. From the phenomenal success of the St. Louis Exposition, held in this building during recent years, it is estimated that at least 700,000 people will inspect the exhibit, and it will be the first occasion in this country where so large a field for electrical work has been presented to the electrical people. Application blanks and any information that may be desired will be cheerfully furnished."



We understand that a fine exhibition of electric street railway appliances has been already provided for. A track over 700 feet long will be laid in the exhibition building, under the direction of the enterprising Thomson-Houston company, and on it will be run all kinds of cars, including the overhead, conduit and storage systems.

The accompanying diagram shows very clearly the proposed arrangement for space, and may serve as a guide to our readers in selecting any particular location in which to exhibit their goods and appliances.

Electricity in Cleveland, O.

It is only about nine months ago since the first electric railway was put into operation in the city of Cleveland, Ohio. Since then the advantages of electricity for street car service has become very generally recognized in that city and the number of electric cars is being daily increased, while the Cleveland public and press have become enthusiastic over this method of rapid transit.

Last week a new extension to the East Cleveland Electric railway was opened in Cleveland on Prospect street and Euclid avenue, and the first car ran over the line with the president and secretary of the road and electricians in charge as freight. The construction of this extension had been somewhat delayed on account of delay in securing the rights for overhead wires, but these rights were finally secured, and the two miles of wiring for the electric road was put up in twenty-four hours' time. This, to say the least, is hustling, but nevertheless the East Cleveland Railroad company did that very thing. It is the intention of the East Cleveland company to operate sixty motor cars on this line with two and a half minutes' headway, and all the horses will be removed from the line as soon as the motor cars are equipped with the Sprague motors, which have been ordered

It is said that the experiment will be tried of running these cars at the rate of about eleven miles an hour through the city, and it is not thought that the city government will object to this, since it is a well known fact that electric cars operated at twelve miles an hour are much safer to the general public than horse cars drawn at half that rate of speed, since the electric cars can be stopped so much more quickly and are under much better control than cars drawn by horses.

It is an interesting fact in connection with this road that the popularity of the electric cars with the passengers and property owners along the line is constantly increasing. At a public meeting held in one of the largest armories in Cleveland a few nights ago in the interest of rapid transit, resolutions were passed commenting on the sucessful operation of the Sprague electric road, and the East Cleveland company was requested to extend the motor line in several directions in order to improve the transit facilities.

The equipment of the East Cleveland Railway includes, besides a number of the old type of Sprague motors, a number of cars equipped with the new style of motors, and all additions to the equipment will be of this class of motor.

The Vine Street Motor Railway, Kansas City, is to be immediately changed from a steam motor road to an electric road equipped with the Thomson-Houston system. The proprietors of the railway are confident that they will make a saving in operating expenses of fully seventy per cent., as the present cost of operating their steam motors is about $20.00 per day.

The equipment of the Armourdale line of the Metropolitan Street Railway system at Kansas City is nearly completed by the Thomson-Houston Electric company, and it is probable that cars will be in operation there in a week or so.

In use on the Thomson-Houston Electric Railway, at Wichita, Kan., is a 40 h. p. generator that has done extraordinary work as compared with the work done by dynamos of other electric systems. As many as six heavy cars have been operated by this generator at the same time, all of them running at a schedule speed, which on certain parts of the road is fifteen miles an hour.

Notes on the Thomson-Houston System.

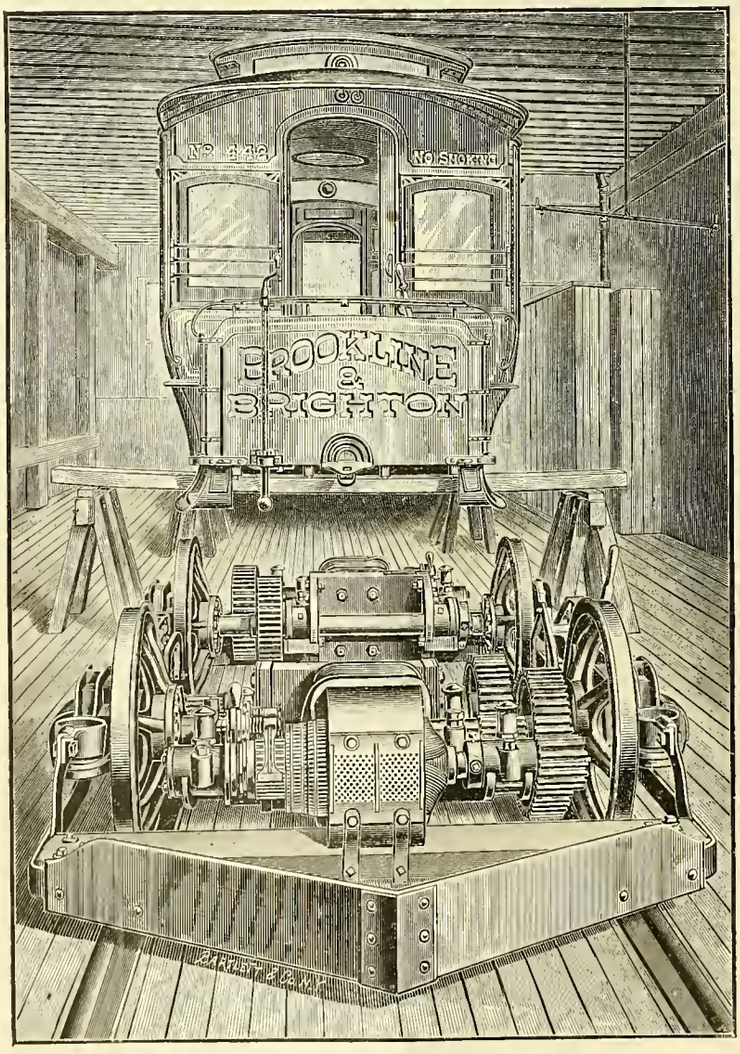
The popularity of electric railways is evidenced by the recent purchase of the Des Moines Broad Gauge Railway, equipped with the Thomson-Houston system, by a wealthy Chicago syndicate; the purchasing price being $350,000, some three times the original cost of the road. When equipped with horses this road did not pay operating expenses, but since its equipment and operation under the Thomson-Houston system, its net earnings will pay 3% dividends upon an investment of nearly $400,000. The road has never had a repair shop for its electrical apparatus, and in a recent conversation its President said: That they did not know what electrical repairs meant, as they had had none to make. In some respects the Des Moines road has been the most wonderful in results of any electrically equipped road; it having at its power station but one 80 h. p. generator, which operates eight cars over grades running as high as 10% without indications of overheating, and frequently tow cars are used with those equipped with motors. On one branch of the system the necessity of speedy equipment compelled the use of a No. 2 copper wire without feeders, such wire being the only available material; yet with this small conductor the cars are run at a rate of six miles per hour up a 10% grade, three miles distant from the station.

The Omaha and Council Bluffs Railway & Bridge company are progressing rapidly with the electrical equipment of the recently purchased horse car lines in Council Bluffs. For the operation of such lines they have purchased ten additional motor trucks, and two generators, from the Thomson-Houston Electric company. In placing this order for additional apparatus the management of this road state in a letter to the Thomson-Houston company that they consider their present line equipped with the Thomson-Houston system the most perfect electric railway in the world.

The Omaha Motor Railway company is nearly ready to be put in operation with the Thomson-Houston Electric system. The largest power station which has yet been constructed for electric railway operation, is owned by this company, and the car equipment ranks second in quantity among electric railways yet constructed, it having twenty-six motor cars, all of which will be used to tow at least one additional car, and many of the motor cars will tow two additional cars. The success of the Thomson-Houston system on the Omaha and Council Bluffs line has made the citizens of Omaha jubilant at the immediate prospect of such rapid transit being given them over their entire city. In addition to the equipment ready to be put in, the company intends to add twenty additional motor cars upon the extensions to its system within a few months.

The Thomson-Houston company has recently closed a contract for the electrical equipment of the Peoria, Illinois, Street Railway system. One of the finest power stations in the country will be built for the operation of the electric cars, with steam power capacity sufficient to operate double the number of cars which are to be installed under the present contract. The owners of the Peoria road have made very careful investigations of the various electric railway systems in operation throughout the entire country, and state as a result of their investigations that the Thomson-Houston system is far superior to all others especially in the economy of its repair account.

OBSERVATORY HILL PASSENGER RAILWAY—BENTLEY-KNIGHT SYSTEM.



THE BENTLEY-KNIGHT DOUBLE MOTOR TRUCK.

Topeka has not yet gotten over feeling proud of having the largest electric railway in the world. The schedule time is maintained on the entire system, which is somewhat complicated, and the amount of business done is far in advance of the expectation of the projectors of the enterprise. The demands of travel frequently compel the use of two tow cars with each motor car, and the receipts of a single train have been $100 daily.

To test the apparatus recently when the rear car in a train of three cars jumped the track at the foot of a six per cent. grade, the motor car was started and pulled the train up the grade at a fair rate of speed, dragging the rear car over the paving stones. In the opinion of the management of the Topeka road the Thomson-Houston company rate their motors much below their maximum capacity, as it would seem that the 20 h. p. equipment which is in use on the cars at Topeka has shown an efficiency as high as 30 or 40 h. p.

The Observatory Hill Passenger Railway, Allegheny, Pa.

Our cut shows one of the double motor cars now in use upon the Observatory Hill Passenger Railway of Allegheny City, Pa. This road is one of the oldest electric railways in the country, its cars having been in continuous service since December, 1887. The equipment was furnished by the Bentley-Knight Electric Railway company, and now consists of six double motor cars. The work done has constantly been of the heaviest description, the grade climbed being 295 feet in 4,900 feet, while the steepest pitch is 12½ per cent. rise, and the road is remarkable from the fact that over two-thirds of its entire length of four miles is on curve. For one mile the current is conveyed by means of an underground conduit, the remaining three miles by elevated conductors, and each car carries at all times the necessary connections for both underground and overhead conductors.

The Bentley-Knight System.

The accompanying illustration shows the double motor trucks supplied to the West End Street Railway company of Boston, by the Bentley-Knight Electric Railway company, eight of which trucks are now in operation upon the Chestnut Hill, Boylston & Beacon Street route of that railway. The cars equipped with these trucks have been in operation for the past five months, making a regular speed of twelve miles an hour, and having attained a maximum speed in regular service of nineteen miles per hour. On Sundays and holidays each of these trucks tows two others, and the speed is not sensibly diminished. Each car is equipped for use with under-contact elevated conductors. For summer use the West End road is now putting on a number of open cars, each equipped with single 20 horse power Bentley-Knight machines, and for excursion work and heavy service, has just received from the Bentley-Knight company a 40 horse power machine which, it is expected, will be upon the road within the coming week.

12,000 passengers moved in one day from five tons of coal and an average cost for fuel of 1¼ cents per car mile is the record made by the Bentley-Knight cars in Boston to date.

President Kilgour, of Cincinnati, has placed two of his sons in the Thomson-Houston factory to obtain a practical knowledge of electricity.

Electric Railway in Plymouth, Mass.

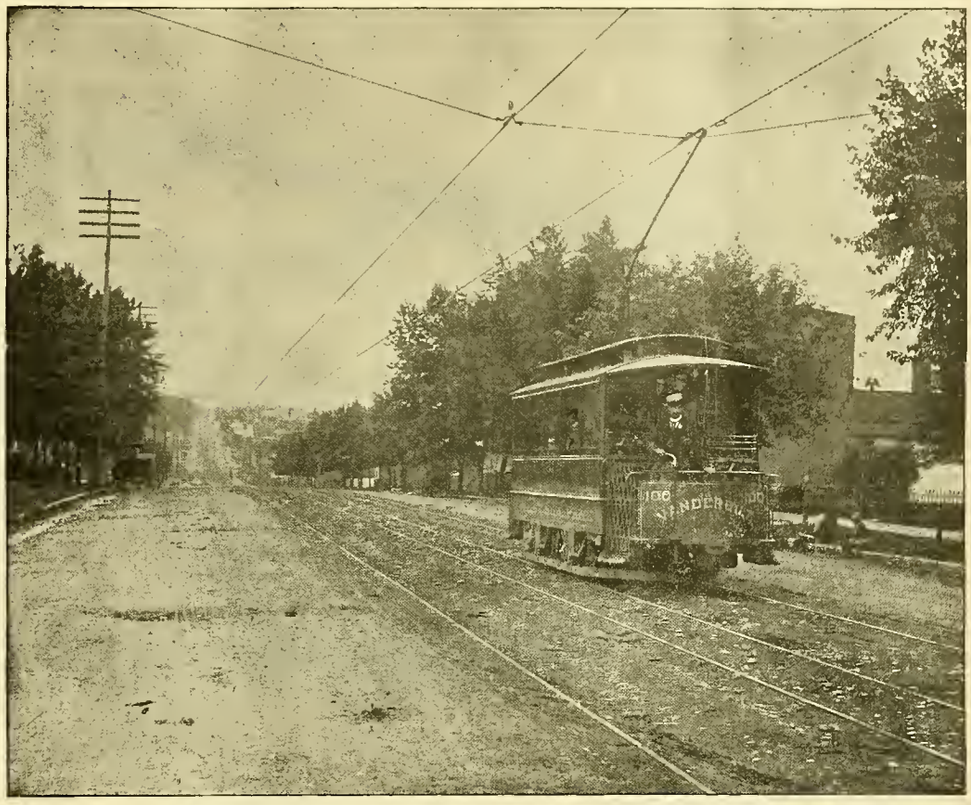
The Plymouth and Kingston Street Railway, which has been recently equipped by the Thomson-Houston Electric company, has just been put into operation. It is 4½ miles in length and probably has more grades, in proportion to its length, than any street railway in the United States. There is one place in the road where the grade is 9 per cent. for 200 feet, increasing to 10 per cent. the next 200 feet. There are seven grades in all, respectively 10, 9, 6.7, 6.4, 6.2, 5.8, and 5.2 per cent. The turnouts on this road are so arranged that while one car with tow is ascending a 10 per cent. grade another is on a 5.8 throwing a heavy load on the generator, which, however, has been able to respond instantly to whatever demands have been made upon it. The motor cars experience no difficulty in ascending these grades with heavy loads of passengers, and so far the operation of the entire road has been perfectly satisfactory.

At Cincinnati, the new line of electric cars' recently installed by the Daft company, runs for a short distance over the Gilbert avenue cable line. Just in front of the power house the cable, which is in two divisions, ends, and for a short distance the trains of two cars passing this point have to release their grip from one cable and travel by momentum alone until they take hold upon the other. As it frequently happens that the momentum of the train is not sufficient to carry it across, a winding drum with a cable attached has been placed at the point of division and is used to bridge the gap. Recently a car was sent out with a new grip which was a little too large, and upon arriving at the point referred to the grip jammed in the slot. The winding cable was attached and the drum started, but the car did not move. While preparing for another trial one of the electric cars came along, and with no very apparent effort pushed the cable car in front of it until it could take hold upon the cable. This was done on a slippery track, and is a very clear demonstration of the ease with which the electric motor encounters difficulties, and the large reserve force, so useful in emergencies, which it possesses.

There are 13 curves on the line, and several grades, the steepest of which is 5½ per cent. In the overhead construction the cross suspension method has been used throughout. The cars are six in number, and are each equipped with two 10 h.p. motors. They make on an average 475 miles per day.

The power house is a large brick building, 175 x 70 feet, and contains two steel boilers built by Phœnix Iron Works. The power house is built to allow a sufficient addition to bring the total horse power to 1000. There are two Deck and Church 100 h.p. engines with pumps and station fittings for 800 h.p. The electrical equipment consists of two 80 h.p. generators, switch board and necessary electrical appliances for operating the same.

The stables and power house are lighted from the dynamos. The company is so much pleased with the operation of the system that it has decided to equip all its lines with electricity as soon as practicable; this, in itself, being a splendid endorsement of the system.



McGavock & Mt. Vernon Electric Railway at Nashville, Tenn.

McGavock & Mt. Vernon Electric Railway, Nashville, Tenn.

Thomson-Houston System in Nashville.

The new electric railway at Nashville, Tenn., which is one of the roads recently equipped by the Thomson-Houston Electric company, has been running now for some little time. This road is 6⅛ miles in length, half of which is laid with Johnson rail, the other half, with the exception of about ¼ of a mile, of 20lb. steel T rail.

Facts and Figures.

The following table shows a splendid record of the operation of the Cambridge division of the West End Railway Company of Boston, under the Thomson-Houston system, during the past month.

Motor cars.	Towed cars.	Summary.
Round trips.—2,844	3,053	5,897
Service hours—3,404.45	3,679.20	7,084.15
Car mileage—18,486	19.844 5	38 330.5

Not one trip was missed during the entire month

Stillwater Electric Railway.

The Stillwater Electric Street Railway went into operation on the 27th ult. This is an entirely new line, there being no street railway in Stillwater previous to this. Any one visiting that city will understand the reason at a glance. Owing to the grades it would have been an absolutely impossibility to have made a horse railway pay, and only the introduction of electricity has made the economical operation of a street car line possible.

The line is five and one-fourth miles long, and is at present running six 16 foot cars equipped with Sprague motors.

The generating plant consists of two 60 horse power generators and a 125 horse power Meyer Fixed cut off engine.

The barn and power house are located on the same lot, and the general arrangement of the barn floor is of the latest form for electric railway purposes, having pits under all the track room in the barn.

On the South Hill branch of the line running between Stillwater and South Stillwater, immediately on leaving the Stillwater terminus, the line suddenly ascends some 250 feet within three-fourths of a mile, one part rising 210 feet in 2,400 feet. At the South Stillwater end there is a similar declivity, only a little more gradual.

The cars ascend the steepest grade, pulling a trail car at a speed of from five to seven miles an hour with ease. It is unnecessary to say that the people of Stillwater feel very proud to think they have the first successful electric railway system in Minnesota, and a line equipped with cars superior in finish to any operated in any of the largest cities of the state. They show their appreciation of the efforts the officers of the road have put forth by their liberal patronage of the cars.

Sandwell's Accumulator Tramcar and Tender.

By the courtesy of the "Electrical Engineer" of London, England, we are now enabled to present to our readers cuts and description of Sandwell's Accumulator Tramcar and Tender.

It is claimed by the inventor* that his system is one which enables electric traction to be introduced upon ordinary street railways without alteration of the lines, and with the least possible changing of the present cars, while enabling the storage cells to be manipulated with ease, and without damage by lifting in and out; and, at the same time, saving the necessity for extra outlay in having, as usually proposed, either very large batteries of accumulators, or else two sets of motors, gearing and fittings, etc., as must be the case with a separate electric engine or locomotive to draw the cars. It is evident that one of three things must be done with the ordinary accumulator cars, or with electric engines; either the cars must be greatly strengthened and altered to carry sufficient cells, or an electric engine must be made large enough to provide energy for the whole day's trips; or else two engines are needed, each with complete motor, gearing and all fittings. It is to obviate these necessities that the Sandwell car and tender have been invented, and, at the same time, special methods of working the cars have been introduced.

The chief points about this system are: first, the use of the separate trolley or tender, for which the inventor claims an exclusive patent and, second, the arrangement of two armatures mounted upon one spindle, the field-magnets of which can be shifted mechanically from one armature to the other—either for alteration of power, or, as more especially intended, for a safeguard in ordinary running—the second armature being able to be used after heavy running up hill if the first one has become at all heated, and also as a stand-by in case of a breakdown.

We do not feel it necessary to express an opinion as to the advisability of the use of double armatures—a matter that is open to discussion from various standpoints—so we will merely describe this system as it is laid before us. It may be fittingly argued that electrical engineers should be able to make their armatures sufficiently well designed not to heat or break down at all; but if at present it remains the fact that the armature is the weakest part of the ordinary systems of electric traction, it may be advisable for electric railway engineers, if they are so disposed, to take means of obviating this weakness by the provision of double armatures. If this is the case, the device adopted by Mr. Sandwell admits of the ready substitution of one armature for another, by the simple movement of a lever handle on the car platform.

The appearance of the special feature of the Sandwell system is shown in the illustration, Fig. 1, of the trolley as attached to the car. A low car on wheels of the same gauge as the passenger car itself, and suitably painted and finished to correspond, is fitted with shelves for the storage cells, which are permanently connected upon this trolley, and, after once fitting, do not afterwards require removing. The lid is removable to allow of inspection, and the terminals of this battery are connected to flexible connections which are fixed at a suitable distance apart to a handle, which is constructed to slip into a double spring-catch connection on the car itself. The battery consists of 68 cells of the latest E.P.S. traction type, the available E.M.F. at work being taken as 130 volts on the car. The capacity of the battery is 140 ampere hours.

The advantages claimed for this method of carrying the cells are that the cells, being permanently fitted and on separate trolleys, are so easily handled that their life should be considerably lengthened through the absence of the necessity for lifting about separately: the saving of labor is also a further advantage: while the danger or disagreeableness from acid being in the same car as the passengers is entirely obviated and no disadvantage from the occasional overflow or slopping of the chemical solution will therefore be noticed. The trolleys can be easily uncoupled and run into the charging-shed; a small electric locomotive could, if found necessary, be employed for the shifting of the trolleys on a large system.

The car used is one of the ordinary ones in use by the North Metropolitan Tramway Company, the directors of which have considerably interested themselves in the working of their cars by accumulators on this system. The arrangement of motor and gearing is clearly seen in the accompanying perspective view, Fig. 2, which shows the car frame separately. Tooth gearing is used with double speeds, the driving power being communicated by belts. Two toothed wheels of different sizes are fitted to the axle of the car wheels. The motor drives by a belt upon two pulleys fitted to double shafting, the shaft of one pulley being solid, the other hollow, fitting over the solid one in the usual manner of hollow shafting. The shifting of the belt from one pulley to the other effects the alteration of speed as desired. Full details are shown on the plan of car, Fig. 3, which also indicates the electrical connections to the switchboard and resistances. These connections are the same at both ends of the car.

The motor, which has field-magnets of the

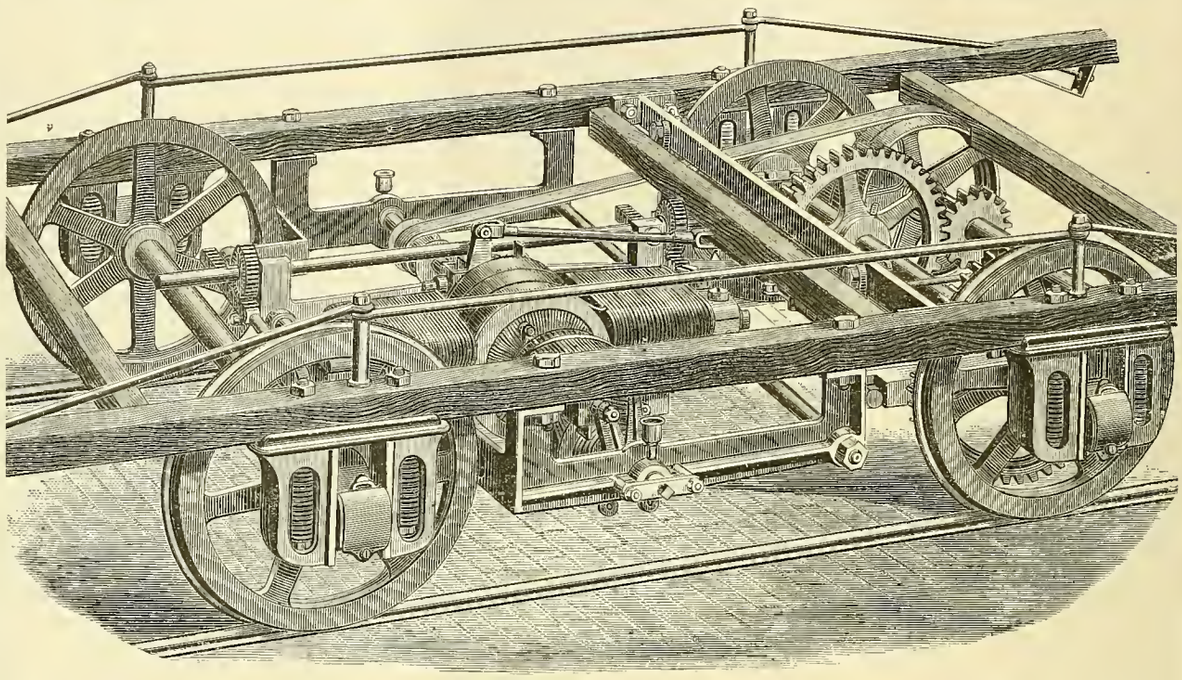


FIG. 2.—FRAME OF SANDWELL'S ELECTRIC CAR.

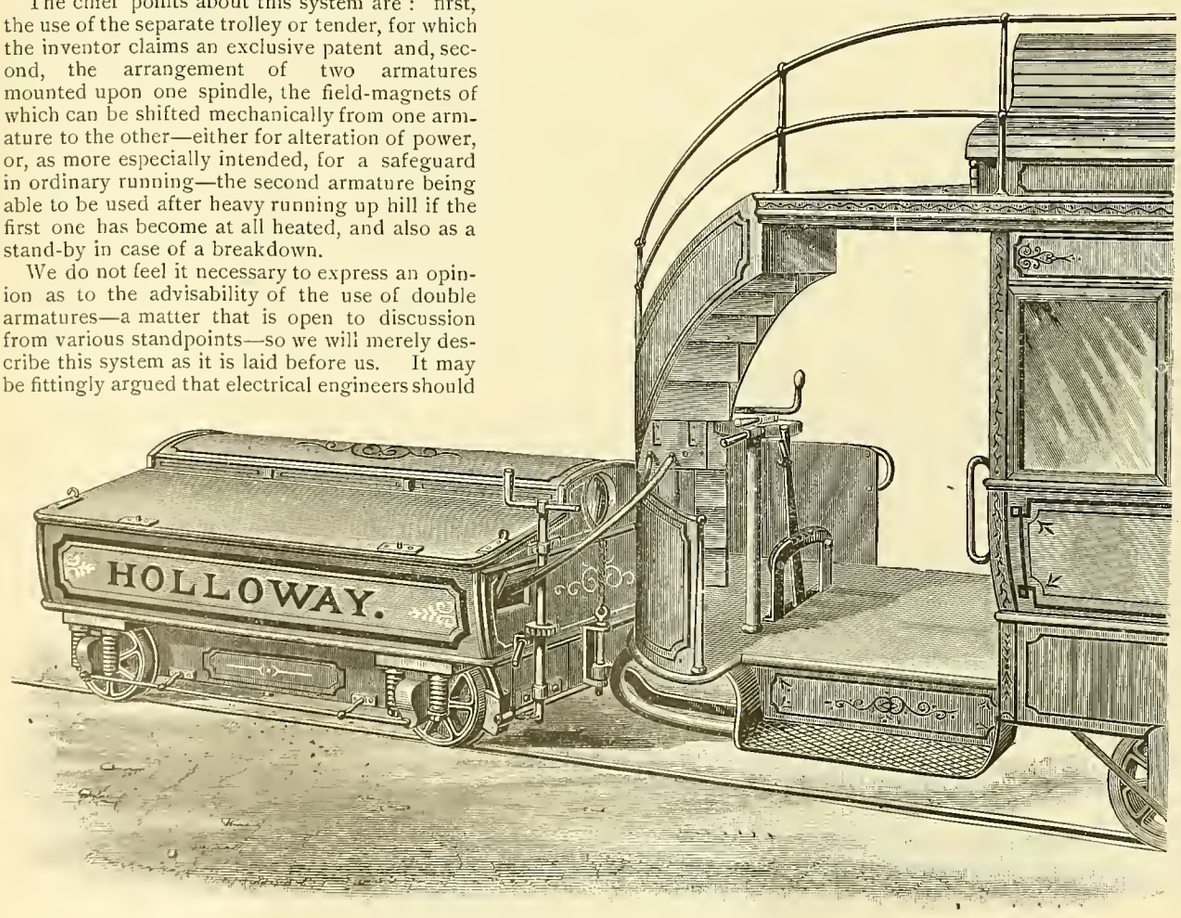


FIG. 1.—SANDWELL'S ACCUMULATOR TROLLEY AND CAR.

* W. D. Sandwell, Victor Engineering Works, Victor Road, London, England.

Siemens type, and a Gramme armature, has two similar armatures fitted upon one motor shaft. The armature is 12in. diameter by 9½in. long, wound with 580 turns of copper wire .089in. diameter. The field-magnets are mounted upon a sliding carriage, which can be operated from the driver's platform by a handle, the working of which, by means of suitable levers and wheels shown, slides the field magnets from one armature to the other, and at the same time shifts the corresponding brushes. A reversing lever also alters the brushes for the purpose of reversing the motion of the car.

The usual current for the motor when in work is from 35 to 45 amperes; it takes 20 amperes to overcome the inertia of a car on a dead level without load, and 30 amperes with a load. The car, as constructed, will mount with comfort at usual speed a grade of 1 in 30, and it can be made to mount 1 in 20 if necessary. For any very heavy grade it is proposed to have the storage station at the foot, to work the whole of the line, with the exception of the hill itself, by storage cells, and to have a conduit system for the steep part, disconnecting the trolleys at the bottom, and thus only necessitating the construction of a conduit line of a few hundred yards for the very steep part, at the same time not attempting to haul the weight of the accumulators up the incline.

The following tests of the motor have been taken with a Prony brake:

TEST OF MOTOR.

Speed.	Volts.	Amperes.	Weight on Lever.	H. P. on Brake.
620	150	45.5	38lb.	7.13
710	"	45.3	35	7.53
720	"	52.5	36	7.85
780	"	46.0	34	8.03
790	"	46.5	34	8.13
800	"	46.5	34	8.24

Average h.p. = 7.8183. Electrical h.p. = 9.4604.
Efficiency = 85 per cent.

The weight of the motor and gearing is approximately, 1,344 lbs., the car itself 6,160 lbs. A full load of passengers may be taken as about 5,824 lbs. The weight of the battery and trolley is 4480 lbs. The car will run 24 miles with one trolley freshly charged, and it is proposed to change the trolley twice a day for each car.

The items of cost can only be given approximately, but it may be taken that the cost of altering the cars is about $100.00; the cost of the cells $550.00, two and a half sets being required for each car to allow for changing and repairs; the motor and gearing would be about $900.00 per car. The cost of running is calculated that it would allow of a contract being taken at 9 cents per car mile for lines with grades not exceeding 1 in 30, of which they will not exceed 20 per cent. of the whole length. Other easier or more difficult lines at proportionately less or more for the expense of running.

The experimental car and trolley constructed has made several trial trips from Holloway to Moorgate-street in London, and back with satisfaction, and no difficulty is experienced in working the trolleys or the cars. The system is being worked out privately, Mr. Sandwell being backed up by several financial men of high standing to carry out the system, the details of which are now perfected, and it is expected to shortly undertake contracts for working street car lines on the combined car and accumulator trolley system.

The Popularity of Electric Cars.

It is extremely interesting to note that a few evenings ago a mass meeting of citizens was held in Cleveland, Ohio, to urge the extension of the electric railway system in that city. When the East Cleveland Street Railway company about a year since proposed to install an electric line of cars on Euclid Avenue and several other principal streets in that city, there was a general protest by the residents along the proposed route who had never seen any lines in electrical operation, and others, against the erection of poles and overhead lines. Objections to railway pole lines in cities where there have been no electric cars are natural in view of the kinds of pole lines which are often installed by telegraph and telephone companies, but as the intention of the East Cleveland Street Railway company was to install iron poles, the objections were finally overruled, and the line was equipped with overhead system, using iron poles and operating sixteen (16) Sprague electric cars. The route extended over some of the handsomest residential streets and principal business thoroughfares. The success of the road has been marked from its very start. The residents have been given a method of transit more convenient and more rapid that they had ever before enjoyed, without any disfigurement of the streets by hideous elevated railroad structures. The system rose rapidly in popularity with residents and property owners as its advantages became recognized, and real estate along the route of the electric railway increased greatly in value; in a number of cases bringing double or triple its former price. With this change there was a very noticeable change in the tone of the Cleveland press, which rapidly changed from a spirit of opposition to the electrical method of rapid transit to one of friendliness and approbation. The railway company has already increased its equipment, adding eight more to its original order of sixteen (16) cars.

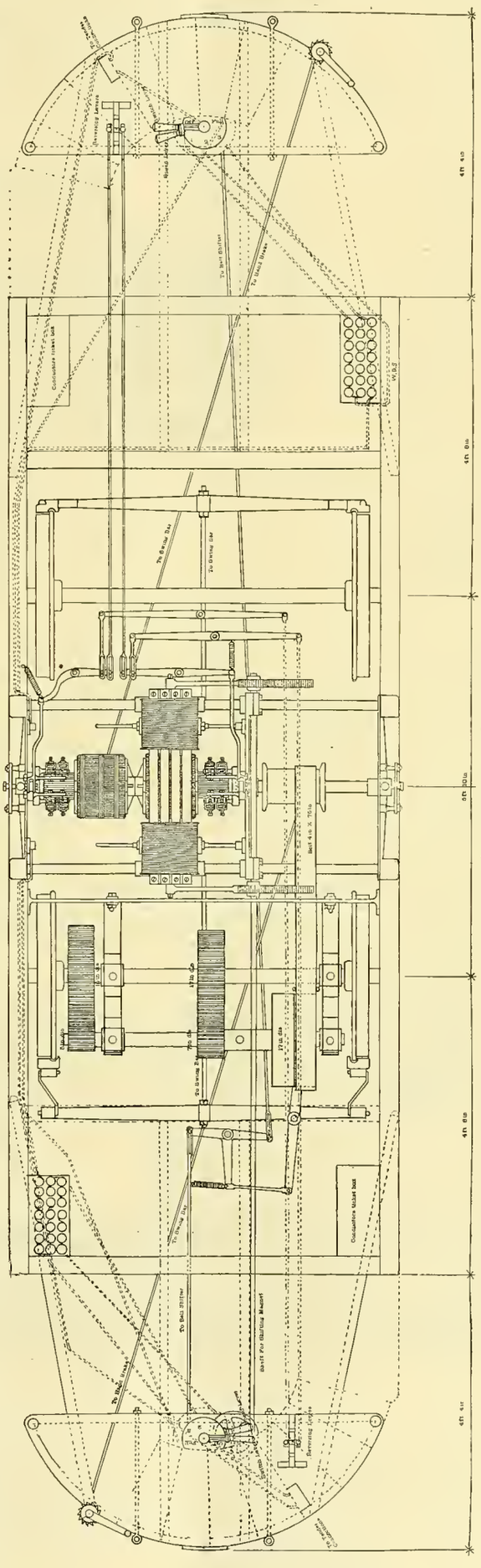


FIG. 3.—DETAILED PLAN OF SANDWELL'S ELECTRIC CAR.

The meeting held the other evening was largely attended, and was for the purpose of urging the railway company to still further extension of their line, and to increase their facilities for rapid transit. The meeting in Doan's Armory on Euclid Avenue, Cleveland, was presided over by Mr. W. E. Sherwood. After the announcement of the purposes of the meeting, which was received with great enthusiasm, a committee, consisting of Judge E. M. Heisly, Gen. Edward S. Meyer and Mr. George H. Foster, was appointed to draw up resolutions.

The resolutions, which were presented by these gentlemen and which were unanimously adopted, read as follows:

Resolved, That it is the sense of this meeting that the public convenience of the City of Cleveland requires and demands that the electric motor system shall be extended to the public square, and if necessary to that end for the East Cleveland railroad that it lay its tracks on Euclid Avenue from Case Avenue to the public square, if consent can be obtained, and the gentlemen present pledge themselves to do all in their power to obtain that consent for the company.

This action of the citizens in Cleveland is simply another example of the popularity of the electric system of street car propulsion in every city where it has been adopted.

ST. LOUIS, Mo., Feb. 21st, 1888.
To Whom it May Concern:

I called at the St. Louis Cable & Western Railway Co.'s power house to examine the movable grooves on cable drums invented by Mr. John Walker, out of professional interest in the matter. I believe, and am certain, that the invention presents the solution of the problem of destruction of cables on cable roads, and is apt to give cable roads a much greater efficiency and more economical working than heretofore. Mr. Walker's invention is apt to do away with undue strains on drums and shafts, which on solid drums can not be avoided, and have been the cause of many break downs. The adjustable grooves working automatically will tend to increase the life of the cable and machinery and improve the general efficiency of the system.

Yours very respectfully,
MAX G. SCHINKE, Civil Engineer.

It is very likely that the GAZETTE will have a great deal more to say with regard to Sandwell's Tram car and Trolley in the near future.

The *Allen Elevated Electric Railroad.

The exigencies of the times force the question of more rapid transit for cities. Six or eight miles an hour is not rapid transit, but is probably the limit for all surface roads.

Shall we go under the streets? The experience with tunnel roads in London is adverse to such a system, not only on account of the enormous cost, but the air is usually bad, damp and chilly, and the prospect along the way anything but

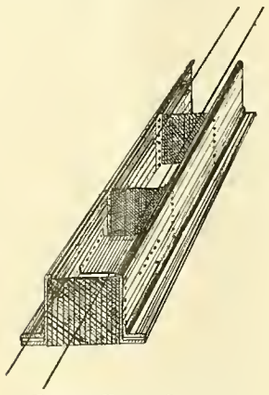


Fig 4.—Track Section.

pleasant; for these reasons the tunnel roads of the old world are becoming more unpopular.

If Chicago continues to grow the street traffic in a short time will require the entire space of all down-town streets. Surface roads must give way to traffic, and the problem is what system will best meet our wants. If it is not practicable

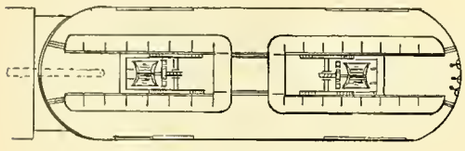


Fig. 5.—Seating Plan.

to tunnel, and the surface is already required for traffic, it would seem that elevated roads afford about the only remedy. At least this is the decision of some of the most eminent engineers, both at home and abroad.

There are certain requirements that builders of elevated roads must comply with before they can expect to receive public approval for their plans. It will not do to simply hoist a surface road into the air as has been done in New York. The owners of property along any street proposed for the route of an elevated road have some rights at least, and whether an enormous trestle-work of wood and iron shall forever deface their street, and change their homes into perpetual boiler shops is after all a serious question.

There are already some seventy or more patents granted on different schemes for elevated railways. Many of these plans if put into operation would so change the street that it would no longer be desirable either for business or resident purposes, and would give the street surface more the appearance of a tunnel than an open thoroughfare.

If the elevated road has been tardy in putting in an appearance it is because the plans proposed do not fill the conditions that the public has made for them. They must be practically noiseless, and the street must not be disfigured by any trestle-work that will mar the prospect or interfere with fire engines or hose. They must be safe and speedy, and not interfere with street traffic; cost of construction must not be more than other roads, and the motive power must be so applied that there will be no smoke, soot or cinders. The cars must be well heated and lighted and adapted to run through alleys and over viaducts when necessary. Many other conditions might be named, such as three cent fare, etc., but if these conditions are complied with it will probably do for a beginning.

We herewith give some illustrations of the latest plan for an electric elevated railroad, known as the Allen system. It is to be constructed on single corrugated columns, and a

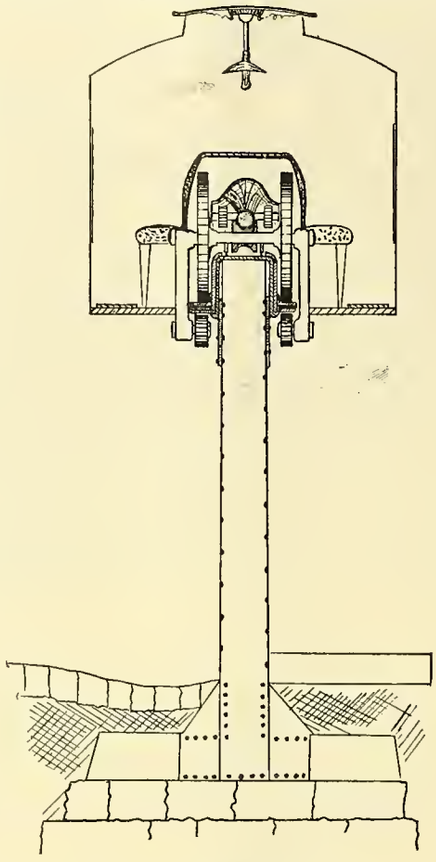


Fig. 2.—Transverse Section.

side view (Fig. 1) shows but one rail, which extends along at the line of the curbstones where it would not interfere either with traffic or with the prospect of the street any more than the telegraph poles which line nearly all our streets at present.

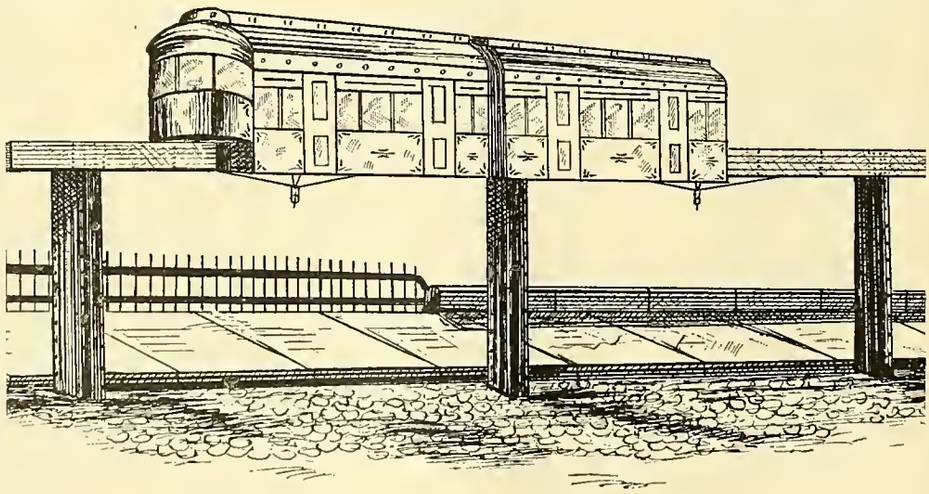


Fig. 1.—Side View—Allen Electric Elevated Railway.

There will be but two cars in each train, the head car carrying two electric motors which receive the current supplied through two conductors which extend between the tracks connected with dynamos at the termini of the road. The two cars have but one apartment, the contiguous ends being open.

The transverse sectional view in Figure 2 gives a good idea of the manner in which the cars are secured to the tracks, and the arrangement whereby the floor of the cars is on a line with the lower edge of the tracks, also position of motors, seats, etc.

Fig. 3 shows the upper end of a corrugated iron or steel column used in combination with the cap shown in Fig. 6, which is saddled over the top of the column, with sheat lead between, for convenience in holding the girders securely in place. This cap, which is about four feet in length, affords ample means for riveting the ends of the girders in one continuous length.

Fig. 4 shows a section of the track. The cars run on two duplicate renewable rails bolted to the lateral flanges on the bottom edges of the

Fig. 3.

main girders, which are about five inches wide; and between the two is a cushion of asbestos packing to prevent noise.

The two main girders, which form the entire superstruction of the railway, are intended to be about sixteen inches in width and placed about eighteen inches apart, with a lateral flange five

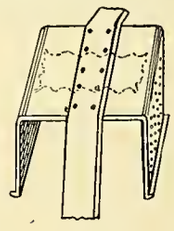


Fig. 6.

inches wide on the outside bottom edge of each which supports the cars. A truss, formed of flat iron, one inch by four inches wide, extends from the top of each column to a point a few inches below the tracks, midway between the columns, as shown in first view, and electric lights are to be suspended from these lower points for street illumination.

Fig. 5 shows the seating plan of the car, location of the motors, etc. The seats are placed back to back, and the motors and wheels of the cars between the seats are so incased that noise in the car and injury to machinery from dust is obviated.

The inventor claims that it would be impossible to derail a car without in some way breaking the track, as the strong framework beneath the car terminating with guard wheels beneath the side flanges firmly hold the car in an upright position under all circumstances.

The columns are to be about fourteen feet high and thirty-six feet apart, and erected on solid mason work, with a cross beam of rolled iron six feet in length beneath the pavement, and made a part of the column. Seats are placed backs to backs, giving passengers good positions facing the windows—an arrangement which brings the weight of the load directly in line with the wheels of the car. The cars are to be heated and lighted by electricity supplied from the same current that supplies the motors.

The cost of the road would probably be even less than a cable surface road, as there would be no grading or paving, and other expenses connected with the cable conduit.

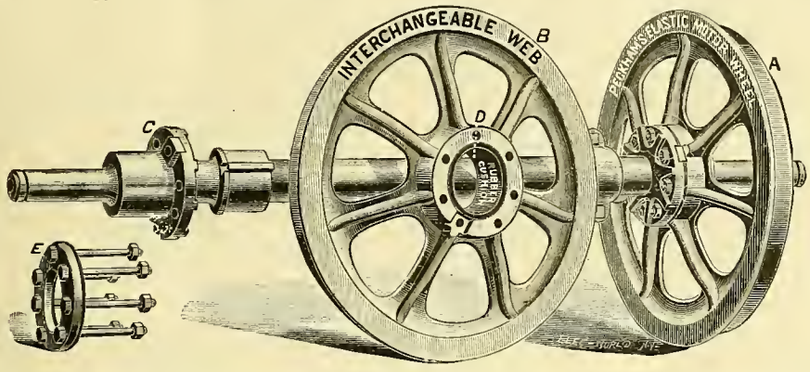
* Henry E. Allen, Chicago.

Improved Motor Wheel and Axle.

The following article, descriptive of the Peckham Improved Motor Wheel and Axle for electric roads, has been furnished us by the manufacturers* for publication :

This improved wheel and axle, is especially designed for use on electric cars. In the construction of this wheel, metallic contact between the web and the axle is avoided by means of a rubber cushion inserted in the core of the wheel between the web and hub, on which the axle and its load rests and is supported. By this means the axle and the motors resting upon them are relieved of jars and concussions and consequent crystallization, besides preventing noise and giving an easier-riding car.

The hub of the wheel is made of steel, and forced by hydraulic pressure upon the axle, where it remains until the axle is broken or worn out. The web is made of the best charcoal iron, and secured to the hub by bolts, which, when the web is worn out, can be easily removed and a new one substituted at any car stable, and by any ordinary workman.



The wheel-hub is slightly tapered to correspond with the taper of the rubber cushion, which fits snugly into the web, and is secured in place between the web and hub by malleable iron front-plates. All parts of the wheel are made to templates and are interchangeable.

The axle, here shown, is also especially designed for use on motor cars. It possesses an enlarged bearing for the split gears in general use on motor cars, so that the key-seat for the key used to prevent the split-gear from turning upon the axle is cut into the enlarged bearing instead of the axle, which thus remains unimpaired, and while an increased bearing is furnished for the gear, it likewise affords a shoulder for the motor bearing to keep it in place. The axle is also provided at the opposite end with a screw-threaded adjustable collar, which can be moved at will, and the motor bearings kept in their proper place, all lost motion being properly adjusted. The axles are made of the best hammered iron and steel, as preferred.

The Peckham horse-car wheels, constructed upon the same principle as this wheel (but not so heavy and strong), have been in use on horse cars for a considerable time, and are indorsed by those who have used them. The motor wheels are being used by the leading electric motor manufacturers who realize the importance of using them for their cars.

* The Peckham Street Car Wheel and Axle Co. N. Y. City.

One of the finest electric railways which has been constructed in any of the small cities, is being installed by the Thomson-Houston Electric company at Ottawa, Ill.

ELECTRIC STREET RAILWAYS IN AMERICA.

(IN OPERATION OR UNDER CONTRACT.)

Corrected to June 1, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Adrian Electric Ry	Adrian, Mich	Fisher-Rae		3
Akron Electric Ry. Co	Akron, O	Sprague	12	6.5
Alliance St. Ry. Co	Alliance, O.	Thomson-Houston	3	2
Americus Street RR. Co	Americus, Ga	Thomson-Houston	4	5.5
Appleton Elec. St. Ry. Co	Appleton, Wis.	Van Depoele	6	5.5
Asheville St. Ry. Co	Asheville, N. C	Sprague	3	4.5
Atlanta & Edgewood St. Ry. Co	Atlanta, Ga	Thomson-Houston	4	4.5
Atlantic City Elec. RR. Extension	Atlantic City,	Thomson-Houston	4	5
Attlehoro & North Attlehoro RR. Co	Attleboro, Mass	Thomson-Houston	5	8
Auburn Street RR. Co	Auburn, N. Y.	Thomson Houston	3	3
Balt. Union Pass. Ry. Co	Baltimore, Md.	Daft	4	2
Bangor St. Ry. Co	Bangor, Me.	Thomson-Houston	4	5
Bay City RR.	Bay City, Mich.	Sprague	3	5
Bay Ridge Elec. RR.	Bay Ridge, Md.	Sprague	2	2
Belt Line	Lynn, Mass		4	4 5
Brooklyn St. Ry. Co	Cleveland, O.	Thomson-Houston	10	10
Buffalo St. Ry. Co	Buffalo, N. Y.	Sprague	4	2.5
Carbondale & Jermyn St. Ry.	Carbondale, Penn.	Sprague	3	1.5
Central Passenger Ry. Co	Louisville, Ky.	Thomson-Houston	10	10
Central Ry. Co	Peoria, Ill.		15	10
Chattanooga Electric St. Ry. Co	Chattanooga, Tenn.	Sprague	6	5
Cincinnati & Inclined Plane Ry	Cincinnati, O.	Sprague	20	6
Cincinnati St. Ry. Co	Cincinnati, O.	Thomson-Houston	8	2.7
Citizens Elec. St. Ry	Decatur, Ill	Thomson-Houston	2	5
Citizens' St. Ry	Elkhart, Ind	Fisher-Rae		7
Colerain Ave. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	5
Collamer Line	East Cleveland, O.	Sprague	8	3
Columbus Consolidated St. Ry. Co	Columbus, O.	Short	2	2
Danville St. Car Co.	Danville, Va	Thomson-Houston	4	2
Decatur Electric St. Ry.	Decatur, Ill	Fisher-Rae		3
Derby Horse Ry. Co.	Ahsonia, Conn.	Thomson-Houston	1	4
Detroit City Ry., Maek St. Line	Detroit, Mich.	Fisher-Rae		2
Davenport Cent. St. Ry. Co.	Davenport, Ia.	Sprague	9	3 5
DesMoines Broad Gauge Ry. Co	DesMoines, Ia.	Thomson-Houston	8	10
Detroit Elec. Ry. Co.	Detroit, Mich.			
East Cleveland Ry. Co.	Cleveland, O.	Sprague	16	8
East Detroit & Grosse Pointe	Detroit, Mich.	Fisher-Rae		8
East Harrisburg Pass. Ry. Co.	Harrisburg, Pa.	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa	Thomson-Houston	1	
East Readlog RR Co.	Readlog, Pa.	Sprague	3	2.5
" " Extension	" "	Sprague	1	1
East Side St. Ry. Co.	Brockton, Mass.	Sprague	4	4
Eau Claire St. Ry. Co.	Eau Claire, Wis.	Sprague	6	5
Erie City Pass. Ry. Co.	Erie, Pa.	Sprague	20	12
Eckington & Soldiers Home Elec. Ry.	Washington, D. C.	Thomson-Houston	10	3
Essex Co. Pass. Ry. Co.	Newark, N. J.	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa	Sprague	25	8.5
Fort Worth City Ry. Co.	Fort Worth, Tex.	Fisher-Rae		10
Fort Worth Land & St. Ry. Co	Fort Worth, Tex.	Fisher Rae		15
Fulton County St. RR.	Atlanta, Ga	Thomson-Houston	8	9
Gratiot Elec. Ry.	Fort Gratiot, Mich	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn	Sprague	4	3
Highland Park Elec. Ry. Co.	Detroit, Mich	Fisher	4	3 5
Highland Park Ry	Detroit, Mich.	Fisher-Rae		3.5
Hillside Coal Co	Scranton, Pa.	Thomson-Houston	1	1
Hoosac Valley St. Ry. Co.	N. Adams Mass	Thomson-Houston	6	5
Huntington Elec. Ry. Co.	Huntington, W. Va	Short	2	3.5
Ithica Street Ry. Co.	Ithica, N. Y.	Daft	2	1
Jamaica & Brooklyn RR.	Jamaica, N. Y.	Van Depoele	10	9
Key City Elec. Ry. Co.	Dubuque, Ia.	Sprague	4	2
Lafayette St. Ry. Co.	Lafayette, Ind	Sprague	9	3
Lafayetta Traction Co.	Easton Pa	Daft	2	1
Laredo City RR. Co.	Laredo, Tex	Sprague	4	4
Lima St. Ry. Power and Motor Co.	Lima, O	Van Depoele	7	6
Lindell Ry. Co.	St. Louis, Mo	Julien	1	
" Ave. RR. Co.	" "	Sprague	10	5.5
Lng. Island City & Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Los Angeles Elec. Ry. Co.	Los Angeles, Cal.	Daft	4	5
Lynn & Boston Ry. Co.—Crescent Beach	Lynn, Mass	Thomson-Houston	1	1
" " Ry. Co —Nahant Line.	" "	Thomson-Houston	1	5.7
" " RR. Co.—Highl'nd line	" "	Thomson-Houston	3	2
" " RR. Co—Nathan line	" "	Thomson-Houston	1	.8
" " St. Ry. Co.	Crescent Beach, Mass.	Thomson-Houston	1	1
" " Myrtle St. Line			4	3
Main Street Line Extn., U. P. Ry.	St. Joseph, Mo.	Sprague	4	1
Manchester & Richmond Ry. Co.	Mancheater, Va.	Sprague	10	3.5
Mansfield Elec. St. Ry. Co.	Mansfield, O	Daft	5	4.5
McGavoc & Mt. Vernon St. Ry. Co.	Nashville, Tenn	Thomson-Houston	6	3
Marlboro St. Ry. Co.	Marlboro, Mass.	Sprague	2	3

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Meriden Horse Ry. Co.	Meriden, Conn	Daft	12	5
Metropolitan RR.	Portland, Ore.	Sprague	4	3
Metropolitan St. Ry. Co.	Kansas City, Mo	Thomson-Houston	4	4.5
Minneapolis St. Ry. Co.	Minneapolis, Minn	Sprague	6	6.5
Mt. Adams & Eden Pk. Incl. Ry. Co.	Cincinnati, O	Daft	3	1
Naumkeag St. Ry. Co.	Salem, Mass	Thomson-Houston	6	3
Nayang Cross-Town Ry.	Scranton, Pa	Thomson-Houston	3	150
New Horse Ry.	Meriden, Conn	Daft	12	5
Newburyport & Amesbury H. Ry. Co.	Newburyport, Mass.	Thomson-Houston	2	6
Newport Street Ry, Co	Newport, R. I.	Thomson-Houston	6	4.5
Newton St. Ry. Co.	Newton, Mass	Thomson-Houston	10	8
N. Y. & Harlem RR. Co. (4th Ave)	New York, N. Y.	Julien	10	8.5
Observatory Hill Pass. Ry. Co.	Allegheny, Pa	Bentley-Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg. Co.	Omaha, Neb	Thomson Houston	14	14
Omaha Horse RR.	Omaha, Neb	Sprague	20	10
Omaha Motor Ry. Co.	Omaha, Neb	Thomson-Houston	26	10
Ontario & SanAntonio Heights Ry. Co.	Ontario, Cal	Daft	4	8
Ottawa Electric St. Ry. Co.	Ottawa, Ill.		8	5
Pacific Ave. St. Ry. Co.	Tacoma, Wash. Ter	Sprague	8	6
Passenger RR., Extension	East Harrisburg, Pa	Sprague	4	3
Peoples RR. Co.	St. Joseph, Mo	Sprague	20	10
Pennsylvania RR. Co.	Atlantic City, N. J.	Sprague	6	6.5
Pittsburgh Sub. Rapid Transit Co.	Pittsburgh, Pa.	Daft	3	
Pittsb., Knoxville & St. Clair St. Ry.	Pittsburgh, Pa.	Daft	4	2.25
Plattsmouth Elec. RR.	Plattsmouth, Neb.	Sprague	2	2
Plymouth & Kingston Ry. Co.	Plymouth, Mass.	Thomson-Houston	3	4.5
Port Chester & Rye Beach St. Ry. Co.	Port Chester, N. Y.	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich.	Van Depoele	6	4
Quincy St. Ry. Co	Quincy, Mass.	Thomson-Houston	4	5
Redbank & Seabright Ry	Redbank, N. J	Thomson-Houston	3	5
Revere Beach Ry. Co.	Revere, Mass.	Thomson-Houston	1	1
Revere St. Ry. Co	Revere, Mass. (Ex.)	Thomson-Houston	4	1.5
Richmond City Ry. Co.	Richmond, Va	Sprague	46	13
Richmond St. Ry. Co.	Richmond, Ind.	Thomson-Houston	6	41
Richmond Union Pass. Ry. Co.	Richmond, Va	Sprague	50	7.5
Riverside & Suburban Ry. Co.	Wichita, Kans	Thomson-Houston	6	9
Rochester Elec. Ry. Co.	Rochester, N. Y.	Thomson-Houston	8	7
Ross Park St. Ry. Co	Spokane Falls, W. T.	Thomson-Houston	6	7.5
St. Louis St. Ry Co.	St. Louis, Mo	Short	5	3
San Diego St. Ry. Co.	San Diego, Cal.	Henry	9	4
Sandusky Elec. Ry. Co.	Sandusky, O	Sprague	6	6.75
San Jose & Santa Clara RR. Co.	San Jose, Cal	Fischer	6	10
St. C., Merriton & Thorold St. Ry. Co	St. Catharines, Ont.	Van Depoele	10	7
Salt Lake City RR. Co.	Salt Lake, Utah	Sprague	10	6.5
Sault Ste. Marie St. Ry. Co.	Sault Ste Marie, Mich.	Fischer	2	
Sault Ste. Marie St. Ry.	Sault Ste. Marie, Mich	Fisher-Rae		3
Scranton Suburban Ry. Co.	Scranton, Pa.	Thomson-Houston	10	5
Scranton Pass. Ry. Co	Scranton, Pa.	Thomson-Houston	4	2
Seashore Elec. Ry. Co.	Asbury Park, N. J.	Daft	20	4
Seattle Elec. Ry. & Power Co.	Seattle, W. T.	Thomson-Houston	5	5
Southington & Plantsville Ry. Co.	Southington, Conn.	Thomson-Houston	2	2
South St. Paul Rapid Transit Co.	S. St. Paul, Minn.	Daft	10	3
Steubenville Elec. Ry. Co.	Steubenville, O.	Thomson-Houston	6	2.5
Stillwater Elec. St. Ry.	Stillwater, Minn	Sprague	6	5
Tacoma Ave. St. Ry. Co.	Tacoma, Wash. Ter	Sprague	4	2
The Peoples St. Ry.	Topeka, Kans	Sprague	20	12
Third Ward Ry Co	Syracuse, N. Y.	Thomson Houston	8	4
Toledo Elec. Ry. Co	Toledo, O	Thomson-Houston	2	2
Topeka Rapid Transit Co.	Topeka, Kas.	Thomson-Houston	30	17
Troy & Lansinburg St. RR.	Syracuse, N. Y.	Sprague	6	5.5
Union Pass. RR.	St. Joseph, Mo	Sprague	8	5
Union Elec. RR.	Sterling, Ill.	Sprague	7	6
University Pk. Ry. & Electric Co.	Denver, Col.	Thomson-Houston	3	4
Vine St. Ry	Kansas City, Mo.	Thomson-Houston	6	3
Washington St. Asylum & Park RR.	Binghampton, N. Y.	Sprague	4	5
Watervliet Turnpike & RR. Co.	Albany, N. Y.		16	15.5
West End St. Ry Co. Brookline Brch.	Boston, Mass.	Sprague	1	10
" " Harvrd. Sq. Brch.	Boston, Mass.	Thomson-Houston	23	12
" " Bylstn & Beach sts	Boston, Mass.	Bentley-Knight	20	14
Wheeling Ry. Co.	Wheeling, W. Va.	Thomson-Houston		
Wichita & Suburban Ry. Co.	Wichita, Kans	Sprague	7	7.5
Wilkesbarre & Sub. St. Ry. Co.	Wilkesbarre, Pa.	Sprague	7	3
Wilkesbarre & West Side RR.	Wilkesbarre, Pa.	Sprague	3	4
Willamette Bridge RR.	Portland, Ore	Sprague	5	1.5
Wilmingtoo City Ry. Co.	Wilmington, Del	Sprague	4	3
Windsor Elec. St. Railway Co.	Windsor, Ont.	Van Depoele	2	2
White Line St. RR.	Dayton, O.	Van Depoele	12	9
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo.	Sprague	9	4.5
Wyatt Park Ry. Co.	St. Joseph, Mo.	Sprague	8	5.5

The Street Railway Gazette.

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Articles and papers on subjects relating to intermural transit always appreciated; the GAZETTE's columns are open for the expression of independent opinions, and the discussion of all matters connected with street railways.

Correction.

On page 85 of the May issue we made a statement that the John D Isaacs railway patents were owned by the Southern Pacific Ry Co.

We desire to correct this statement, and to say that these patents are owned exclusively by Mr. J. D. Isaacs and E. H. Marwedel.

We understand that a license has been signed authorizing the use of these patents by the Piedmont Cable Ry. Co. of Oakland, Cal.

The action of Justice Edwards, at Kingston, in granting the motion of the attorney general for leave to commence suit against the Atlantic Avenue Railway company in Brooklyn for an annulment of its charter, has caused considerable surprise among street railway men. The trouble grew out of a big strike on the road last winter, in which the company came out victorious; and, undoubtedly, the present action is only retaliatory on the part of the property holders along the Fifth Avenue line, who claim that the company made no effort to resume traffic on its line for several days after the settlement of the strike, and that the excuse that they had been overawed by the riotous demonstration of the strikers was unworthy of consideration. We doubt very much, however, if the case will ever come to court, and, even if it does, no reasonable thinking person can have the slightest possible doubt as to the eventual outcome.

The order issued by Judge Edwards giving permission to the attorney general of this state to bring an action against the Atlantic Avenue Railroad company of Brooklyn for the purpose of having its railroad charter forfeited because it failed to run cars during the great strike in February last has been filed in the Ulster county clerk's office in this city. John T. McDonough, of Albany, appeared as the attorney for the attorney general. Labor organizations have been active in bringing about these proceedings. The outcome will be awaited with interest by all horse railroad companies. It is understood that the defense of the Atlantic Railroad company will be that it was impossible to run cars during a certain stage of the strike.

Convention of Electric Street Ry. Men.

Responding to the call of Dr. D. W. Allen, President of the Davenport Central Ry. Co., the following named gentlemen met in Davenport on June 20th, and effected an organization with T. J. Evans, of Omaha, President of the Omaha and Council Bluffs Electric Ry. and Bridge Co. as president, and Dr. W. L. Allen, of Davenport, as secretary.

It was arranged to hold the next meeting in Minneapolis on September 14th, and papers on the following subjects will in the meantime be prepared by the gentlemen named.

"Track," T. J. Evans and Mr. Moore; "Station equipment," Walter Chambers and J. L. Barker; "Legislation," H. E. Teachout and Messrs. Geyer and Ward; "Car equipment," J. L. Barclay and O. J. Chapman; "Reduced rates for the encouragement of patronage," J. W. Howard and O. J. Chapman; "Comparison of expenses of operating by the three kinds of power, viz: steam, animal and electricity," W. L. Allen and O. J. Chapman; "Free transportation to city officials and others," Messrs. Watson and T. J. Evans; "Line equipment," J. W. Howard and J. L. Barclay. Now that the association has been thoroughly organized, there is little doubt but that it will extend all over the country, and become of considerable advantage in acting as a unit for the purpose of defeating unfavorable legislation; and the GAZETTE wishes it every success.

F. T. Blunk of the Seattle, Washington Territory, Electric Railway; C. R. Giddings, general manager of the Sioux City Corliss Engine company; Walter Chambers of the Davenport Central Railway; John W. Howard, superintendent of the Davenport Central Railway; Wm. Bowen, general manager of the Hawkeye Electric Manufacturing company; Dr. W. L. Allen, president of the Davenport Central Electric Railway company; T. J. Evans, president of the Omaha & Council Bluffs Electric Railway and Bridge company; H. E. Teachout, president of the Des Moines Electric Railway company; O. J. Chapman, superintendent of the Des Moines Electric Railway company; J. L. Barclay, Western agent for the Sprague Electric Railway & Motor company; Chas. H. Cone, agent of the Electrical Supply company of Kansas City, Mo.; Messrs. Watson & Ward, Sterling, Ill.

The Dean-Wells Bill.

On June 4th, 1889, the governor of our state, under pressure from venal councilmen, crafty mayors, or designing middlemen, put his official foot on one of the most popular enactments of legislative action. The last paragraph holds all the merit which the governor has succeeded in infusing into his state paper. After saying that "the power lies in the city council" and after diluting this by "as moved and acted upon by owners of adjacent property (sic semper, etc.),the governor says that while street cars propelled by horses might be safe, etc., the electric or cable motors would be highly dangerous; but he does not say what, perhaps, he does not know, that electric and cable motors, while most emphatically the people's carriage ways, are better able to be called to "the office" to settle than are the owners of Horse Street Railways. The GAZETTE wishes it to be plainly understood that no where in all the different branches of service can there be found more faithful public servants than are our street railway managers and men always alive to the wants of the people, whose interests are their interests, whose object is attained if they but receive from their patrons the well-known plaudit of "well done, good and faithful servant; thou has hauled us when weak and feeble, with horse power; come up higher—call the lightnings and heated vapors to your aid, so that we can attain the attainable, which other great commercial centers have attained, and this, too, with a minimum of expense, saying,' millions for rapid transit, but not one cent for tribute.' "

The Colerain Avenue line in Cincinnati will possess particular interest to street railway men, as it is the only extensive line where it has been attempted to use two overhead wires with the under contact trolley.

Street Railway Associations.

OFFICERS, DATES OF MEETINGS, ETC.

AMERICAN ST. RY. ASSOCIATION.

President, George B. Kerper ---------- Cincinnati, O.
First Vice-president, Jesse Metcalf ---- Providence, R. I.
Second Vice-president, Henry Hurt --- Washington, D. C.
Third Vice-president, W. H. Martin, Jr. -- San Francisco
Secretary and Treasurer, Wm. J. Richardson --- Brooklyn

EXECUTIVE COMMITTEE.

Geo. B. Kerper ---------- Cincinnati, O.
Jesse Metcalf ---------- Providence, R. I.
Henry Hurt ---------- Washington, D. C.
W. H. Martin, Jr. ---------- San Francisco, Cal.
Charles B. Holmes. ---------- Chicago
John Scullin ---------- St. Louis
James H. Johnston ---------- Savannah
Henry A. Sage ---------- Easton
E. J. Lawless ---------- Kansas City

The annual convention of the Association will be held at the West House, Minneapolis, Minn., commencing on Wednesday, Oct. 16, 1889.

N. Y. ST. RY. ASSOCIATION.

President, Chauncy C. Woodworth ---------- Rochester
Vice Presidents, John N. Partridge ---------- Brooklyn
John S. Foster ---------- New York
Secretary, William J. Richardson ---------- Brooklyn

The annual meeting of the Association will be held in New York on September 17, 1889.

MASS. ST. RY. ASSOCIATION.

President, Chas. H. Odell ---------- Salem
Vice-Presidents, H. M. Whitney ---------- Boston
Amos F. Breed ---------- Lynn
F. O. Stearns ---------- Swanson
Secretary, F. H. Monks ---------- Brookline
Treasurer, J. H. Eaton ---------- Lawrence

Regular meeting day, first Wednesday in each month.

The annual meeting of the Association will be held in Boston, Mass., Sept. 4, 1889.

THE ST. RY. ASSOCIATION OF THE STATE OF NEW JERSEY.

President, John H. Bonn ---------- Hoboken
Vice-President, S. S. Battin ---------- Newark
Secretary and Treasurer, Charles V. Bamford ---- Trenton

EXECUTIVE COMMITTEE.

John H. Bonn ---------- Hoboken
S. S. Battin ---------- Newark
C. Y. Bamford ---------- Trenton
C. B. Thurston ---------- Jersey City
John Hood ---------- Camden
A. Q. Keasbey ---------- Elizabeth

OHIO STATE TRAMWAY ASSOCIATION.

President, M. A. Hanna ---------- Cleveland
Vice-President, A. G. Clark ---------- Cincinnati
Secretary, H. A. Everett ---------- Cleveland
Treasurer, J. B. Hanna ---------- Cleveland

EXECUTIVE COMMITTEE.

John M. Doherty ---------- Cincinnati

The annual convention of the Association will be held in Cleveland, O, on November 20, 1889.

WESTERN ELECTRIC RAILWAY ASSOCIATION.

President ---------- T. J. Evans, Council Bluffs, Ia.
Vice-President ---- H. E Teachout, Des Moines, Ia.
Secretary ---------- W. L. Allen, Davenport, Ia.
Treasurer ---------- W. R. Moore, Moline, Ill.

Next meeting will be held at Minneapolis, Minn., Oct. 14, 1889. Regular annual convention will be held in Des Moines, Ia., in January, 1889.

Imitation the Sincerest Flattery.

"Train up a child the way he should go." We have in mind the fact that one of our contemporaries, in its July issue, wisely emulated the example of the STREET RAILWAY GAZETTE and gives it readers the views of successful street railway managers in interviewal form. Were we to forget for the nonce that successful street railway men are *born*, not *made*, we should set a high value on the opinions thus obtained, but "aye, there's the rub;" those men have made their employees what they are, and not till these same managers can be imbued with the powers of omniscience can the healthful influence of those natural regulators be co-extensive with the immense circle which girdles our contemporary's street railway world. "Feed my lambs" may be construed to mean teach my conductors, drivers, and horse caretakers how to be men, furnish to an overflow the mental pabulum which active science brings. The world is so vastly better than in the past ages; and who will say that Excelsior cannot be reached along a street rail, as well as in the universities of our land. Use the tripartite leaven of Honesty, Personal Pride and Energy, and you will find the list of the faithful largely increased.

Married.

Mr. W. A. Stadelman, of the firm of Chadbourne-Hazelton & Co., was married last month to Miss Alita Cardeza, at the residence of the bride's parents, 2316 Green St., Phila.

In congratulating you, Brother Stadelman, upon your enterprise, the GAZETTE earnestly trusts that you have won a prize in the matrimonial lottery, and will prove the fallacy of the statement that marriage is a "failure."

Mr. Henry Haven Windsor, of the Chicago City Ry Co. was married on the 25th of last month to Miss Linda Brandt Jackson, at the residence of the bride's parents, in Marendo Ill.

The GAZETTE extends to Mr. Windsor and his bride, the assurance of its hearty congratulations, and earnest good wishes, and trusts that their lives may prove one constant honeymoon.

Obituary.

MALTBY G. LANE.

This well known millionaire, largely interested in real estate and street railway securities, died in the Bennet building in New York City, at three o'clock on the 3d inst., at the age of 75 years. He was, at one time, largely interested in the 3d Avenue Surface Ry Co. of New York, and was director of the same at the time of his death. He was also a stockholder in the Washington and Georgetown Road, in Washington, D. C. Mr. Lane resided at 66 Park av., and was twice married. His second wife and two children, a son and a daughter by the first wife, survive him.

W. F. SWIFT.

We regret to have to record the demise of Mr. W. F. Swift, who for many years has been prominently identified with the interests of the Brush Electric Co. From the Cleveland *Leader* the following sketch of his career is taken. "Although a young man, he had had a successful career, both as a newspaper man and in the business world, and the announcement of his death will be received with deep regret by a large number of friends. His death followed a long period of ill health from which, until recently, no danger was apprehended. He was a tireless worker, and the persistent energy with which he performed his duties, regardless of his health or other considerations, undermined his constitution, and probably led to the development of consumption, which was the direct cause of death. Mr. Swift was born in Ravenna, on March 7, 1852. In 1867 he removed with his parents to Ashtabula, and soon after began his newspaper experience by serving as correspondent of the Cleveland *Herald*. His excellent work received proper recognition in 1872, when he was given a place on the local staff of that paper. He was in a short time made city editor, and soon afterward resigned to accept a situation with the Chicago *Inter Ocean*. Six months' experience in Chicago was followed by his return to Cleveland, when he became city editor of the Sunday *Post*, and was connected also with a trade journal. He could not content himself with life on weekly journals, and resumed the city editorship of the *Herald*, that he might again experience the rush and whirl of daily newspaper work. In 1880 he became city editor of the *Leader*, and less than a year later he accepted the offer of a position with the Brush Electric company. He first traveled in the South and in Mexico, establishing electric light plants, and on his return to Cleveland was elected secretary of the company. He spent the winter of 1887-88 in New York, establishing an Eastern office of the company, and at that time he suffered severely from throat trouble. His lungs became affected, and from March to June, 1888, he was in Texas, and after a brief stay in Cleveland following his return in June he went to Santa Fe, N. M. He returned from Santa Fe a month ago, having received assurances from the doctors there that his lungs were all right, but it was found upon his arrival in Cleveland that he was in the last stages of consumption. Mr. Swift was married to Miss Flora M. Chichester in this city on Jan. 2d, 1879, and is survived by Mrs. Swift and three children He joined the church in Ravenna when 12 years of age, and became a member of the Euclid Avenue Congregational Church, by letter when he took up his residence in the East End."

News from Allegheny, Pa.

On the 22nd of this month an application will be made to the governor for a charter by the Allegheny Traction Co., capitalized at $350,000, of which the incorporators are: John D. Nicholson, James A. McDevitt, C. L. Magee, John H. Dalzell, George B. Hill, A. C. McCallum, Jr. and Joshua Rhodes.

A number of the gentlemen named are identified with the management of the Pittsburgh, Allegheny & Manchester railway. This looks as though the last named road was to be merged into the new company. One of the incorporators recently said: "The Allegheny Traction company has no connection whatever with the Pittsburgh, Allegheny & Manchester corporation at present, but I do not say that it will not have. The stockholders of both concerns are nearly identified and there is a movement on foot to lease the lines of the old company. The new corporation is at the back of the scheme. When the time arrives there will be no difficulty in accomplishing the end sought. Pittsburgh councils recently passed an ordinance permitting a regularly chartered company to build a bridge across the Allegheny river within fifty feet of the present Sixth street bridge. This bridge company is distinct from the Allegheny Traction company, but the members of both corporations are identical."

The bridge will be built solely to accommodate the new street railway. No vehicle except cars will be permitted to travel over the structure. The traction company is desirous of furnishing the public with as rapid transit as possible, and in order to do this a bridge solely for the use of the street railway is necessary. In case the Sixth street bridge was used the new cable company would be incommoded in many ways. The cars would encounter all sorts of vehicles and this would delay travel. The revenue from car tolls will amply pay the new bridge company on the capital invested. The new structure will cost about $200,000, and as each traction car passing over it will be charged toll, the earnings on the investment will pay the stockholders handsomely. According to present plans the approach to the new bridge will not be from the foot of Barker's alley, as was first proposed. The plan, which will probably be adopted, is to place the approach close by the abutment of the Sixth street structure on this side. The bridge will then make a curve across the river so that the approach on the other side will connect with the Federal street car tracks. The object is to have the car tracks on this side of the stream run directly onto the bridge from the foot of Sixth street. This plan will necessitate a curve at either approach. We understand that the Allegheny Traction company's line will run over the same route and tracks of the Pittsburgh, Allegheny & Manchester road. The old line cannot be leased without the consent of both majority and minority stockholders. The former have all along been agreeable to an arrangement of the kind proposed, but the minority people have held back, as they thought the dividends would be reduced by the new deal. Recently they have been brought to see the disadvantage of the new scheme, and everything will move harmoniously hereafter. The minority will reap equal benefits with the majority. This does not seem fair, as the latter has done all the work but it has to be under the circumstances.

The Allegheny Traction company will not require any State legislation to empower it to go ahead with the building of the cable road. All now necessary is the consent of the Allegheny councils to build the bridge. This will be asked at the next meeting of that body, thus enabling operations to be commenced soon. The cables will be laid just as soon as all details are satisfactorily arranged. The probabilities are work will be commenced this summer.

All the cars on the line of the Washington Street Asylum & Park Railway in Binghamton, N. Y., will be equipped with the Sprague improved electric railway motor of fifteen-horse power each, making a total of thirty horse power on a car. Each car equipped with electric motors will tow one ordinary car. It is expected that the road will be in operation under the new system in about three weeks.

The Patton Motor.

Ever eager to greet any new device, which has practical merit and which bears directly upon the interesting question of rapid transit we take pleasure in referring our readers to the new motor as designed and formulated by the Patton Motor Mfg. Co. of this city. A car is now under construction at Pullman, to run on the Pullman Railway. The novel feature is the combination of engine dynamo, storage battery and electric motor, which combination is held by the Patton Motor Mfg. Co. in letters patent.

Any one can see at a glance that the electricity required for service is generated on the vehicle, this being one of the important features. Another is the storage of the electric power to be held for any emergency and used as required. By this combination then a vehicle is offered to the public which is absolutely independent in itself; capable of drawing any number of "trailers" or climbing any grades, in fact having all the virtues of electricity with none of the disadvantages, such as overhead wires or expensive "power plants" for the generating of necessary force.

Electricians and practical railway officers who are cognizant of the efforts of the company at once proclaim it the "coming motor for street railways."

The same company has already in service motors run exclusively by power from gas engine, which is found sufficient in very many cases, to do all that is required.

Therefore, with both gas and electric motors, it would certainly seem as though this enterprising company was prepared to fill all requirements.

The St. Charles (Mo.) Car company, enterprising as it always has been, has recently enlarged its works and equipped them with some of the latest and most improved style of car building machinery. Its capacity for building street cars is now from forty to fifty per month, in addition to their well established trade in freight and passenger cars.

Mr. A. Rapp, formerly manager of the Pullman Palace Car company's works, at Pullman, Ill., is now general superintendent of this company. This gentleman is a practical car builder and designer of wide experience and rare ability, and the securing of his services is guarantee sufficient that the high standard of excellence, for which the works of the St. Charles Car company has always been noted in the past, will be maintained in the future. Increasing its facilities as it recently has, the company is well prepared to promptly execute orders for all kinds of street cars, whether horse, cable or electric, and has on hand a magnificent stock of carefully selected and well seasoned lumber for use in their construction.

Says the *Western Electrician*:—"Is the storage battery to have a rival? A company, it is claimed, has of late been experimenting on a scheme for storing steam. It is said this is accomplished by injecting steam and hot water into a reservoir, where the pressure can be safely raised to 1,000 pounds; these tanks are heavily jacketed to retain the heat used upon street cars and elsewhere for locomotive or power purposes. A motor has been designed for the purpose, in which none of the steam escapes into the air, but is condensed, and can be again injected into the tank. There is no noise from escaping steam, no cinders or smoke, and the machine or motor can be easily operated. It is claimed that by use of these tanks the motor can be run nearly 50 miles, and then the tanks can be changed in two minutes. Whether the report be correct or not, the general public will continue to believe in the superiority of the electric motor over any form of a steam engine."

Mr. H. Ward Leonard, of the firm of Leonard, Izard & Co., electric engineers, has been appointed general manager of the Edison Mnfg. Co. of New York City, and he has left Chicago to assume that position, A complimentary dinner was tendered him by the Chicago Electric Club upon his departure. We understand that Mr. Leonard will also retain the presidency of the Leonard, Izard & Co.

Cable Railways

Cements.

Within the past few months the Gazette has had a great deal to say about cements, and that its articles in this connection have been appreciated is evidenced by the large number of letters that have reached this office bearing on the subject. The following article on natural cements, by Adolph Cluss, will, undoubtedly prove of considerable interest, taken in connection with those that have already appeared in the Gazette under this head.

Limestone, with intimate, fine-grained admixtures of silica, alumina, magnesia, etc., in quantities of 35 to 60 per cent. are called cement stones. The high percentage of silicates causes a separation of the alumina from the silica during calcination at red heat just sufficient to expel the carbonic acid.

Oxides of iron and chlorides of potash are generally present in small quantities. They assist hydraulicity and crystallization. A cement of porous, friable, globular texture, with a specific gravity of about 2.7 is obtained, which contains silica and alumina in a soluble state, and hence the lime can easily act on either, according to affinity, when water is added for mixing and hydration.

The burned lumps must be pulverized before they will combine with water, when they form hydrated silicate of lime, while the alumina remains practically inert. These cements do not heat up, nor swell sensibly while they are mixed. They set quickly, but harden slowly under water without shrinking, and attain, gradually, great strength, with well-developed adhesive force. The color of these cements gives no clue to their cementitious value, since it is chiefly due to oxides of iron and manganese, which bear no relations to hydraulic properties.

To insure efficient chemical action in hardening, the grinding must be carried to the production of impalpable powders. These cements bear doses of sand of double their own volume or over. Mixing pure cements from 30 to 40 per cent. of water must be added.

Many American cements of this class contain large percentages of carbonate of magnesia. The test of strength, in pure state, as well as mixed with sand, compare well with the cements which do not contain these combinations. These cements have good adhesion to stone and bricks, because they pass with their surplus water slower than the others. Whenever judiciously selected and conscientiously manipulated, they have given full satisfaction. Many causes co-operate in affecting rocks of the compound character required for the production of hydraulic cements.

Different quarries show dissimilar stones; the best brands vary greatly in chemical composition. Fineness, density, thorough and homogeneous mixture, humidity, accessory ingredients, enter largely in the problems. To preserve the activity and strength of the natural cements for a longer time, air and moisture must be excluded by careful packing and dry storage of the barrels.

De Smeth found for our native Virginia cements in pure state, after 30 days' exposure, 170-250 pounds tensile strength per square inch, which increases in eleven months to 316-381 pounds. Mixed with equal portions of sand he obtained from 116-195 pounds, and L 80-L 90, as above.

Gilmore states the adhesion of Rosendale cement to the front bricks, after 28 days, when pure, to be 30 pounds, and mixed with one and two parts of sand, 16 and 12 pounds.

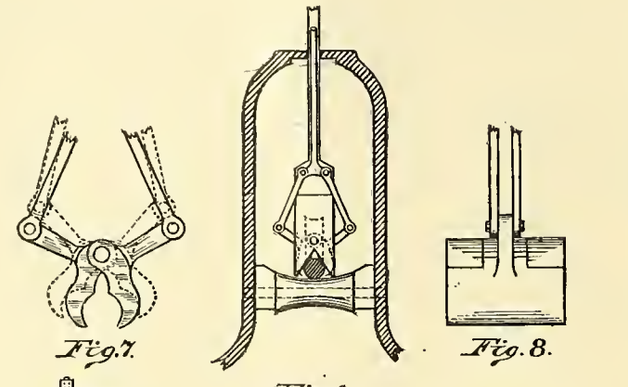


Fig. 7. Fig. 6. Fig. 8.

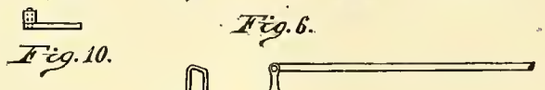


Fig. 10.

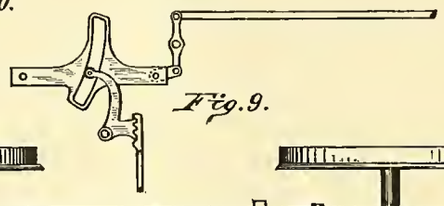


Fig. 9.

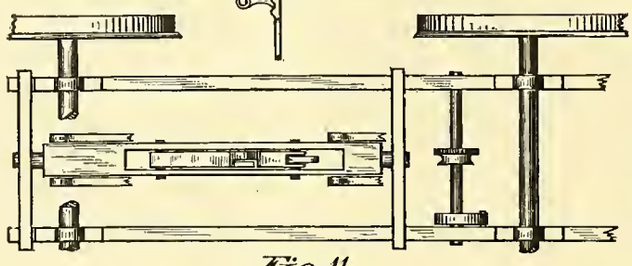


Fig. 11.

Clarke reports the tensile strength of Rosendale cements, pure:

After 1 and 12 months, as	145 to 290 lbs.
And mixed 1 : 1 after 1 and 12 months	116 to 256 "
1 : 2 after 1 and 12 months	60 to 180 "
1 : 3 after 1 and 11 months	35 to 121 "
One cubic foot of Rosendale cement weighs	49 to 50 "

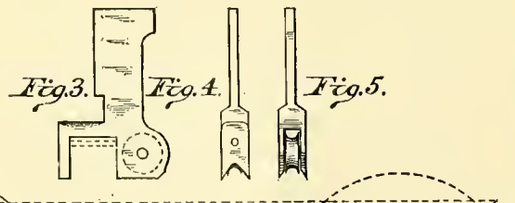


Fig. 3. Fig. 4. Fig. 5.

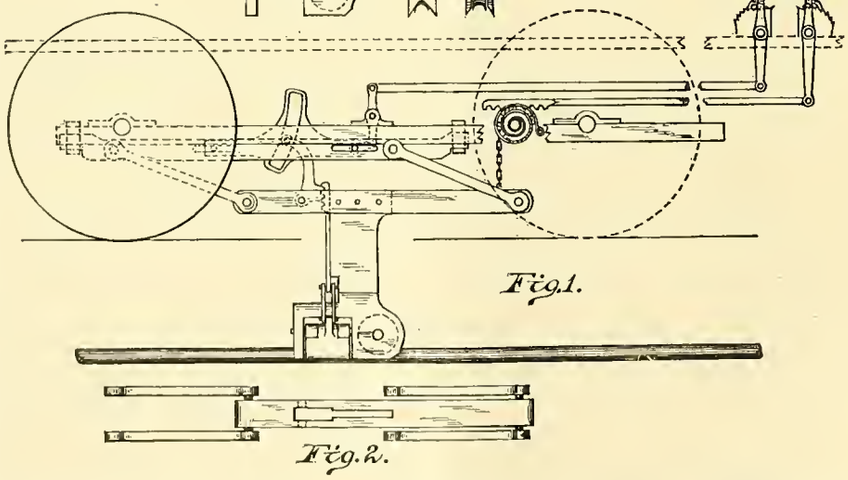


Fig. 1.

Fig. 2.

The proportion of tensile to compressive strength averages probably after one month 1 :4, and rises probably, after two years, to about 1 :6. The specifications of the engineer department of the District of Columbia required seven days after mixture for neat natural cement 95 pounds, and for mixture with one and two parts of sand 56 and 22 pounds tensile strength per square inch.

Natural Portland cements are manufactured in those rare cases where rocks contain combinations of lime and silicate of alumina in the chemical proportions and physical conditions found necessary for producing artificial Portland.

The treatment then differs from that of ordinary cement only in the higher temperature for burning.

Kirchner's Gripping Device for Cable Railways.

It is claimed for this device * that it will permit a car provided with it to pass over a crossing cable of its own accord and without modification of the underground structure. It will also permit a car to be taken from one line to a crossline cable by means of a sub-cable without the use of horses. The gripping arrangement is movable, both vertically and laterally, but is so arranged as to be always perpendicularly above the cable, whether the latter is gripped or loose in it. It is also claimed for this device that it cannot, under any circumstances, become engaged and caught fast to the cable when the latter is roughened or frayed by long usage, as frequently happens with side gripping devices. As this grip is raised the jaws are opened by a positive movement and the cable is released.

The location of the cable will be about seven inches below the slot, except where two cables cross, when they will be lowered about three inches, in order to allow the grip that amount of lift to enable it, on releasing, to pass over the crossing cable and engage on the other side of it.

In the accompanying illustrations Fig. 1 shows a side elevation partly broken away, with part of a car truck fitted with the Kirchner improvements; Fig. 2, a plan of the frame which carries the grip-carrying bracket, and the rods by which this frame is attached to the car truck; Fig. 3, a side elevation of the grip-carrying bracket; Fig. 4, a rear, and Fig. 5, a front view of the same; Fig. 6, a transverse section of part of the conduit, showing bracket cable and conduit pulley; Fig. 7, a front, and Fig. 8, a side view of the grip; Fig. 9, a side elevation of the grip operating device; Fig. 10, a plan of the lever with roller which moves in the link of Fig. 9; Fig. 11, a plan of the car truck, and its connection parts shown in Fig. 1.

Among the advantages claimed by the inventor for his device are, that the grip is easily movable and so devised and operated as not to be liable to become deranged by usage. It will take a car over cross-line cable without any extra attachment or horses. It will take a car from one line to a cross-line cable by means of a sub-cable. It will prevent a sudden jar, as the frame will slightly give and the grip cannot miss the cable.

News reaches us from Boston that the contract for equiping the Cambridge division of the West End Street Ry. Co. from Bowdoin Square in Boston, to Harvard Square in Cambridge, one of the worst pieces of track, and on one of the most heavily traveled routes of the entire system, has been awarded to the Thomson-Houston Electric Co. after the company had made a thorough test of the different systems. We also understand that the entire line, 228 miles in length, will probably operate all its cars, 1584 in number, under the same system.

* N. Kirchner, of 6 South Delaware av. Philadelphia.

Street Railway News.

DOMESTIC.

(See also "New Enterprises," "Extensions," "Elections," etc.)

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a verification of each item received by them in time for each issue:)

CALIFORNIA.

Los Angeles—The Cable Line here was opened on June 9th, and a grand banquet was given at the power house in the evening. The new line embraces about 26 miles, and will be in operation in about six months.

San Diego—The Fourth street cable street railway proposition is being very favorably received by the property owners, and the secretary, George B. Hensley, states that all that is required is a little further guarantee to make the venture an assured certainty. The San Diego members of the syndicate are jubilant over the outlook for their scheme.

San Francisco—Mayor Pond recently vetoed an ordinance granting a franchise to the Omnibus Cable company for the extension of its cable system over six miles of street.

COLORADO.

Trinidad—The Trinidad Street Railway company has increased its capital stock from $10,000 to $100,000.

DISTRICT OF COLUMBIA.

Washington—The Washington and Georgetown Railway company will build its power house on Water street. It will be 400′ by 120″, will be two stories high, and cost in the neighborhood of $75,000.

FLORIDA.

Tallahassee—A franchise granting the exclusive right of way over all the streets of this city for a period of ten years has been granted to R. L. Bennett, of Philadelphia, G. W. Saxon and F. F. Meyers, who recently organized for the purpose of constructing a street railway.

GEORGIA.

Atlanta—We understand that the Peach Tree Line here will probably be cabled in the near future, though nothing definite has as yet been decided.

Augusta—We understand that the street railway line here will soon be operated by electricity.

Macon—The entire street railway system of this place has been sold to Mr. George F. Work, of Philadelphia, and Mr. H. Horne. It is very probable that electricity will be adopted as motive power.

We understand that the affairs of the Dummy Line company are now in a very satisfactory condition; since the recent change of management all the debts have been paid off, and it is the intention of the company to improve its property to the utmost of its power as soon as possible.

Rome—Mr. J. G. Caseay has sold his Dummy Line to the Rome Land company

Savannah—The Savannah Belt Railway company is investigating electricity as a motive power, with a view to its adoption in the near future.

INDIANA.

Indianapolis—The Julien Electric Traction company, of New York, has been granted permission to test the merits of its storage battery system on the lines of the Citizens' street railway here.

IOWA.

Ottumwa—At the sale of General J. M. Hedrick's estate, rival companies ran the Hedrick street railway franchises up to $16,300, and they were knocked down to W. R. Daum and associates. An electric railway of some four miles will be immediately put in.

Waterloo—A franchise has been granted by the city council for the operation of street car lines by electricity. The company states that it proposes to put in a motor line to Cedar Falls; also a city line there.

KANSAS.

Kansas City—We understand that the Riverview Cable line (Elevated Railway company) will be operated by electricity from the Union depot to Riverview station, and from there to the end of the Riverview Cable line.

Pittsburg—The Pittsburg Electric Light and Railway company of this place has been incorporated, with a capital stock of $50,000. [Names of directors appear under head of "Elections" in this issue.

Topeka—Mr. A. G. Bradstreet, of New York, representing $60,000 worth of bonds, out of a total issue of $65,000, has been appointed receiver for the Topeka South Side street railway, upon application made by the American Loan & Trust Co., of Boston.

MARYLAND.

Baltimore—The Philadelphia Traction company has obtained control of the Citizens road and the Peoples line of this city. They will undoubtedly cable them and develop the properties.

President Crawford, of the Third National Bank, states that of the 25,000 shares of the Citizens' Passenger Railway company being purchased by the traction syndicate, only 1,000 yet remain to be secured.

Regarding the scheme of cabling the Citizens' line here, Mr. Bowie, President of the City Passenger line, recently said: "The scheme is more likely to affect the Citizens' Line than the City Passenger Railway. The former has been in operation on a capital of $500,000 and have not averaged six per cent. annual dividends. By the purchase the capital has been increased to a million dollars, and it will cost $1,500,000 to cable the road. How anything will be made upon the capital invested increased to five times the original I can not understand. It costs the Citizens' line about as much to feed six horses as to pay one man. Cabling will do away with the horses, but the number of men will have to be doubled, so nothing will be made in that way, Again, the cable troughs will have to be kept clean and dry, and an additional expense will then be incurred for sewerage. To make the cable road pay, even though the People's Line was not absorbed by it, would require all the earnings of all the street railways in the city. The City Passenger Company has tried to find a substitute for horses, but as yet unsuccessfully. The overhead electric system, as used in Richmond, is a good one, but could not be carried out in the crowded center of the city, and the storage system at present costs more than horses."

MASSACHUSETTS.

Boston—A dividend of 5 per cent semi-annual on its common stock has been declared by the West End Ry. Co.

Salem—As soon as the Naumkeag Street Railway company obtains permission to use electric motors it will get forty new cars and run on ten-minute time. This company has petitioned the Railroad Commissioners for leave to increase its capital stock to $250,000, and for authority to issue coupon bonds to the amount of $850,000, to cover cost of extension and putting in an overhead electric system, and to secure the present funded and floating debt.

Scituate—We understand that the Thomson Houston system will be adopted on the proposed line from this place to Duxbury Beach.

MICHIGAN.

Grand Rapids—Mr. S. B. Tibbets, vice-pres. and gen. manager of the Valley City Cable Ry. Co. has resigned his position and disposed of his interests in the same to Chicago parties.

Kalamazoo—Judge Severens, of the U. S. court, has signed a decree foreclosing the mortgage held by the Central Trust Co. of N. Y., on the plant of the Kalamazoo Street Ry. Co. of $106,900, but the sale will not take place until this fall.

MINNESOTA.

St. Paul—The Crescent block, formerly the old Munger property, on Grant street and Nicollet av., just where the motor turns, has been sold to the Minneapolis Street Railway company for $27,000. What Mr. Lowry wants of that corner is not known. One report is that the power station for the cable line is likely to be located there. Then, it is also said that the company is endeavoring to get possession of other adjacent property, so that if it so desires the cable can be made to take a short cut and a straight line through from First avenue south to Nicollet. This latter rumor is probably to be discredited, in that the consummation of the scheme would entail too great an expenditure.

MISSOURI.

Kansas City—The barns of the Metropolitan Street Ry. Co., located at the s.e. cor. of 17th st. and Madison av. were destroyed by fire on the 15th of last month. The total loss on the building and contents is estimated at $12,000. The original cost of the building was about $10,000. Nine mules were also destroyed. (Would not the general adoption of the electric light in barns greatly reduce the fire risk? Ed.)

St. Louis—The Union Ry. and the Mound City Ry. Co's. will hold a meeting next month to act upon a proposition to increase their capital stock for the purpose of changing the motive power of their lines. Electricity or the cable will probably be adopted.

A meeting of the stockholders of the People's Railway company, the Fourth street line, was recently held at the office of the company, 1810 Park avenue. The proposition to increase the capital stock of the company from $300,000, its present amount, to $1,000,000, was submitted to the meeting and favorably acted upon. The directors were authorized to issue $1,000,000 in 10 20 6 per cent. bonds, to be used in altering and extending the lines of the company and to change its motive power. A member of the board of directors recently stated that the original intention of cabling would be carried out The meeting held was to authorize the issue of bonds in sufficient amount to carry on these improvements.

NEBRASKA.

Kearney—We understand that the Thomson-Houston Electric company has accepted a proposition made to it by the Midway Line company to complete the road here, and that work on the line will be commenced within the next 30 days.

Omaha—The Street Railway company here will probably adopt electricity in lieu of horses at an early date.

Plattsmouth—At a recent meeting of the city council a resolution was passed granting the electric motor company the right of way on the intersection of streets in paving district No. 1. The motor company is to obtain the right of way between streets from the abutting property owners. The right of way on Main street having been granted, the company will push the construction of its track to a rapid finish. Cars are expected to be running in the latter part of August or first of September.

NEW JERSEY.

Jersey City—The Pavonia Horse Railroad company has made application to the Jersey City Board of Alderman for permission to use electricity as a motive power in operating the road.

Elizabeth—The Elizabeth Street Railway company recently scored a victory over its rival, the Connolly Motor Equipment company, of Newark. The city council, after hearing Judge Gilhooly and H. H. Isham on behalf of the Elizabeth company, and Judge Cross for the Connolly company, passed unanimously a resolution directing the City Attorney to draft an ordinance allowing the Elizabeth company to extend its tracks to the Morris avenue crossing, so as to have its terminus 100 feet nearer the station than its rival's.

Newark—The Essex Passenger Railway company has been experimenting with the Daft system on its Bloomfield line, and it is probable that the Roseville line will be likewise equipped in the near future.

It is quite possible that the Rapid Transit Company will adopt either the Thomson-Houston or the Sprague system of electric propulsion on its lines.

NEW YORK.

Albany—The Broadway Company has secured permission to erect poles and to operate its lines by electricity.

At a meeting of the common council, held June 25th, the question came up of granting to the Albany Railway company permission to erect poles and string wires on State and Eagle streets and on Washington, Central and Watervliet avenues. Permission was refused, but undoubtedly the railway company will obtain the franchise asked for at an early date When completed, it

will be the longest electric railroad in this country, with its branches being 16 miles. That of the greatest length now being operated is 14 miles, in Topeka. The power house will be built at once, and completed in August. The old stables in North Albany will be razed, and the new structure erected at the South End. The power is to be furnished by dynamos driven by three 90-horse power engines. The fifteen new cars ordered will weigh over four tons each.

Brooklyn—The Brooklyn City Railroad company has decided to lease half a dozen more street car lines, which will give the company a mileage of 125 miles, over 1,500 cars and 5,000 horses. The roads to be added to the already long list are the Brooklyn Cross-Town line, which runs from Hunter's Point to the Erie Basin ; the Calvary Cemetery, Green Point and Brooklyn, the Greenpoint and Lorimer Street, and the Williamsburgh and Flatbush line. President Lewis of the City Railroad Company says the acquisition of the new roads is caused by a desire to concentrate and consolidate, in order to run the lines on a more economical basis. By means of the new roads certain valuable tracks can be used and a profitable transfer system established at several points The old drivers and conductors will be generally retained, but among the officers of the newly-acquired roads there will be some changes. The stockholders will formally determine upon the leases at a meeting on July 29th.

New York—The Twenty-third Street Railway company has a suit pending in the Supreme Court to recover $13,680, paid to John O'Brien, as receiver of the Broadway Surface Railway Co. as rental for the use of the Broadway company's tracks between July, 1886, and November, 1888. The Twenty-third street company now claims that the rental was fixed at $15 per day under an agreement that the company should have the privilege of bringing suit to recover it. Mr. O'Brien refuses to return the money. In his answer he refers frequently to the Broadway and Seventh avenue Railroad company, and says that he received money also from that company. He set up also, that as a receiver he had made disbursements amounting to $29,890.31, and asked that these disbursements be apportioned between the roads. Judge O'Brien has granted a motion of the plaintiff to strike out from the answer the references to the Broadway and Seventh Avenue Road, and to compel Mr. O'Brien to furnish a bill of particulars, giving the items of the disbursements which he made.

The activity in the affairs of the Thirty-fourth Street Ferry and Eleventh Avenue Railroad Co. is explained by a certificate lately filed in Albany by Edwin Lauterback, of the lease to the company, for 999 years, of the Thirty-fourth Street Railway company. Meanwhile, Edmund Coffin, jr. is seeking to restrain the former company from constructing its road, on the ground that it has not obtained the necessary consents. Judge Andrews has ordered a reference to ascertain the facts.

Rochester—The Rochester City & Brighton Ry. Co. will probably change its motive power, and adopt steam in the near future.

We understand that the lines of the New South Track and Crosstown Ry. Co.'s will be in operation by Nov. 1st.

Syracuse—The Genesee and Water Street Car company's new track through Crouse avenue is nearly completed, greatly facilitating the ascent of the hill. The residents of the avenue are now agitating a proposition for a new pavement. The street car track is being extended through Marshall street as far east as Walnut place. This will be the terminus of this branch of the road for the present, although the company's franchise permits an extension to the corner of University place and Spruce street. It is proposed in time to make a further extension from that point, running up across the hill so as to connect with the Driving Park branch, thus making a belt line. The company is talking of running their cars by electricity, using the overhead system. The Almond street branch will be laid immediately and a double track in Genesee street as far as Almond is another feature about to be consummated. The new tracks are being laid in the best possible manner. All the material used is of the best. Superintendent Hart is personally overseeing the work.

The 7th Ward Railway Co. has disposed of its right, title and interest in its franchises to the 11th Ward Street Railway Co. and the latter company has executed a trust mortgage on its entire plant to E. S. Teft, as trustee of the owners and holders of the bonds. The conveyance was made with the express understanding that the 11th Ward company shall construct the road, for the building of which the franchise was granted.

The People's railway will be running to the lake within two weeks. Connections will be made at Warren street bridge and at James and Townsend streets as soon as the additional cars arrive.

Tracks are being laid for the Fourth Ward railway in James street, between Warren and Salina. The Seventh Ward Railroad company's new barn in Colvin street, Eleventh ward, is nearly finished. It is twice as large as the old barn in the Seventh ward.

The double tracks to the lake are completed on the Salina side and are in operation by the Central City company. The electric cars now make connections to the Geddes pier.

Troy—Franchise has been granted to the Troy & Lansingburg Ry. Co. for the erection of poles and stringing of wires for the purpose of operating the road by electricity.

It is probable that the line between the Red Line Barn in Lansingburg, and the City Line, will be in operation by the 15th of August. Pres. Cleminshaw recently stated that a lease of the Waterfall & Cohoes Ry. has been secured.

Utica—The Belt Line Street Ry. Co. opened its Eagle Street branch on the 18th of last month. This company now has 240 horses, and 30 cars. W. E. Haycox, formerly connected with the East Cleveland Street Ry. Co., of Cleveland, Ohio, andt he inventor of the "Haycox Door Fastener," is superintendent of the company.

OHIO.

Cincinnati—The Thomson-Houston Electric company has finished putting up the trolley wires on the Colerain electric road, and the Cincinnati Street Railway company promises that the road will be ready to operate in three weeks. The dynamos have not yet arrived, but are expected every day. It is not believed that the company will begin to operate by electricity until the new bridge over Mill Creek is built, which will be about three months.

Mansfield—James Edgar, of Nankin, Ashland county, has filed a damage suit for $15,000 against the Mansfield Electric Street Car company for injuries he claims to have received by his horses running away with him May 16 last, after they had been frightened by a street car.

Cleveland—We understand that the Woodland Ave. and West Side Ry. Co. will experiment with the storage battery. If it prove satisfactory the system will be adopted, but think now that the overhead wire will obtain.

OKLAHOMA.

Guthrie—The city council has granted a franchise for an electric street railway to a syndicate of eastern gentlemen, represented by Mr. J. A. Brown, who has deposited a check for $10,000 as a guarantee to commence the construction of the road within ten days.

OREGON.

Portland—Two street car companies have obtained permission to change their lines to cable or electric, but have not yet decided which to adopt. The construction of the road to Portland Heights is progressing favorably, a double track having been laid for quite a distance.

PENNSYLVANIA.

Allegheny—The Pleasant Valley, Peoples Park Pass and Observatory Hills railway companies have been consolidated and will be operated by electricity.

Easton—A pretty lively time is going on between the Easton and South Easton Passenger Railway company and the city officials. The company laid some T rails on South Third street, contrary to notice served by the highway committee of councils. This was done at midnight of June 29th. On the morning of the 1st the city officials, with the police force and a large gang of laborers, commenced to tear up the rails and track. The company blocked the track with its cars and refused to move them. The city officials then caused the rails between the cars to be removed, and the police took charge of the cars and run them from the tracks. Suits were then brought by the street car company against Chief Tilton, Detective Simons and Mayor Lesher for assault and battery, and civil suit has already been brought against the city for damages. The court has granted a preliminary injunction restraining the city officials from interfering with the laying of T rails.

Erie—What was looked upon at first as a rumor in the matter of the purchase of the Erie City Passenger Railway by the Hon. William L. Scott and the Hon. J. C. Brady is now regarded by the public generally as a reality. The controlling interest in the road was owned by President Everett, of Cleveland, and Gen. Casement, of Painesville, who are rebuilding the road and putting in the electric plant. This company absorbed the Erie City company last winter, and it is now known under the corporate name of the Erie Electric Motor company, with a capital of $4,000, with power to increase the capital stock to $750,000. It is certain that there are negotiations under way. Scott and his son-in-law, C. H. Strong, are the owners of the Erie Electric Light and Power company,and it is generally believed that the purchase is being made, first because the electric road is looked upon as a gilt-edged investment, and then again because the two plants could be operated with the one power station, reducing expenses very materially. When the road was built out on the lake road to Trinity Cemetery it was the intention to extend the road to Massasauga Point Hotel, but Mr. Scott positively refused to allow the road to be built down through his farms, for the reason that it would greatly injure his stock breeding farm, which had been fitted up especially for that purpose. This was a stumbling block which the management of the company did not anticipate. It is believed that if Mr. Scott secures the road that he will not only extend it to Massasauga Point, but that he will extend it in other directions and will make it a most valuable institution to the city. Since the electric cars have been put on the traffic has been greatly increased, and, although the novelty has worn off, it is believed that inside of six months the demands upon the road by the public will be such as will compel the company to increase its capital stock and double the present facilities for carrying the public. The system operated is the Sprague,and it works without a hitch.

Johnstown—We understand that the street railway company here will not start up for some time. It was paying six per cent dividends, and its stock was selling at 75, but the flood left nothing but a few bits of track here and there.

Lebanon—The franchises of the South Mountain railroad, which were granted by act of assembly, approved 1854, will be sold in this city by Sheriff Miller on August 10. The road extends from a point at or near Harrisburg on the west, through East Hanover, Union, Swatara and Bertel townships to Hamburg and thence through Berks, Lehigh and Northampton counties to Portland on the Delaware river. Thomas H. Capp has entered judgment against the road in the sum of $37 000 for material furnished the company by his father, a former merchant of Jonestown, this county.

McKeesport—The W. Dewees Wood Co., of McKeesport, have purchased a one-third interest in the McKeesport Street Railway Co., recently held by the late Martin Harn. The company will increase the capital stock and use electricity.

Norristown—At a recent meeting of the stockholders of the Citizens' Passenger Railway Co. it was resolved to accept the provisions of the act of Assembly for the government of street railway companies passed at the last session of the legislature. In accepting the provisions the State will grant a new charter which protects the company under the new law.

Pittsburg—The Diamond Street Railway Co. has been organized and officers elected, the names of which appear under head "Elections."

A mortgage of $300,000 upon the property of the Pleasant Valley Street Car Co., was recently recorded for the purpose of securing the use of the same amount for funds to equip its com-

bined roads to Pleasant Valley and to East Side. This action insures the speedy completion of the electric system of this line. The dividends pay five per cent interest and will have thirty years to run.

RHODE ISLAND.

Providence—If the experiments here with the storage battery are successful it will be adopted generally on all the street car lines in the city.

TENNESSEE.

Chattanooga—Chancelor DeWitt recently dissolved the injunction obtained by the Telephone company against the electric railway company, and rendered an elaborate decision on the relative rights of the two corporations. The electric railway company will begin running cars to-morrow, everything having been gotten in readiness several days ago, awaiting the decision of the court. The road is about two miles long and will be an important line.

Nashville—The Supreme Court sitting at Jackson, recently held that the railway company is required to keep the streets in repair on its line each way the length of the cross ties, whether so required by statute or otherwise. It is, in the opinion of the court, a continuing due in case of other corporations succeeding to the property; therefore, failure to comply with the law is, the court holds, indictable, and the tracks may be removed from the streets as a nuisance.

VERMONT.

Rutland—At the recent annual meeting of the Rutland Street Railway company the following statement of the treasurer was submitted:

RECEIPTS.

July 14, 1888, cash on hand	$ 887 73
From passengers	16,205 70
From sale of horses	658 30
From advertising, etc	285 20
Total	$18,036 93

EXPENDITURES.

Interest on bonds	$ 1,920 00
Repairing road	1,491 84
Repairing cars	145 60
Paid for horses	1,789 00
Paid for shoeing	1 15
Paid for harness	124 97
Repairing harness	17 08
Hay, grain and straw	3,139 82
Wages of employes	5,271 42
Salaries of officers	1,741 67
Miscellaneous	1,876 83
July 15, 1889, cash on hand	517 55
Total	$18,036 93

WASHINGTON TERRITORY.

Seattle—At a recent meeting of the Seattle Electric Railway and Power Co., Mr. L. H. Griffity was authorized to purchase four thirty-horse power motor trucks and two eighty-horse power dynamos.

The Queen City Railway Co. has commenced work on its Madison Street cable line.

New Enterprises.

ALABAMA.

Birmingham—A company has been formed W. B. Copeland as secretary to build an electric street railway. The Sprague system will be used.

Greeneville—A company has been organized by J. T. Stiner and J. F. Stallings to build ½ mile of street railway at this point.

Tuscaloosa—The Tuscaloosa Belt Railroad Co. has been incorporated by W. C. Jemison, W. G. Cochrane, W. C. Fitts and others. The capital stock will be $200,000. It is reported that they will purchase the dummy line of the Tuscaloosa Coal, Iron & Land Co. and extend it to the Warrior river.

Hoxie—The Walnut Ridge Street Ry. of this place has been incorporated for the purpose of building a street car line from here to Walnut Ridge. Capital stock, $5,000. W. M. Ponders is president.

ARKANSAS.

Sulphur Rock—The Sulphur Rock Street Railway Co. has been organized by J. W. S. Bracken, W. T. Nesbit and others. The capital stock is $3,000.

CALIFORNIA.

San Diego—A syndicate of capitalists of San Diego and Philadelphia have purchased what is known as the Copeland franchise and will construct a cable road, commencing work on the same within the next 90 days.

COLORADO.

Denver—A franchise has been granted to the Denver City Cable Railway Co. to construct and operate a double track cable road in Highland. Permission was also given to the company to construct a viaduct over Platte River, for the purpose of accommodating its proposed line of road. The cable line will be built in the southwest portion of Highland west on sectional lines to the intersection of Golden or West Colfax avenue, from which point a double track extension will be made, which will be operated by horses. The right of way for the cable, viaduct and horse car roads were granted conditional upon the company commencing the work of construction within six months, and having the line in operation within 12 months.

CONNECTICUT.

Bristol—An electric railway will probably be built here in the near future.

DAKOTA.

Aberdeen—The city council has voted all the rights and franchises of the old street railway company to a new company composed of the most wealthy and enterprising business men here. The line to be completed by September 1, 1889. The main line will run from Fountain lake to the fair grounds and branches to the principal additions of the city.

Pierre— A franchise has been applied for to build a motor line here, and it is very probable that it will be granted.

St. Lawrence—The charter has been granted for the construction of a street car line between Miller and this point. The incorporators are: B. F. Ives, A. D. Hill, B. R. Howell and J. H. Baldwin.

Yankton—The Yankton St. Ry. Co. will put electricity on its proposed road.

FLORIDA.

Fernandina—The Fernandina Street Railway Co. has been incorporated.

GEORGIA.

Albany—The city council has granted the right of way to two street railway companies upon all the city streets. A dummy line will also be established, running two miles out to the Kinchefoonie creek.

Macon—We understand that the Belt line will soon be built in this city.

ILLINOIS.

East St. Louis—It is extremely likely that the electric railway will be built between this city and Belleville, Ill.; the right of way has already been purchased.

INDIANA.

Muncie—The Muncie Street Railway company, capitalized at $150,000, has been incorporated. [A list of the directors appears under the heading "Elections" in this issue.]

Ohio Falls—The Ohio Falls Street Railroad company has filed articles with the secretary of state, declaring its purpose to extend its operations to the construction, owning and maintaining of lines in Jeffersonville, Port Fulton, Clayburg and Clarksville. The capital stock of the company has been increased to $25,000.

IOWA.

Sioux Falls—An electric motor company has recently been organized here for the purpose of connecting Sioux Falls with the quarry region of East Sioux Falls, and the development of the intervening section. The directors are Messrs. Wilkes D. Welles, E. A. Sherman, C. E. Johnson, C. C. Crandall, W. R. Kingsbury and J. G. Wheeler, all residents of this place. It is pretty well decided to adopt the Sprague overhead wire system.

The council has granted the electric motor company a franchise to build a line from the foot of Ninth or Tenth street across the river and through the streets easterly to the city limits. The line will be immediately built to East Sioux Falls, a distance of six miles.

KENTUCKY.

Middlesborough—The Middlesborough Electric Street Railroad company will build an electrical street railroad. The capital stock is $50,000.

Middlesboro—A project for the construction of an electric railway here is to be pushed through. The projectors have not yet decided what system of electrical propulsion to adopt; but it will undoubtedly be one of the "overheads."

LOUISIANA.

Shreveport—All the stock has been taken up in the Belt Line company, and the road will probably be in operation by next August.

MAINE.

Brunswick—The Brunswick Electric Street Railway company has been organized for the purpose of putting in one mile of track between this city and Topsham. We understand that the company will first test the merit of the storage battery, and if it does not prove to be a satisfactory and economical venture, the overhead system, with power from the electric light company, will be adopted. It is expected that the road will be in operation by this fall. The capital stock is $50,000, in shares of $100 each. Among those interested in the formation of the company are Messrs. F. H. Wilson, Weston Thomson, Wm. M. Pennell, F. C. Webb, Geo. C. Woodbury, Superintendent C. B. Story, of the electric light company, and A. F. Gerald, of Fairfield.

MICHIGAN.

Saginaw—The Saginaw Union Street Railway company is endeavoring to secure a franchise to put in a motive power of electricity. Detroit parties are negotiating for the line in the event of an electric franchise being secured, on the basis of $250,000 for the plant.

Negaunee—The electric railway project formerly reported in the GAZETTE, to connect this point with Ishpeming, promises to come to a head without much longer delay. The common council of Ishpeming has granted a franchise. The line, if built, will be about six miles in length, although the distance from center to center of the two cities is not over three miles. It is probable that the Thomson-Houston system will be adopted. The combined population of the two cities is in the neighborhood of twenty thousand, and it would seem that an electric line connecting the two would be a paying investment.

MINNESOTA.

Minneapolis—A new cable project has come to light here; the leading spirits in the enterprise are R J. Anderson, W. P. Douglass of Anderson, Douglass & Co. An ordinance has been granted, giving them the right to construct a cable road on certain important streets and the parties agree to have cars running within two years, with the loss of the franchise as penalty in case of forfeiture. The franchise is good for 30 years. These gentlemen claim to represent Southern capitalists who are largely interested in cable roads in Philadelphia, Chicago and Pittsburg. It is likely that they refer to the Elkins-Widener syndicate. The line when built will be about seven miles in length. [Later advices state that the ordinance has been refused.—ED.]

Mr. Thomas Lowry recently made the following proposition to the city council, which has been referred to the committee on railroads before action is taken.

The street railway company will build a cable line on the line now operated by the motor from Washington avenue or the union depot to Thirty-first street, and have completed as soon as possible, commencing work at once, provided, that in case the crossing at the Hastings & Dakota railroad is changed so that the company can not operate its cars, the city will pay the actual cost of change and loss of business to the company by reason of stoppage of travel, such loss to be decided by arbitrators—one to be selected by the city council and one by the company, and they to select the third; provided further, that the company agree to have the road completed by the summer of 1890; and, provided further, that the street shall be paved as soon as the cable line is completed.

This was referred to the committee on railroads and the aldermen of the wards affected.

St. Paul—A contract was recently closed between Archbishop J. Ireland and T. Cockrane on the one side, and Thomas Lowrie and the City Street Railway company on the other, which insures the construction of two double track electric lines from Wabasha street out through Reserve Town to the Mississippi river. It provided that upon the payment of $250,000 to the Railway company the line will be built and in operation within six months from the present time. The system by which the roads will be

operated has not yet been decided, but we have reason to think it will be by the over-head.

Winona—The Street Railway company, which was recently organized here (Winona Street Railway company), has a scheme on foot to put in an expensive electric plant for the purpose of operating its cars by electricity, furnishing power for manufactories, elevators, etc, and for lighting purposes.

MISSOURI.

St. Louis—The Magnolia Avenue Street Railway company has received permission to build a road to be operated either by over-head wires or by storage batteries.

Kansas City—The Surburban Street Railway company has made pretty definite arrangements for completing and operating an electric railway. Mr. E. J. Lawless, one of the projectors of the enterprise, said that grading would soon be finished, and that construction will begin within sixty days. The overhead construction will consist of single iron-poles, placed between the two tracks, the wires being suspended from each end of the cross beam. An electric light will be placed on the top of every pole. Heavier motors will be used than those on any other proposed electric line in Kansas City; cars will be run at the rate of ten miles an hour, the road being in thorough operation within the next nine months.

The East side Railway company, capitalized at $25,000, has been incorporated by John H. North, Witten McDonald, Ed L. Scarritt, W. H. Winants, C. A. Hunt, W. W. Winants, E. A. Phillips, F. C. Marsh and W. C. Scarritt. The first five named will constitute the board of directors for the ensuing year. The purpose of the company is to construct, maintain and operate street railways in the city and its adjacent territory, and also to secure franchises for such railways. A general real estate, bond and banking business will also be conducted.

The North End Street Railway company will award the contracts for building its road within the next thirty days.

Mexico—The Mexico Street Ry. Co. capitalized at $10,000, has been incorporated by W. H. Garland, C. W. Squiers, and H. M. Sainstay, all three of St. Louis, Mo.

St. Joseph—A deed has been filed making a transfer of the Citizens and Frederick Avenue lines from the Central Trust company of New York, to the People's Street and Electric Light and Power company for $800,000.

NEBRASKA.

Beatrice—The South Beatrice Street Railway company has begun the construction of its line from Court street south.

Lincoln—The Bethany Heights Street Railway has been incorporated. The capital stock of the company is $35,000, divided into shares of $100 each. The following are the incorporators: H. C. Eddy, J. Z. Briscol, Charles Hammond, E. T. Gadd, C. T. Boggs, A. Eddy, W. W. Holmes, C. C. Munson, John H. Ames, Thomas H. Hyde, A. S. Raymond, C. R. Vanduyn, W. S. Mills and Porter Hedge.

NEW YORK.

Albany—Work has already been commenced on the Watervliet Turnpike and Railway Co. Electric road, upon which the Thomson-Houston system has been adopted. The contract for construction has been awarded to J. F. Barry & Co., of New York City. The cars, fourteen in number, will probably be built by J. M. Jones' Sons, of Troy. The dynamo house will be built near the toll gate on the Troy road, to contain 200-horse power engines, etc.

Auburn—The Auburn Owasco Lake Electric Railway company have received permission to build its road through Owasco street, to be operated by electricity. The road will be single track with turnout, and must be completed and in operation by July 1st, 1890.

Lyons—The trustees of Lyons have granted to the Lyons Street Surface Railroad company consent to construct a street railway and the franchise will be sold at the court house, July 15th. The road is to be constructed under the supervision of the street committee of the village, and shall be completed during 1889. The road will be built with New York and Syracuse capital.

New York—The Metropolitan Crosstown Railway company has petitioned the board of aldermen for permission to construct a railway through Grand, Delancey and Spring streets, South Fifth Ave., Fourth, McDoodle, Waverly Place, Bank street, Greenwich Avenue, Thirteenth and Horatio streets, Thirteenth Avenue and Fourteenth street.

Rochester—The common council has granted permission to the South Track and Crosstown Railway companies to operate their roads by electricity. The companies are required to give a bond of $10,000 to indemnify the city against suits for damages growing out of the operation of the lines by electricity.

Saratoga Springs—The village has granted a franchise for an electric railway from the lower part of the city to the Geysers. Manager J. L. Butman agrees to have the line in operation next month.

Saratoga—The Saratoga Electric Railway company has filed articles of incorporation with the secretary of state. It is formed by J. M. Burt, of Bennington, Vt.; W. B. Ferguson, of Boston, Mass., and John L. Putman, John D. Hayes, Caleb W. Mitchell, Geo. W. Morton, James H. Pardue and Dennan Vail, of Saratoga. They are to construct a street surface road in Saratoga to run to the Kissingen, Geyser and Vichy springs. The road will commence at Broadway and West Congress street, thence through West Congress to Hamilton, South and Union streets, to and through Clarendon avenue and on a south-westerly line of extension of Clarendon avenue to the road leading from Kissingen spring to Saratoga lake; thence along said highway to Ballston avenue; thence to the springs, a distance of two and a half miles. They have a capital of $50,000.

Watertown—The stock and franchise of the street railway company has been transferred to S. L. George, of Watertown, and the road will be built at once. The motive power will be electricity by overhead wire system.

OHIO.

Akron—The city council has voted to grant additional franchises to the Electric Street Railway company, of which General Jack Casement is president and S. F. Everett, of Cleveland, vice president, and these gentlemen have given a $20,000 bond to have twelve miles of line in operation in one year.

Cleveland—A company, capitalized at $100,000, has been organized here among property owners for the purpose of building a line of street railway on Ontario street to the Central viaduct, to Jennings avenue, Willey street to Scranton avenue, and thence on Pearl street to the Brooklyn bridge. We understand the property owners have already been granted the right of way. The track will be about two miles in length.

The Scranton Avenue Street Railway company has organized with a stock of $100,000.

Hamilton—The Hamilton Electric Railway company has been incorporated with a capital stock of $100,000.

Marion—The Marion Street Railway company has been incorporated with a capital stock of $25,000. The incorporators are G. W. Robertson, J. G. Leffler, Harvey Wilson, Ira Uhler and M. B. Chase.

OREGON.

Portland—Arrangements have been completed for the construction of an electric motor line from this city to a point six miles to the southeast. It will be operated by the overhead system.

Woodstock—A line from this point to Portland, to be operated by electricity, will probably be constructed in the immediate future.

PENNSYLVANIA.

Allegheny—A charter has been granted to the North Bend Electric Passenger Railway company to build a line 2½ miles long to be operated by electricity. The capital stock is placed at $25,000. The names of the directors are to be found under "Elections" in this issue.

Lebanon—Some time ago a charter was granted to the Lebanon Electric Street Railway company by the State department. Steps were taken and application made to city councils for a franchise. After long consideration of the bill at various meetings, it came up for final action before common council and the bill was passed. The new road, as defined in the bill, is to start at the eastern limit of the city and extend westward on Cumberland street to Sixteenth street. It will then take a northerly direction and finally pass eastward again to the eastern terminus. A branch road is to be run northward to the furnaces. Councils agreed that three per cent. of the annual gross receipts for passenger fares are to be paid to the city, provided that it shall not pay more than one per cent. during any year when the license fees exceed $15 per cent. Officers of the company have been visiting Steelton, Erie and other places, and inspecting the workings of the electric roads at those places.

Pittsburg—The Duquesne Electric Railway Construction company has been incorporated with capital stock of $60,000. A list of directors will be found under heading "Elections."

The charter has been granted to the South City Traction company, of this city, to build eight miles of road here. The stockholders are: James A. McDevitt, of Lancaster, who holds 1,800 of the 2,000 shares; Joshua Rhodes, A. M. Neeper, A. F. Keatin, John F. Steel and T. H. Given, who is president.

The Fifth avenue, West End & Crafton Street Railway company has been incorporated, with a capital stock of $18,000. A list of directors will be found under "Elections."

We understand that the Birmingham and Pittsburg Street Railway company has been bought by a syndicate, of which Mr. H. S. McKee is a representative, and the road will shortly be converted to cable system. Other gentlemen interested are D. Z. Brickell, J. A. Chambers and Murray Verner.

The Hiland Avenue Railway company, capitalized at $24,000, has been granted a charter to build a line four miles in length, beginning at the Hiland avenue reservoir, and extending on Hiland to Penn avenue. A list of the directors are given under heading "Elections."

The East End Street Railway company, of Pittsburg, capitalized at $30,000, has been granted a charter. The company propose to build a line six miles in length. A list of the directors will be found under the heading "Elections."

A charter has been granted to build seven miles of road, to the Forbes Street Railway Co., of this city. The company is capitalized at $42,000, and a list of the directors will be found under heading "Elections."

Washington—The Washington Electric Railway has been incorporated with a capital stock of $60,000. Mr. L. M. Singley, of this city, is president of the company.

Wilkesbarre—The Wilkesbarre and South Side Electric Railway Co. has been granted permission to lay tracks, and build a street railway over certain streets in Wilkesbarre.

TENNESSEE.

Chattanooga—The Pennock Electric Ry. Co. has been incorporated by Messrs. A. M. Pennock, Maurice Child, jr., and G. W. Huddleton and others.

W. B. Mitchell, J. A. Hart, S. R. Reed and others have chartered the Chattanooga & North Side Street Railway Co. to build a street railway to Hill City, a suburb of Chattanooga.

P. M. B. Young and Joel Branham, of Rome, Ga.; J. E. Shumate, of Dalton, Ga.; M. Block and others contemplate building a dummy line from Chattanooga to the Chicamauga battlefields.

Nashville—A street electric railway company has been organized by the following named gentlemen: Isaac T. Rhea, T. W. Wrenne, R. W. Turner, J. H. Bruce and P. G. Breen.

Memphis—The Springlake Street Railway Co. incorporated by B. R. Sharp, M. C. Pearce, W. M. Brown and others, to build a dummy line. Capital stock, $25,000.

Knoxville—The Riverside Electric Street Ry. Co. has been organized for the purpose of building an electric railway about 5 miles in length; J. M. Brooks, W. A. Park and C. A. Fellows are interested.

TEXAS.

Sherman—We understand that this city will shortly build about eight miles of electric street railway.

Vernon—The Vernon St. Ry. Co. recently organized by R. F. Jones and others and previously

referred to in the GAZETTE will build its line in the near future. Capital stock $6,000.

Wetherford—A 30 year franchise has been granted a Chicago Co. authorizing them to build a street railway on a number of the principal streets here. Work must be commenced within 90 days, and we understand it will be pushed to completion as rapidly as possible.

VIRGINIA.

Manchester—The Southside Land and Improvement Co. has been incorporated with William C. Seddon, president, and Alexander H. Rutherford, secretary, both of Baltimore, to deal in real estate and build and operate street railroads. They have applied for right of way for the street railway, from Richmond to Spring Hill. The capital stock is to be not less than $100,000 nor more than $1,000,000.

WISCONSIN.

Wauwatosa—A project is on foot here to build a line of electric street railway from this point to Milwaukee.

WASHINGTON TERRITORY.

Monte Santo—There is a prospect of an electric railway being constructed here in the near future.

Seattle—The South Side Cable Ry. Co. capitalized at $200,000 for the purpose of constructing, owning and operating a street railway by means of cable, electricity or otherwise, in the city of Spokane Falls and its suburbs has been incorporated. Trustees, Alfred S. Moore, San Francisco, Cal.; John D. Sherwood, Frank R. Moore, Horace L. Cutter and H. Bolster of Spokane Falls, W. T. Its object and purpose shall be to construct, own and operate a street railway by means of cable, electricity or otherwise in the city of Spokane Falls and its suburbs.

We understand that the Seattle Electric Ry. Co. have recently purchased property on Pine St. for the purpose of erecting a power plant. It is the intention of the company to put in four 200 h.p. Corliss engines, each of which is to drive two large dynamos, generating power sufficient to run 32 electric cars, and to leave considerable surplus at the command of the company which is to be rented to manufacturers, printing offices and other concerns all over the city, by means of stationary motors.

Tacoma—The Tacoma Railway & Motor company has been incorporated by Paul Schulze, D. H. Louderback, James H. Ashton, John H. Cummings, J. H. Mitchell, jr. Henry Hewitt, jr. and C. J. Kershaw. The capital stock is placed at $500,000, divided into 5,000 shares of $100 each. The incorporators constitute the board of trustees that shall manage the affairs of the company for the first six months. The purpose of the company, as set forth, is the construction and operation of street and suburban railroads.

The Tacoma Central Street Railway company has been incorporated stock of $40,000 to build, equip, run, operate and maintain street railways of horse, steam, cable, electric or other motive power in, through and about the city of Tacoma and to different points in Pierce county. The incorporators are John S. Baker, John S. Campbell, Wm. Siler, Walker H. Tisdale and James S. Boyle.

John A. McGoldrick has a business proposition to build a street railway before the city council. He offers to take all the streets not already corralled by the syndicate and all of the streets released by them, and within nine months will have his roads in good running order. The Villard-Louderback-Cummings syndicate is expected to oppose the granting of any franchise to Mr. McGoldrick on the ground that it will interfere with its vested rights.

WEST VIRGINIA.

Charleston—An electric railway will be built here by the Kanawha Electric Light Co.

WISCONSIN.

Fond du Lac—The Fond du Lac Street Railway company has been incorporated by F. B. Hoskins, J. E. Sullivan, E. A. Carey, H. R. Potter and C. E. Strong.

In consequence of an over-press of matter, we have had to omit an illustrated description of an interesting method of operating cable roads; it will appear, however, in our August issue.

EXTENSIONS.

Asheville, N. C.—The Asheville Electric Street Ry. Co. will extend its lines in the immediate future.

Atlanta, Ga.—We understand that the Union Street Ry. Co. will extend its service on Peeples street in the immediate future.

Contracts have been awarded for the extension of the Metropolitan Dummy Line from Fair street to the Sid Phelan Place, about 1½ miles on the Atlanta side of Decatur.

Buffalo, N. Y.—In the matter of the petition of the East Side Street Ry. Co., praying for permission to extend its tracks on Clinton street from Emslie to Bailey avenue, the petition was granted subject to the following conditions: (1) That the franchise be sold by the Comptroller; (2) That the Richards girder rail be used; (3) That the fare from Main street to Bailey avenue be five cents, and that double tracks be laid from Emslie avenue to Fillmore avenue, thence to Bailey avenue with single or double tracks.

Grond Rapids, Mich.—At the adjourned meeting of the directors of the Valley City Street and Cable Railway company held July 5th, it was decided to resume work on the Bridge street line at once and push it as rapidly as possible. Work will be commenced this morning, and by noon to-day it is hoped to have a full force of men employed.

It was also decided to begin the construction of a line in the Third ward, on Union street, next week, and arrangements were made to secure the necessary materials and cars for the new lines. The iron yokes for the Bridge street line are nearly all on the ground.

Hastings, Neb.—The street railway company here will extend its lines in the near future.

Macon, Ga.—The Huguenin Heights line is to be extended in the near future.

McKeesport, Pa.—The McKeesport Street Ry. Co. will extend its lines to Drovosburg to the city line in crooked runs, and to the proposed approach of the new bridge connecting Riverton with Duquesne.

Parkersburg, Va.—The street car line now in operation from Seventh street on Market to the suburb of Elbron, is to be extended to the southern end of the city at the foot of Ann street and in the opposite direction to the fair grounds.

San Francisco, Cal.—The Market Street Railway company has received permission to extend its lines from the terminus of Fifth and Bluxome streets line, on the east line of Fourth to Third and Townsend.

Vicksburg, Miss.—It is highly probable that the Vicksburg Street Railway Co. will extend its lines in the immediate future, and adopt electricity as a motive power.

The Vicksburg Street Railway has decided to extend its lines from Washington street by way of South, Cherry, Clay, Lee, First and North streets, as soon as Clay street is graveled.

ELECTIONS.

Burlington, Vt.—The Street Railway company here has elected the following named gentlemen to serve as officers for the ensuing year:

President—George F. Pope.
Vice-president—Elias Lyman.
Superintendent—K. B. Walker.
Assistant Superintendent—Joseph Lepp.
Treasurer—L. H. Turk.
Clerk—F. H. Parker.
Directors—Jo. D. Hatch, George F. Pope, K. B. Walker, L. H. Turk and Elias Lyman.

Duluth, Minn.—Prof. W. F. Phelps, secretary of the chamber of commerce, has been appointed to the position of City Railway commissioner. We understand that the position carries with it a salary of $5,000 per year.

Lancaster, Ohio.—The Lancaster Street Railway company has elected the following named officers:

President—William Duffy.
Vice-president—C. W. Boyd.
Treasurer—General Hugh Ewing.
Secretary and General Manager—Frank Barrett.
Directors—General Ewing, Morris O. Brooks, A. E. Humphreys, J. H. Earnshaw, Frank Barrett, C. W. Boyd, William Duffy.

Lincoln, Neb.—The Bethany Heights Street Railway company has elected the following officers:

President—Charles Hammond.
Vice-president—J. Z. Briscoe.
Secretary—C. R. Van Duyn.
Treasurer—C. C. Munson
Directors—Charles Hammond, A. Eddy, W. S. Mills, J. S. Briscoe and C. C. Munson.

Newark, N. J.—At a recent meeting of the Elizabeth and Newark Horse Railway company the following named gentlemen were elected directors for the ensuing year:

Directors—Wm. Clark, Amos Clark, Anthony Q. Keasbey, Henry Conger, Robert Cummings, Andrew Lemassena, Jr., Geo. G. Frelinghuysen.

Kansas City, Mo—At a recent meeting of the directors of the North End Street Railway company of this city, the following named gentlemen were elected officers:

President—W. H. Winants.
Vice-pres. and Gen. Man.—E. A. Philips.
Treasurer—J. H. North.
Secretary—W. C. Scarritt.
Chief engineer—W. B. Knight.

Macon, Ga.—J. B. Colgrove has been elected president of the Dummy Railway company here. Mr. J. T. Voss, of Macon, general manager, and W. T. Johnson, treasurer.

Mohawk, N. Y.—At a recent meeting of the Mohawk and Ilion Street Railway company the following officers were elected:

President—O. W. Bronson.
Vice-president—C. W. Carpenter.
Treasurer—R. M. Devendorf.
Secretary—H. D. Alexander.
Directors—O. W. Bronson, C. W. Carpenter, John Brown, J. B. Rafter, H. D. Alexander, R. W. Devendorf and L. L. Powell.

Montgomery, Ala.—At a recent of the Montgomery Terminal and Street Railway company held for the purpose of re-organization, the following named officers were duly elected:

President—Ig. Pollack.
Vice president—John D. Roquemore.
Secretary—R. C. Mitchell.
Treasurer—G. W. Craik.
Directors—Ig. Pollack, John D. Roquemore, R. C. Mitchell, G. W. Craik, J. W. Dimmick, S. M. Levin and John C. Verdin.

Muncie, Ind.—The following named gentlemen have been elected directors of the Muncie Street Railway company:

Directors—F. E. Smith, Elias Lyman, J. G. Reed, C. E. Shipley, C. R. Hayward, F. G. Brunnell and S. C. Goshorn.

Nashville, Tenn.—T. W. Wrenne has been elected general manager Mr. H. B. Stubblefield secretary of the McGavock & Mt. Vernon Street Railway company.

New York City, N. Y.—The Broadway and Seventh-Avenue Railroad company has elected the following:

Directors—Charles Banks, William B. Dinsmore, Bernard McEwing, John H. Murphy, Thomas J. O'Donohue, Thomas F. Ryan, John J. Bradley, William L. Elkins, Charles F. Frothingham, D. B. Hasbrouck, W. H. Rockwell, Henry Thompson and Peter A. B. Widener.

Pittsburgh, Kansas—The following named gentlemen have been elected directors of the Pittsburgh Electric Light and Railway company:

Directors—B. T. Hobart, St. Louis, Mo.; C. E. Grannis, New Haven, Conn.; A. E. Stillwell, C. H. Hammatt, Kansas City, Mo.; Frank Clayton, B. H. Wilson, F. E. Doubleday, D. Ramsey, Pittsburg, Kan.; J. M. Goff, Walnut.

Allegheny, Pa.—The new directors of the North Bend Electric Passenger Railway company are J. C. Barr, J. B. Conway, E. S. Giles, Charles Anderson and Frederick Swilter, of Pittsburgh, and Hay Walker and John Rodgers, of Allegheny.

Pittsburgh, Pa.—The following named gentlemen have been elected directors of the Duquesne Electric Railway Construction company:

Directors—William J. Hammond, John V. Patton, William J. McElroy, William E. Tustin, William J. Hammond, Jr., all of Pittsburgh.

The Diamond Street Railway company has elected the following officers:

President—A. C. Hopkins,

Vice-president—John N. Nebb.
Secretary—L. Halsey Williams.
Treasurer—Charles H. McKee.

The Fifth avenue, West End and Crafton Street Railway company have elected the following named gentlemen to serve as directors for the ensuing year:

Directors—Ross J. Beatty, John W. Magnus and George W. Hall, of Pittsburgh, C. S. Netling, Jr., of Allegheny, and William J. Post, of Ingram Station.

The East End Street Railway company of Pittsburgh, has elected the following:

Directors—S. H. A. Stewart, J. F. Steel, James A. McDevitt, Chas. H. McKee and A. M. Neeper.

The following named gentlemen have been elected directors of the Hiland Avenue Railway company:

Directors—Geo. Rice, Chas. H. McKee, F. L. Stevenson, F. C. Hutchinson, and G. I. Whitney.

The following named gentlemen have been elected as directors of the Forbes Street Railway company:

Directors—C. L. Magee, G. I. Whitney, Geo. Rice, H. S. A. Stewart and F. L. Stevenson.

Rutland, Vt.—At a recent annual meeting of the Street Railway company, held on the 17th inst. the following named gentlemen were duly elected as officers for the coming year:

President—J. N. Woodfin.
Secretary and Clerk—F. A. Field.
Treasurer—M. Quinn.
Directors—M. Quinn, M. McKeogh, A. H. Tuttle, J. F. Woodfin, H. C. Tuttle, T. J. Lyon, J. W. Cramton, J. C. Baker, J. A. Sheldon.

San Francisco, Cal.—At the annual meeting of the stockholders of the California Street Cable Railway company, held on the 10th inst., the following named gentlemen were duly elected:

President—J. B. Stetson.
Vice-president—Antoine Borel.
Treasurer—Alfred Borel & Co.
Secretary—Albert Stetson.

The old board of directors were unanimously re-elected; they are A. Borel, J. C. Coleman, Chas Mayne, W. Randall and J. B. Stetson.

Sioux City, Iowa.—At a recent meeting of the Sioux City Electric Street Railway company the following named gentlemen were elected officers of the company:

President—James E. Booge.
Vice-president—John Hornick.
Secretary—F. C. Hills.
Treasurer—Zeno R. Brown.

Winona, Minn.—The stockholders of the Winona City Street Railway company have elected the following:

Directors—B. H. Langley, M. G. Norton, C. B. Booth, of Winona, and E. G. Gilman, W. G. Deane, H. W. Turner and H. S. Cole of St. Paul.

Patents.

The following is a complete list of such patents as relate to Street Railway Interests, issued during the past month, especially prepared for the STREET RAILWAY GAZETTE, by John C. Higdon, solicitor of patents and trade marks, room 29 St. Cloud Building, opposite U.S. Patent Office, Washington, D C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

Issue of June 25, 1889.

405,750. Standing Contact Arm, C. J. Van Depoele, Lynn, Mass.

405,691. Truck for Cable Railway Cars, S. A. Bemis, Springfield, Mass.

405,767. Conduit for Cable or Electric Railways, W. J. Brewer, New York, N.Y.

405,703. Car Truck Bolster, J. Higginson, St. Louis, Mo.

405,743. Regulator for Dynamo Electric Machines, J. H. Robertson, Rutherford, N.J.

405,858. Electro-Magnetic Motor, Tesla Electric Co., New York, N.Y.

405,859. Electrical Power Transmission, Tesla Electric Co., New York, N.Y.

406,015. Dynamo Electric Machine, T. L. Wilson, Brooklyn, N.Y.

Issue of June 18, 1889.

405,535. Car Starter, A. M. Craddick, and W. S. Heady, Tower Hill, Ill.

405,554. Contact Device for Electric Railways, F. E. Fisher, Detroit, Mich.

405,306. System of Rapid Transit, H. Flad, St. Louis, Mo.

405,467. System of Rapid Transit, H. Flad, St. Louis, Mo.

405,468. Street Cable Railway, H. Flad, St. Louis, Mo.

405,556. Electric Railway, R. M. Hunter, Philadelphia, Pa.

405,668. Electric Motor or Dynamo Electric Machine, R. M. Hunter, Philadelphia, Pa.

405,263. Compound Wound Alternating Current Dynamo, H Lemp, Lynn, Mass.

405,365. Electric Railway, A. L. Lineff, Westminster, England.

405,505. Standing Device for Street Cars, J. Ritchie, Flatbush, N.Y.

405,602. Dynamo Electric Machine or Motor, C. L. Rosenquist, Yonkers, N.Y.

405,507. Dynamo Electric Machine, W D. Sandwell, Herne Hill, County of Surrey, England.

405,441. Dynamo, Sperry Electric Co., Chicago, Ill

405,284. Dynamo Electric Machine, F. Thone, Oskaloosa, Iowa.

405,626. Slotted Conduit for Electrical Conductors, C. J. Van Depoele, Chicago, Ill.

405,627. Switch for Suspended Electric Conductors, C. J. Van Depoele, Lynn, Mass.

405,628. Conduit for Electric Railways, C. J. Van Depoele, Lynn, Mass.

Issue of June 11, 1889.

405,002. Brush Holder for Dynamos, W. S. Bishop, New Haven, Conn.

405,155. Cable Grip, G. A. Carreras, St. Louis, Mo.

405,218 Dynamo Electric Machine, O. P. Loomis, Somerville, Mass.

405,223. Electric Motor Starting and Stopping Device, Elektron Manufacturing Co. of New York.

405,174. Regulation of Alternating Electric Current Generators, Brush Electric Co., Cleveland, O.

404,981. Alarm Signal for Cable and Electric Railway Cars, L. Pfingst, Boston, and S. A. Bemis, Springfield, Mass.

404,873. Electric Railway, United States Electric Railway Co., Denver, Colo.

405,231. Slot Rail for Cable Roads, Johnson Co., of Kentucky.

405,059 Suspended Railway, J. Thompson, Kansas City, Mo.

Issue of June 4, 1889.

404,465. Electric Motor, C. S. Bradley, Yonkers, N.Y.

404,466. Alternating Current Electric Motor, C. S. Bradley, Yonkers, N.Y.

404,469. Electric Railway, W. Cannell, Cleveland, O.

404,601 Cable Grip, C. S. Chapman, Kansas City, Mo.

404,602. Regulator for Dynamo Electric Machines, Clark Electric Co., New York, N Y.

404,687. Electric Railway, L Daft, Plainfield, N.J.

404,783. Regulator for Electric Motors, A. Gartner, Newark, N.J.

404,533. Electric Motor and Regulator, Continental Motor and Electrical Co., Newark, N.J.

404,484. Dynamo Electric Machine, W. Hochhausen, Brooklyn, N Y.

404,712. Detachable Brush Holder for Dynamos, J. F. Kester, Terre Haute, Ind.

404,713. Armature Core for Dynamos, J. F. Kester, Terre Haute, Ind

404,714. Regulator for Dynamo Electric Machines or Motors, J. F. Kester, Terre Haute, Ind.

404,715. Brush Spring for Dynamos, J. F. Kester, Terre Haute, Ind.

404,651. Safety Attachment for Electric Motors, W. S. Paca, Baltimore, Md.

404,497. Means for Operating Trains upon Cable Railways, Rapid Transit Cable Co., New York, N.Y.

404,498. Guide Pulley for Cable Railways, Rapid Transit Cable Co., New York, N.Y.

404,499. Grip for Cable Railways, Rapid Transit Cable Co., New York, N.Y.

404,559. Track Moistening Apparatus, for Electric Railways, E. D. Priest, Lynn, Mass.

404,563. Car Starter, G. Schmidt, Rhine, Prussia, Germany.

404,661. Electric Motor, Belding Motor and Manufacturing Co., Chicago, Ill.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents.

Expire during July.

128,500. Electro Magnetic Passenger Register for Street Cars, etc., W. H. Mumber.

129,000. Electric Magnetic Motor, J. S. Camacho.

129,085. Commutator for Electric Machines, V. Barjou.

129,201. Car Ventilator, J. Wright.

129,448. Spring for Cars, T. F. Allyn.

129,500. Lubricator for Car Axle Journals, S. Ustick.

129,820. Oil Can Cap and Nozzle, J. R. Hathaway.

130,010. Railroad Tie, J. L. Boone.

129,783. Oil Can, C. J. Brown.

129,697. Chair for Street Railway Rails, W. Warner.

Business Mention.

The North Side Cable Co of Chicago, is now about to use a considerable number of the Ry. Register Co.'s Stationary Registers.

The West End Street Railway Co. of Boston recently placed an order with the Johnson Co. of Johnstown, Pa. for side bearing girder rails, switches, etc. for its entire system. (It is almost useless to say that the order was secured by Major H. C. Evans.)

Messrs. Woodbridge & Turner, electrical engineers, of 74 Cortlandt street, New York City, have just completed two electric roads. (Chattanooga, Tenn.) electric railway, operating six miles of track and six cars; and the Marlboro Street Railway in Marlboro, Mass., operating three miles of track and two cars.

Both roads are running very successfully.

This same firm is now equipping the Troy and Lansingburg Street Railway, and is constructing an electric road in Wilmington, Del.

We are pleased to note that Mr. Rufus Martin has now associated with him Mr. D. C. Breckenridge, and the firm will, in the future, be known as Martin & Breckenridge, of 15 Broad St., New York City. We understand that this firm succeeds to the old firm of Rufus Martin in all respects. The GAZETTE wishes it all prosperity in its enterprise.

The Chicago office of the St. Charles (Mo.) Car company is located at 527 Phenix building, Mr. Charles M. Hewitt being in charge.

We have received from the Pond Engineering Co. of St. Louis, a twelve page pamphlet descriptive of the Lowe feed water heater and purifier. Inasmuch as in the near future, the probabilities are that most all the street railways in the country will install power plants, we would recommend those operating steam plants to send to the company at 707 Market street, St. Louis, for one of these pamphlets, and put it in the hands of their operating engineer.

Among many recent shipments made by the Peckham Street Car Wheel and Axle Co. of its elastic motor wheels, may be enumerated those sent to the Bentley-Knight Co.; the Detroit Electrical Works; Daft Electric Light and Power Co.; the Troy & Lansingburgh Street Railroad; Akron Electric Railroad; Port Huron Electric Co., and Second av. Railroad Co. of New York City.

As previously stated in the GAZETTE, the Glidden & Joy Varnish Co. of Cleveland, Ohio, is pushing its goods in every direction, and, in the immediate future, will undoubtedly make other manufacturers who have held the bulk of the street railway business look out for their laurels, or they will be likely to lose them.

THE STREET RAILWAY GAZETTE has great reason to congratulate the mechanical world that in this hourly development of appliances, nothing can claim a higher standard in its field than the new lubricant invented and patented by the Anti-Friction Composition Journal Bearing Company. Oils have so long usurped the anti-friction field that it seemed certain that this candidate for such fame would stand no show. Yet the world moves, and so do the wheels of commerce, safely and economically across the continent, relying as they do upon this mineral lubricant, manufactured and sold by this concern. We often ask, "What is there in a name?" In this case we can safely say the name is significant, teaching by its wordy composition that this mineral compound is almost endless in the expectant service which it offers; all oils, and even water itself can be and are consumed; but the public are guaranteed that every element of "Anti-Friction" is positively indestructible by any degree of heat to which it can be exposed.

Office of St. Louis Cable & Western Railway Co.
ST. LOUIS, MO., Jan. 9th, 1889.

John Walker, Esq, Cleveland, O.

DEAR SIR: I desire to say that after six months' use of the machinery plant designed and built by your company for this road, we find it to meet our highest expectations. The driving machinery has run continuously and perfectly satisfactory during that time. Your differential drums have answered the purpose so well that we are able to run with two wraps instead of four or five, as formerly. In both design and construction the use of the plant has demonstrated its entire suitability to our needs.

Yours truly,
(Signed) DWIGHT TREDWAY, Pres.

Rooms 31 and 32 Milwaukee Buildings,
6th and Delaware Sts.
KANSAS CITY, MO., April 2, 1888.

John Walker, Esq., St. Louis, Mo.

DEAR SIR: Your esteemed favor of 17th with blue print of drum received. The more I think of your drum the better I like it, and think it will settle all the difficulties that have heretofore occurred in driving cables.

Yours very truly,
(Signed) CLIFT WISE.

Personal.

Mr. Dutton, of the firm of Dorner & Dutton, Cleveland, Ohio, is on a trip through Michigan

Mr. Charles T. Yerkes has gone to Europe.

Mr. H. H. Littell, of Louisville, recently favored the GAZETTE office with a call.

Mr. Rufus Martin, of the firm of Martin & Breckenridge, of New York City, sails for Europe on the 23d inst., for a two months trip in England in the interest of the J. G. Brill Co.'s equalizing gear. (BON VOYAGE)

Mr. Charles M. Hewitt, of the St. Charles Car company, recently returned from Europe, favored us with a call during the past week.

OFFICE OF THE CITIZENS' RAILWAY CO.,
BALTIMORE, June 15, 1889

The President and Directors of this Company HAVE DECLARED A DIVIDEND OF 8 PER CENT, payable on and after MONDAY, July 15, 1889, at the THIRD NATIONAL BANK. Transfer Books closed from July 8 to 15, 1889.

JOS. A. BOLGIANO, Secretary.

SEALED PROPOSALS WILL BE RECEIVED UP TO AND including

JULY 28, 1889.

At the office of Barrett & Earoshaw, Lancaster, Ohio, for the construction of eight thousand eight hundred and sixty seven (8867) feet of street railroad in the city of Lancaster, Ohio.

Bids will be received to construct the entire line ready for the rolling stock, or for furnishing and laying the iron, furnishing ties and stringers, and for grading separately.

Profile and specifications furnished on application to
FRANK BARRETT,
Secretary and General Manager,
Lancaster, Ohio

NOTICE.—ST. LOUIS, MO., JUNE 17, 1889.—A meeting of the stockholders of the Mound City Street Railway Company will be held at the office of said company, at the southwest corner of Gravois and Jefferson avenues, in the City of St. Louis, State of Missouri, on the 20th day of August, 1889, for the purpose of considering and acting upon a proposition to authorize the issue by said company of its 10-30 years 6 per cent bonds for the aggregate sum of $1,000,000, the payment of the principal and interest on said bonds to be secured upon the property and franchises of the company, the said bonds to be used for the purpose of altering the railroad of the company and changing the motive power thereof, and for such other purposes as said meeting may determine; and also to consider and act upon any other matter which may properly be brought before said meeting. Said meeting will be convened at 9 o'clock a. m. on said 20th day of August, 1889.
JOHN SCULLIN
President.

CLEMENT M. SEAMAN, Secretary.

NOTICE.—ST. LOUIS, MO., JUNE 5, 1889.—A meeting of the stockholders of the Mound City Street Railway Company will be held at the office of said company, at the southwest corner of Gravois and Jefferson avenues, in the city of St. Louis, State of Missouri, on the 8th day of August, 1889, for the purpose of considering and acting upon a proposition to increase the capital stock of said company from $125,000, the present authorized amount thereof, to the sum of $1,000,000, and to consider and act upon any other matter which may be properly brought before said meeting.

Said meeting will be convened at 9 o'clock a. m. on said 8th day of August, 1889.

JOHN SCULLIN,
President.
JOHN SCULLIN,
FRANK CARTER,
CLEMENT M. SEAMAN,
JAMES SCULLIN,
JAMES H. ROACH,
Directors.

CLEMENT M. SEAMAN, Secretary.

NOTICE.
SALE OF STREET RAILROAD FRANCHISE.

NOTICE is hereby given that on the 29th day of July, 1889, at eleven o'clock in the forenoon, in the westerly vestibule of the City and County Hall, the right, privilege, and franchise of using Clinton St. from Emslie Street easterly to Bailey Avenue for the purpose of constructing, operating, and maintaining a street railroad therein, will be sold at public auction by the undersigned Comptroller of the city of Buffalo, to the incorporated railroad or railway company organized to construct, maintain and operate a street railroad in the City of Buffalo, which shall be the bidder who shall agree to give for such right, privilege, or franchise the largest percentage per annum of its gross receipts; with security for the fulfilment of such agreement, and for the commencement of said road within one year and for the completion thereof within three years from the date of said sale, according to law and the conditions hereunto annexed, the security to be given by the purchaser at said sale as aforesaid to be a bond or undertaking to the City of Buffalo in writing and under seal in such form, condition, amount, and sureties as shall be required and approved by the said Comptroller. The purchaser at such sale of said grant, right, or privilege, shall take the same only upon and subject to the following further conditions, viz.:

I. That the purchaser shall construct such road with the rail known as the "girder" rail which shall be similar to that used in Niagara Street from Main Street, northerly.

II. That the purchaser shall transport or cause to be transported, all passengers between Bailey Avenue and Main Street and vice-versa for a five cent fare.

III. That the purchaser shall construct a double track from Emslie Street easterly to Fillmore Avenue, and from Fillmore Avenue to Bailey Avenue a single or double track, as it may elect, and if of single track, then with the necessary "turn-outs."

JOSEPH E. BARNARD,
Comptroller of the City of Buffalo.

The Street Railway Gazette.

VOL. IV. AUGUST, 1889. No. 8

ELECTRIC RAILWAYS.

Stockholders Meeting—West End Street Railway Co., Boston.

A meeting of the stockholders of the West End Street Railway company was held in Boston, July 25, for the following purpose:

1. Whether or not the stockholders will authorize the directors to petition the board of railroad commissioners for leave to increase the capital stock of the company beyond its present authorized capital, by the amount of four million five hundred thousand dollars ($4,500,000) by the issue of 90,000 shares of common stock.

2. Whether or not the stockholders will amend the by-laws as to proxy voting, so that they shall not be inconsistent with the statutes of the commonwealth passed during the last session of the legislature.

3. Also for the transaction of other business which may properly come before the meeting.

President Whitney called to order at 11 o'clock. In the absence of Vice-President Cummings, the treasurer, J. H. Goodspeed, acted as secretary. About seventy gentlemen were present. President Whitney stated the reason for the calling of the meeting, and set forth the needs of the increase in stock asked for. He stated the great increase in the Brighton and Arlington electric lines, and said he believed the increase in the earnings with the electric railway over the entire city would be 30 or 40 per cent. Of the 230 miles of track now in use over 30 miles have been laid with new track. Of the remainder there are several miles which will not have to be touched at all, as the speed attained by the motors will be so slow that the tracks now laid will answer the purpose. It cost, the first nine months of this fiscal year, $194,202 for repairs. Over $400,000 has been spent on the cars which stand on the books at $763,000. Since last year 225 new cars have been purchased. It will cost $100 per car to fit each one for the electric railway, and nothing is lost in changing from horse to electric. They are perfectly adapted to the business. It has been necessary to buy new horses every year. Last year 1,350 were purchased at a cost of $204,908. There are now 7,135 horses which stand on the books at $950,000.90. There will be no loss on horses. There is not a foot of real estate which the road owns that it can dispense with. The average cost of running horse cars is 10.16 cents per mile. The cost of running the Allston electric line, with all its disadvantages, has been three cents per mile. For the fuel alone it has been 1½ cents per mile. The directors believe that the cost of running the entire electric line will be but 2½ cents per mile, while the engineers think it will be less. This all means that with the electric system the public will be given the accommodations it needs and desires, and for this the increase in stock is asked for.

President Whitney's address was as follows:

Before the stockholders take action in reference to the matters that are proper to come before the board as business matters, I desire to say a few words explanatory of the reasons why the board of directors come at this time and hour to the stockholders to ask for so large an increase of stock. I think at the last meeting of the stockholders in November we reported that we were then in the midst of putting in some electric roads, which we believed would solve the problem, so far as it was possible to solve it, of rapid transit and better accommodations for the large community that we serve. I am happy to say that, since that time, those roads have been put into operation, and they have not only met the highest expectations of the company, but they have more than fulfilled the hopes of the community. For full testimony on that fact I refer to every single unprejudiced citizen of Cambridge, who is familiar with the operations of the electric road there, and to every single, unprejudiced citizen of Brookline and Brighton district who has had occasion to use the cars and witness the operation of the road in that section.

So far as I am aware, the sentiment throughout the city of Cambridge and throughout the section where this electric road goes, is entirely unanimous; and every community, so far as I am aware, that is reached by this road, is extremely anxious that it should be extended within their limits. On the 6th day of July last the road from Harvard square to Arlington was opened for travel by the electric cars The time from Arlington to Harvard square, which was certainly the quickest time that has been made from time immemorial before, or which it has ever been possible to make, was 35 minutes. The schedule time to-day is 20 minutes. We make, on that avenue, only occasional stops, and I have heard but one expression of opinion in regard to that whole system, and that is of the heartiest approval of the whole thing. So that the company now comes before these stockholders and the community in this position, that it and the community are satisfied that this electric system is the system that will accommodate the people; and it is furthermore, a system that is so much cheaper in its operations that it is advisable, by all means, for the company to put it in at the earliest possible day. It is extremely fortunate that the interests of the community and the interests of the road run in parallel lines on this question.

And the company, considering how these communities are interlocked, how these cars go from one end of the city to the other, from Somerville and Charlestown to Franklin Park, and from the Marine park of South Boston to Harvard square and Arlington in Cambridge, finds it utterly impossible to take up the question piecemeal. It is compelled, from its very situation, from its position, absolutely compelled to take it up wholesale. The full benefit of the system cannot be felt until the cars are taken off from one through route. And if the company proposes to stop its cars upon any particular line, if it should propose to stop its cars that now run from Harvard square to South Boston at Park square and go no farther, that will seriously inconvenience the people that are now traveling over that line, and create a clamor which it would be extremely unpleasant for the company to meet. Therefore I say that while the company might prefer, in some respects, to change it line by line, yet, surveying the whole field, it is absolutely impossible to do so. Therefore, in making a change from horses to electricity we must necessarily include the whole system.

I think I stated to the stockholders, at the last meeting in this hall, that the only two essential principles involved in the successful operation of electricity were, in my judgment, the power of carrying, the ability to carry the power for a certain number of cars over the wire, and the subject of traction. These two things were demonstrated long before the West End undertook this problem. I am happy to say that the mechanical details of the motor for the transmission of this power have been, since that time, so far perfected that responsible companies have come forward and offered us such guarantees as to the reliability and durability of these machines that they have eliminated all of the unknown quantities, so far as the company is concerned.

Now, then, take for instance the matter of power. Many of you, if not all of you, are aware that the company has recently made a purchase of the property of the Hinckley locomotive works for its power station. Now the real electrical centre of this whole city, inside of Charles river, is at the corner of Pleasant street and Shawmut avenue. We are even now very near the electrical centre from that point. As the travel increases to the southward and westward, or in the Highland district, the electrical centre will move north until in a very short time it will be almost on a line with this property. We studied the problem very closely and there is not a place in this city so well adapted for the purpose of running this whole electrical system as the very spot we have secured. And it is possible, from this spot, simply by adding engines and boilers and dynamos and a simple duplication of the parts, to run every car inside of Charles river, including South Boston, from now on, for the next 10, 15 and I do not know but 25 years to come. If the company should feel that it was safe to place its entire plant upon that property and depend upon its feeding lines to operate the cars, all over that point, there is property located, as well as any property in this city could be located for the operation of all these cars inside the Charles river from now on for the next quarter of a century.

So that, in making this departure, we are making a departure which, so far as that particular property is concerned, ends the matter for years to come. It is a question which every one of you gentlemen, stockholders of this company, will realize the force of. And if we should hereafter come to you and ask for further capital for the location of another power house in some other station, you will understand the reason why, and that is this: Doing so large a business as we do, serving so large a community as we do, whether it is safe and proper for us to depend altogether upon the location of the power house in one district. We believe that, for the present, it is sufficient. We believe that we can so put these buildings and this property as to make it almost absolutely fireproof, and that the question of another station in some other quarter of the city may be postponed, perhaps, for a long time. So much for that; and I speak of that so that you may understand how important and significant this great departure is. Here from one station we can operate all the cars inside Charles river. We could, indeed, go outside Charles river. But the crossing of a current of electricity beyond water, I am told, is involved in some danger, and therefore it is the part of wisdom to have a power station upon the other side of the Charles river, perhaps; another power station there.

The operation of these cars will involve at no distant day the furnishing of 10,000-horse power for the operation of the cars. Every one familiar with mechanics will know that the cost of putting in horse power in a large plant is about $100 per horse power, and every man can estimate for himself about what it shall be in that proportion. I do not suppose we shall need all this sum at once. But we propose laying out these works and entering upon this whole business upon a comprehensive plan. And, for the purposes the stock is issued for, we have a right, as fast as it is necessary, to make these expenditures.

Then, as to the motors: A good motor, a good double motor such as we are using, will cost about $3,000, and a single motor about $2,000. And it depends entirely upon the number of cars we equip, as to the number of motors that we shall want. We are to-day running between 700 and 800 cars. And, if the experience of our travel since the use of the electrical cars was introduced is any criterion, we shall not only want that, but an immense number more almost immediately. There, you can see, is another million and a half or two million dollars. Then the wiring and the poles and all that sort of thing will cost from $5,000 to $6,000 a month. There is another million dollars. Then there is the new construction, the new equipments, new track, which will involve perhaps, another million. And that is the four millions and a half which we must issue to make this change.

Now, I doubt if many of the stockholders realize what is and must be the situation of the company in reference to its increase of stock, whether or not the change be made from horse to the electric system. The present investment of

the company, made up of road, real estate, cars, horses and general equipments is $11,619,172. Now, the increase in our business, the s eady regular increase in our business, is nearly 10 per cent. Now, unless we own too many cars and too many horses, unless we are giving the community too great accommodations, unless we ought to crowd them more into cars, more than is done at present, unless we are extravagant in our real estate and all these matters, there is no other conclusion to be arrived at than this, that, for every increase of 10 per cent. in its invested capital, I mean in the number of passengers carried, there must be a like proportionate increase in its investment. If the transporta ion service is increased 10 per cent., you must increase the number of horses and cars and real estate and general equipment in that proportion. And that is the history of all these railroads from the time they were started until to-day. And whether you change from electricity to horses, or whatever you do, if the increase in transportation service is 10 per cent. a year, you must face an increase in your capital of a like amount, and almost precisely for the same purposes. Now, the West End Railway company to-day does not own a single car in excess of its needs. It does not own a single horse in excess of its needs. It does not own a single foot of rea estate in excess of its needs. It does not own a single foot of track that, is not worth every cent of what stands on the books. And for the needs of the increasing number of passengers there must be a corresponding increase in the amount of real estate and all these other things.

Well, now, gentlemen, so much for the regular increase in horses. But what are the facts when we come to the increase on the electric roads? Take, for instance, the Arlington line. It has now been in operation 17 days. For a like number of days last year the receipts were $2721.08. The receipts this year were $6273.24. There is absolutely 150 per cent. increase for every single day of running. It is shown that that line has been increasing at the rate of 150 per cent. in its travel. Now, I am fully willing to concede that a large part of this travel is pleasure travel. But the electric cars are no new thing in Cambridge. They have been running from the 16th day of February until to-day. And, so far as the electric cars are a novelty, that passed away weeks and months ago. But the regular, steady travel on the electric line has increased, absolutely more than double, 150 per cent. since its opening. How long that will continue I do not know. But now look at the Brighton line and see how travel has increased there. The total receipts for the Brighton line for the month of June of last year is $4426 43. The total receipts for June this year were $8759.80. There is double the number of people that you have got to meet.

Well, now, then, the question that the directors have to meet at this juncture is this: Here is a regular steady increase of travel over those lines, even by horse power, of 10 per cent. The directors have no knowledge whatsoever as to how large its increase of travel will be with electric cars. But they have seen enough to know that it will be very largely in excess of anything that the experience of these companies has ever known before. Whether it shall be 15, 20, 25 or 100 per cent., I do not know. But I do believe that the company will be absolutely at fault if they should rely upon anything less than 30 or 40. I have here the figures of our gross earnings: From Jan. 1, 1889, to June 30, 1889, of this year they were $2,515,136. For the same period last year, $2,309,367, an increase of $205,-769 15. I would willingly have made a comparison for the whole year, excepting that 1888 was a broken year. The routes were not consolidated until about the middle of December, and therefore I have taken the comparison as far back as I could get any comparison. But it is almost the uniform rule that there is a constant increase of 9 or 10 per cent. Now, then, I think it may be interesting to very many of you stockholders to know how large a loss, as it has been suggested might be the case, is involved in this transfer from horses to electricity.

Now, the road: The road stands on our books charged at $4,391,940 for 230 odd miles of road. Now, there are about 30 miles of road of that that are already equipped with new track; there was, at the date of the last report, including the Brookline line. About 30 miles in the city proper will also need no change. That is, the rate of speed will necessarily be so low in the crowded part of the city, ordinarily, that it is almost a matter of indifference what kind of a rail we have, and therefore the present rail will answer the purpose largely, if not entirely, for many years to come. There are outside, long districts, where we run the tracks quite a number of miles, that will not require any change except the change that we make in our ordinary yearly expenditures for that purpose. And there are perhaps 50 or 75 miles where it would be to the great advantage of the company to change its rails, for the reason that with the other we cannot get rapid transit. Well, now, no person who has not been over the electric cars from Cambridge to Arlington can fully realize what that means. When I spoke about it a few minutes ago, I intended to follow out the illustration somewhat further, when I stated that the time from Arlington to Harvard square was 20 minutes. It consists of four miles, and the average rate of speed for that four miles is 12 miles per hour. Now, the average rate of speed that the elevated roads in New York make, having fewer stops per hour, is only 10.89 miles per hour. And the electric cars are making to-day in the city of Cambridge, from Harvard square to Arlington, a rate of speed which is absolutely one-eighth more than any elevated road is making as it passes from one end of New York to the other. And that has entirely changed the sentiment of the people of Cambridge, or at least of the people of that section of Cambridge who have heretofore been so strongly in favor of an elevated road. Now, we believe that when the horse cars are all taken off from that line, from Harvard square to Boston, the time can be very largely reduced between those two points, for the community are perfectly willing to stop only occasionally, and doing that, with the motors that we should use, we should expect to make 15 miles an hour hauling one car. We can certainly reduce the time very materially, and utterly and entirely dispose, in my judgment, for now and for all time to come, or at least for a very great length of time, of any question of an elevated road from the wide part where we commence, where the streets become wide, to all of the suburban districts.

Now, you may not be aware exactly how much the corporation charges every year to its repairs and renewals. But we have charged this year for repairs and renewals for the first nine months $194,202. That represents, if we were to put in an entirely new track, that represents an entirely new system of tracks of about 20 miles, with the material that we have on hand. We are obliged to charge operating expenses every year—$20,000 a month for repairs and renewals. Of course that involves a great deal of new track, but it all comes in there. In the pursuit of the same policy as that, the company charging to its operating expenses even a large sum like that can make all all these changes with comparatively little expense.

Now, then, this about cars: We have 776 cars, which stand on our books at $763,000, or a little less than $1.000 a car. We have spent these last two years between $400,-000 and $500,000 upon these cars, and every single one of these cars is as good as new.

We cannot go to Jones or any other builder and buy the same number of new cars for the same money. And what does it cost to turn them into electric cars? Why. not $100 apiece; not $100 apiece to turn them into electric cars, even if we used those cars. But what does the company do? Why, it finds itself, as I said, every year compelled to buy more cars. And what have we had to do last year? Why, we have bought last year—I mean this year, since the date of our last report—154 new box cars and 74 open cars up to this time. We have had to buy 225 new cars to supply the demands of this business with horses within the last nine months. Well, now, supposing we bought those new cars, made for electric cars. There is no difference at all in them. The sills are a little heavier, the roof might be a little heavier, but the change is comparatively immaterial. And it is, therefore, of little consequence whether we use our old cars for this purpose or buy new ones. So there is not a single dollar lost on the car equipment whether you change from horses to electricity or not; not a single dollar. And so large is the increase in business that, if we needed an electric car to every single motor we have, so large is the increase in business, we should need every single car we have for a tow car. But we do not. These cars that we have are perfectly adapted to the business in every respect, except in some indifferent matters, such as brakes and sills and some strengthening of the roof. As it is a matter of entire indifference to the company whether these cars are used or not as tow cars, and we turn around and contract at an expense of $100 and $150 a car for a new car for that purpose. So there is not a dollar lost in the car equipment in the change f.om horses to electricity.

Now, how is it with the horses? It has been the custom of the company, it has been a necessity in operating the line by horses, that every year there should be a large re newal. During the months of October, November and December of last year we purchased 1,350 horses at a cost of $204,908. And we sold, in the spring, 1,035 horses and lost 168 horses by death. Well, now, it is the custom of the company to charge every single month to repairs, to depreciation on horses and renewals, $12 000 a month. We charge, in round numbers, $150,000 a year to depreciation in horses. We have now in operation on the cars 7,135 horses, which is the full number of horses that are used in operating the cars. These stand on our books at $936,030 We need these horses for the winter's service. We shall be saving by putting this electric system in Franklin Park and other places; we shall be saved an expenditure of $250,000, which we absolutely should need were it not that we have electricity coming to supply the place. We should need to spend $250,000 for horses, and then we should go next year and sell 1,350 more, and charge this to operating expenses. Well, now, we have proposed to do exactly that thing now. We have 7,135 horses that stand on our books at what they are worth to-day. We shall use them through the winter, and in the spring we shall sell, perhaps, 1,300 or 1,400 or 1,500 horses, and then we shall be reduced down to 500 horses, and we shall have a class of horses then, every one of which will bring what it stands on our books at, whether the road needs them or whether they go at private sale. But it is utterly impossible for the road to make this change in haste. But it can make a change from horses to electricity so gradually that the depreciation on horses will only be felt in its accustomed way of charges, as we now charge it, from one month to the other. So that there is no loss on horses. Of course, if our business were to stop; if we were to change in an instant from horses to electricity, if it were possible to do the whole thing at once, of course there would be a large depreciation on horses. But that is not so. We cannot make such a change. These horses we must keep. And that will furnish us the money necessary to pay this d. preciation, to pay your dividends on your stock with the capital that has been used by them, until electricity comes in to supply its place.

Now, so far as the real estate is concerned, as I said before, there is not a foot of real estate that the company owns that it can dispense with. So far from losing a foot of real estate, we need more and more, all over the road, for the housing of the cars that will be necessary on account of the increase in the business. Our real estate is well located and is worth to-day more than it stands at upon the books of the company. And it could not be replaced for a largely increased capital.

Now, then, a word as to the cost of operating, for that is a question that largely concerns the stockholders; and especially with reference to the increase of stock. The average cost of motive power by the horses for the last six months is 10.16 cents a mile. That does not include anything that is not properly chargeable to the use of horse power. It does not include even all the insurance on the stables. And as careful a revision as it was possible to make has been made of the average cost of running by horse power, and it is found to be, as I said, 10.16 cents a mile.

That, the gentlemen, will understand, does not include the expense of drivers, conductors, starters, repairers of track and all these various things. These are all eliminated. That is directly chargeable to the cost of running the road by horses; that is the cost of horse motive power. Well, now, from our experience in the actual operations of our electric road from Allston, with all the disadvantages that we have had there, of pouring the power into a conduit and absolutely losing it, with all the disadvantages of the operation of the electric line from Allston, the cost of fuel required is only a cent and a half. Now the directors believe that the cost of furnishing power, including engineering, and I will say including engineers, and all other expenses, has been a trifle over three cents a mile. The reason that the cost of the engineers and so on is in so large a proportion is due to the fact that the mileage is so small; that over that line now, even, but two or three cars are operated; few cars are operated, and the expense during that time is chargeable to that. And it includes running the cars and conduit and everything from the time we started until this time. So that the directors believe that the cost of power, of operating, including engineers and every expense at the power house, will not exceed two and a half cents a mile. And it is believed by the engineers that the expense will be very much less than that.

Well, now comes the taking care of the motors. The company do not estimate the cost of taking care of the motors and of the other expenses of the overhead line as exceeding two and a half cents a mile more. There is a clear saving of five cents a mile. Then there is still a further saving made in the operation of the road by the increase of speed which we can make, which anybody can figure for himself.

We have not had experience enough to tell exactly what it may be, but that it is an important factor in determining the cost of transporting these people is absolutely certain.

What does this all mean? It all means this, that, with this electric system put in, we are in a position to give the community what it needs in the way of rapid transit. We are in the position to give it what it needs in the way of greater accommodations, more and more frequent cars. And all those things take money. If we were to stop and stand still we should not require a single cent, but it would be an exceedingly unfortunate position for the company or the community. But if we are to go forward and fulfill the expectations of this community and justify the trust that has been placed in us in reference to the transportation of passengers, a trust that concerns all these three or four hundred thousand people that crowd our cars daily, we must be placed in a position to get the money to do this work with. I hope I have not detained the stockholders too long. But I am very glad of the opportunity to say what I have.

On motion of Mr. Hyde it was voted that the by laws be amended and changed by striking out the following words in Article IV.: "And no person shall as proxy or attorney cast more than 50 votes, unless all the shares so represented by him are owned by one person."

The following motion was then made by Mr. Hyde:

That the directors be and they are hereby authorized to petition the board of railroad commissioners for leave to increase the capital stock of the company beyond its present authorized capital stock by the amount of $1,500,000, divided into 90,000 shares of common stock, such increase being proposed to enable the company to pay for construction and increase of property, and in particular for expenses incurred and hereafter necessary to be incurred in introducing and perfecting the electric system of motive power in the operation of the cars of the company, such new shares to be issued from time to time by the directors, as provided by law.

President Whitney appointed G. T. Braman, W. A. Sargent and T. H. Viaux tellers. The result of the vote showed 55,855 shares cast in favor of the motion, which was declared passed. The meeting then adjourned

Since the July issue of the GAZETTE, the Sprague Company has closed contracts with the following named railways:

	No. Cars.	Operating over
The Omaha & Council Bluffs Ry., Omaha, Neb., for.	2	4 miles of road
The Main St. & Lichy Ave. Ry, Nashville, Tenn., for	4	2 " "
The West Dailas St. Ry., Dallas, Tex., for	2	3 " "
The Detroit, Rouge River & Dearborn Ry., Detroit, for	1	1 " "
The East Cleveland St. Ry. (increase) for	32	
The Squirrel Hill Ry., Pittsburg, Pa., for	5	3½ " "
The Broadway & Newburgh Ry., Cleveland, O., for	16	10 " "
The South Side Extension, Akron, O., for	10	6 " "

The Pullman Co. is building for the Metropolitan Street Railway Co., of Portland, Oregon, a couple of vestibuled car bodies, to be operated by electricity, for delivery next month.

It is also in receipt of orders for electric cars, from the Seattle Electric Railway Co., and the Tacoma Electric Railway Co., in addition to the equipment already ordered.

Plymouth and Kingston Street Railway.

The electric railway built by the Thomson-Houston Electric Co., for the Plymouth and Kingston Street Railway Co., has been in operation since June 8th without interruption. The track is 4½ miles in length, is built of steel T rail and extends from Jabez Corner about a mile and a half below the center of Plymouth, and through Sandwich, Market, Leyden, Main and Court streets in Plymouth, and through what is known as Spirit Pasture into Lower Kingston. The road is composed of a number of sharp curves and grades, the most difficult being Spring Hill on Market Street. The track makes a sharp curve from Sandwich Street, and strikes at once a grade of 10%, which the cars have to ascend, and upon reaching the top of the hill makes a double curve in Main through Leyden Street. It will be seen from the above that a severe strain is put upon the motors, and that the motor car with a tow car attached, loaded with 125 passengers, will climb this hill with apparent ease speaks the highest praise of the Thomson-Houston apparatus. The motor cars, three in number, are each equipped with two 15 h. p. Thomson - Houston motors, and receive power for operating from the Plymouth Electric Light Co., which operates an 80 h. p. Thomson-Houston generator. The single trolley overhead construction has been used throughout the length of the line. Almost the entire route overlooks the beautiful Plymouth Harbor, which makes it a very pleasant ride, and the fact that the railway company has to run two trains each way, consisting of a motor car and one tow car attached, and that over 2,000 passengers are carried a day, proves the popularity that the railway has gained with the citizens of the two towns.

[We much regret that a cut descriptive of this new railway has failed to reach this office in time for this issue.—EDITOR.]

Opening of Marlborough Electric Railway.

The Marlborough Electric Railway is equipped with the improved Sprague Electric Railway Motors, and has already carried a very large number of passengers.

On the trial trip there were a number of street railway and electrical men from different parts of New England, including Hon. S. C. Darling, Mr. Noyes, ex president of the South Boston Ry. Surface Co. James S. Murphy, Edward Blake, and representatives from the select men from Marlboro, and others.

On the first day of its operation the cars on this line carried 1400 people, on the second day nearly two thousand, and on the third day a still greater number, making more than a quarter of the entire population of the town during the three days operation. At present half of these cars tow trail cars, in order to increase their capacity, and the cars are so crowded that the management of the Marlborough company has ordered an additional number of ordinary open cars, so that all the motor cars can haul an additional car behind them. At present the road is unable to accommodate all the passengers which desire to travel upon this railway, and the success of the installation is unqualified.

It is said that the management of the road is already meditating an increase of its equipment.

Sprague Electric Railway at Atlantic City.

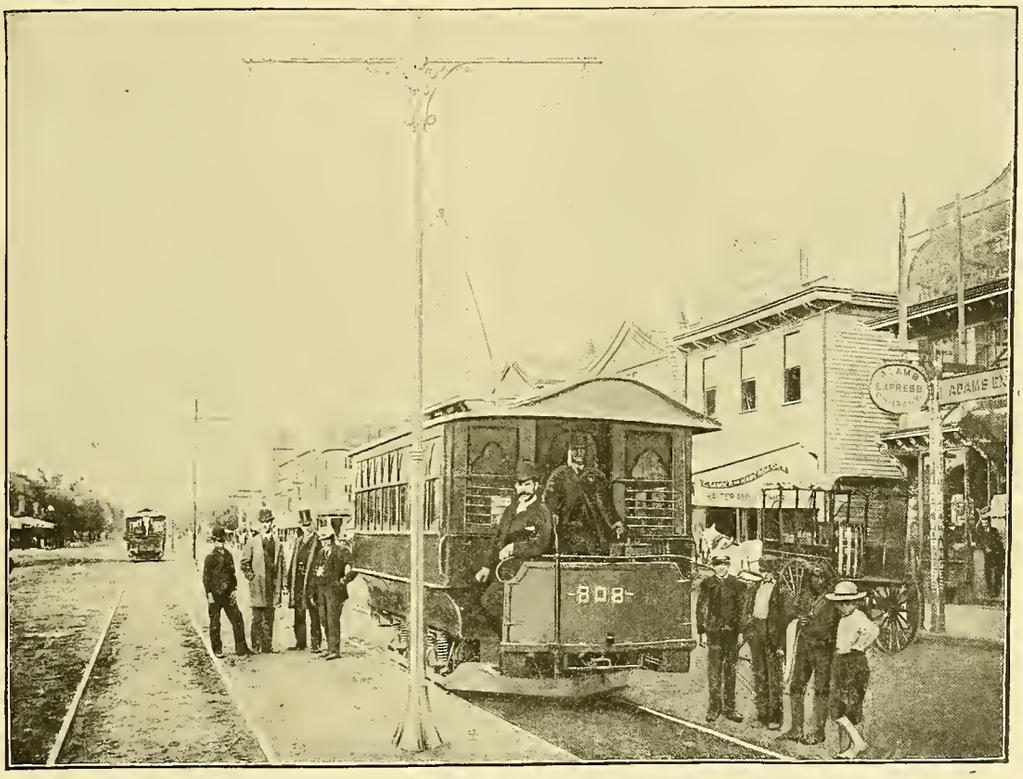
We give in this issue another view of the Sprague Electric Railway at Atlantic City, of which we published an illustration in a previous issue. This view shows more clearly the arrangement of the overhead system, and method of carrying the trolley wire on the double bracket and pole, placed midway between the tracks.

The road is about 6½ miles in length, and at present there are six electric cars in operation, though an additional equipment of ten cars has already been ordered. Each of these motor cars trails another car, so that there will shortly be 32 cars in operation upon this road. These cars are often over-crowded with passengers, but nevertheless the cars have not missed a single trip since the road was put in operation.

The cars are very crowded now with passengers, and that the electric railway is growing in popularity every day, on account of the speed which the cars attain and the reliability of the service which they give.

The cars now in operation at this place make eighteen complete trips daily over the entire road, or nearly 120 miles per day per car. This, considering the fact that each car draws a tow car, and that both motor car and tow car are often over-crowded as only excursion cars can be, is a wonderful record, and we doubt if it has ever been surpassed under similar circumstances.

The cars at this place are in constant service, the operating company keeping none in reserve, so great is their confidence in the reliability of the apparatus.



SPRAGUE RAILWAY AT ATLANTIC CITY.

During the month of May, 1889, the East Cleveland Street Railway company had 17 cars on duty, which covered the aggregate distance of 45,640 miles, making the average car mileage per day, 93.72 miles. During the month

2	runs of	193	miles	per	day	were made.
2	"	190	"	"	"	"
1	"	170	"	"	"	"
1	"	165	"	"	"	"
3	"	159	"	"	"	"
4	"	153	"	"	"	"
6	"	148	"	"	"	"
9	"	142	"	"	"	"
31	"	136	"	"	"	"
23	"	131	"	"	"	"
22	"	135	"	"	"	"
1	"	121	"	"	"	"
23	"	119	"	"	"	"
27	"	114	"	"	"	"
37	"	108	"	"	"	"
34	"	102	"	"	"	"

Electricity in Seattle, W. T.

The following letter is self-explanatory :

SEATTLE, Wash., July 27, 1889.

GENTLEMEN—It may be of interest to some of your readers and others interested in electric railways, or proposed roads, to hear from the Seattle Electric Ry., which has been in operation since April 7th, 1889, under the Thomson-Houston system of electric motors. Negotiations pending the conversion of the old horse railway into an electric railway were begun as early as March, 1888, when electric roads were but an experiment. The company, after having decided to adopt the electric motors, did not get in operation until the date above mentioned. The road has run continuously for 121 days. The engine belt has traveled 85,185 miles. Each car has traveled 9,680 miles. The bearings on the generator do not show any noticeable wear. The armature shafts on the motors do not show any appreciable wear, so perfect is their construction and oil bearings.

We have carried during this period 350,778 persons, an estimated average of two and one-half miles each. Allowing sixty people to a coach, and eighty feet as the length of the ordinary passenger coach, would make a train 88 miles long. We have transported this enormous load a distance of two and a half miles, at a wear to apparatus hardly apparent, and at a cost for fuel, oil and incidentals, except wages and fixed charges, not to exceed $2,000.

We claim for our road that it has carried more passengers, according to equipment (four cars), in the period of thirty days, than any other street railway in the U.S., carrying 104,060 passengers in 29 days, losing one day in the fire of June 6th.

These are figures in favor of electric roads, and in favor of the successful operation of the Thomson - Houston system of electric roads, which can be corroborated on inspection at any time.

We would be pleased to invite comparisons from practical railway people.

Yours truly,
L. H. GRIFFITH, Manager.

We understand that the street railroad which has been in operation upon the Sprague system in Akron, O., for about six months, has lately ordered 20 additional motors. This road when put in operation, was equipped with the old style of Sprague motor, such as are in use in Richmond and a few of the roads which were first installed upon the Sprague system. These motors have worked so successfully, that the Akron Co. has decided to retain their use and equip additional cars with those of the same style and design.

The Broadway & Newburgh St. Ry. company, of Cleveland, O., has contracted with Mr. J. B. Allan, Chicago manager for E. P. Allis & Co., Reliance Works, Milwaukee, for two 20″x42″ Reynolds' Corliss engines, capable of producing in the neighborhood of 200-horse power apiece.

An order for two 1,000 h. p. triple expansion engines for operating the Thomson-Houston electric system in Boston, has been placed with E. P. Allis & Co., Reliance Works, Milwaukee, Wis., by the West End Street Railway company.

Correspondence.

From Ft. Worth, Texas.

Street Railway Gazette, Chicago:

Gentlemen—The third day of this month marked an epoch in the history of our enterprising and progressive city, for the first electric street car in Fort Worth, in fact, in Texas, made regular trips from North Fort Worth to the Union depot, and everything worked smoothly. Several trial trips had been made previously, but yesterday was the first day regular trips were made. Fort Worth has now passed through the various stages of street car progress, until she has to day the perfection of rapid transportation in this line—electrie motor street cars. Like other modern innovations, the street railway system, in its inception, encountered a large amount of popular prejudice. Turnpikes were fiercely denounced, their opponents being the muleteers. Railroads were pronounced to be a nuisance, and their incorporators visionary speculators, the opposition arising from prejudice and vested interests in stage lines and turnpike roads. So, too, with the introduction of gas and electric lighting, their opposers exhibiting in each case the grossest ignorance of science and of the practical effect of the proposed improvement.

Fort Worth obtained her first street car line late in 1876. after the Texas & Pacific had built to this city, and had its depot, a small 24 x 40 frame house, at the foot of Main street, just across from where the magnificent building of Joseph H. Brown now stands. At that time, what there was of Fort Worth was between Third street and the public square. The principal hotel was on the bluff, and was called the Transcontinental. From the depot to the court house was three-quarters of a mile, and in order to bring the passengers to town the narrow tramway on Main street was laid. The equipment was two one mule bob tail cars. In 1881 the union depot was built in its present location, and then the line was extended to reach it. In 1885 the Rosedale, the Queen City and the Lake Park street railways were chartered. The Lake Park was sold out to the Fort Worth street railway company. The Rosedale and the Queen City were built, the latter becoming a part of the Rosedale system. The Fort Worth company later extended its line, or, rather, built what is now known as the Belt line. Only a few months ago the Fort Worth street railway system was leased by the North Side street railway company—Messrs. Huffman, Byers, Peter Smith, and Templeton. A Boston syndicate, with a charter for the West Side street railway company, purchased the Rosedale and its systems. This latter company is represented here by E. E. Chase, T. J. Hurley and George L. Hurley. Both companies have made several extensions, until, to-day, Fort Worth has thirty two miles of street railway, and in a few months all this mileage will be operated by electricity.

Early in 1889 a contract was let by the North Side company for the equipment of its line with electric motors, and a few days later the West Side company let a contract to the same company (Nat. Elec. Trac. Co. of Detroit) for a similar equipment.

The system is the overhead, and some $150,000 has been expended in putting in and fitting up the two lines, which does not include the cost of twenty-one new cars purchased by the two companies.

It is proposed to run the electric cars in the crowded part of the city at a speed of not over four miles an hour, but when the suburbs are reached this will be increased to eight miles an hour. In a few months the remotest suburb will be only half an hour away from the court house or Union depot

Without a doubt all the cars will be equipped with electric motors, and in a few weeks the street car mule will have disappeared from Fort Worth forever. B. C.

The Storage Battery.

At the recent meeting of the National Electric Light Association, which was held at Niagara Falls, the following paper from Mr. William Bracken, of the Julien company, regarding Storage Batteries was read by Mr. S. M. Young:

Development and Progress of the Storage Battery.

by william bracken.

It has been customary for speakers on storage batteries, to begin their discourses by apologizing for their subject. That day has gone by. The storage battery has no longer any apologies to make. My purpose at first was to give a detailed account of the progress of storage battery traction, by going back to 1881, when the first storage battery car was run, and following up the history of improvements from that time to the present. But I have found it impossible to get full and reliable data as to the work accomplished in Paris, in England, or in this country. I wrote to most all the companies and individuals who have been engaged or are now engaged in storage battery traction, to send me full accounts of their experiments and work; but I regret to say that only one responded to my request, and that was A. H. Bauer, who gave me a very interesting account of his experiments with his storage battery car in Baltimore, in 1885–86. The published accounts of the operation and experiments of storage battery cars in Europe are so obviously inaccurate, as to be unworthy of reproduction. There is one exception, however, to this, and that is the account given by the jury of commissioners at the Antwerp Exhibition of 1885, on the work of the storage battery car exhibited there; but as you are all more or less familiar with that report, I will make no further reference to it, I am, therefore, compelled to confine my remarks to my own observation of storage battery traction. I will not weary you with threadbare information. I once heard a judge tell a loquacious lawyer that he must assume the court knew *some* law. I will assume that you have a pretty general acquaintance with the storage battery in lighting and in traction; but there may be some features, chiefly commercial, that have not come under your observation. My observations cover a period of over three years, during which time, the company with which I am associated, has directed its talents and energy to the development of storage battery traction. You all, no doubt, appreciate the difficulty of the task—not alone difficulties inherent in the system itself, but difficulties arising from the skepticism and lack of sympathy, I regret to say, of a very large majority of the electric community. We all know how much skepticism on the part of street railway men, has had to be overcome in electric traction of every kind. It has taken a great deal of hard work—of missionary work—on the part of electrical engineers and inventors to bring about present results. But this is not to be wondered at; for there is nothing harder to accomplish than to supersede an old and well-established system. The horse car had plodded along and gathered strength and influence just as it had gathered fares. That influence was widespread and almost all-pervading; for there is hardly a town on this great continent that has not its horse car line. The horse car system has been spreading for about fifty years, and when it came to be in full and undisputed possession of the field, can it be wondered that those men who had the hardihood to attempt to supersede it should be regarded with more or less suspicion—should be looked upon as pretenders—especially when you consider that the method which they propose to employ was electricity; that dark and mysterious science, as many people, even now regard it?

Now, the first experiments made with electric cars were calculated to increase this suspicion and to throw disfavor on electric traction; for it is a characteristic of inventors to be so carried away by their enthusiasm, as to commit great indiscretions in carrying on experiments in public, which really should be conducted in private. It was on this account that the early experiments of Daft in 1883, and of other well-known electrical engineers in succeeding years, while they created wonder, did not beget confidence. I may say without any invidiousness, that two years ago, there was not a single electric car run in this country that proved anything more than possibilities.

There were probably two dozen cars being run at that time by the overhead wire system; but so unsatisfactorily, that people who went to see them, came away, shaking their heads with distrust. Now, all this distrust has disappeared, and electric traction has grown so fast, that today there are no less than one hundred street car lines in this country that are either running their cars by electricity, or are in the course of introducing the system. Electric traction has beyond all doubt, come to stay; as the French say, it has arrived. But the large cities are threatened with the cable. The storage battery proposes to challenge its supremacy.

There is a very general popular misconception of the nature of the storage battery. I suppose that at least 90 per cent. of the public have an idea that storage batteries are nothing but buckets, full of electricity. We read in the newspapers from time to time, of storage battery cars carrying "tin tanks" filled with electricity. There can be no greater misconception of the nature of the storage battery. The clearest idea I can give you of the energy contained in a storage battery, is to compare it with a lump of coal. The source of energy in a battery is identical with that contained in coal. It is merely energy locked up in a number of substances, principally the metals which, when set free in a certain manner, manifests itself in a certain phenomena we call an electric current. The metal most universally used in the storage battery, is lead in its various forms. In this lead is contained latent energy, the same as in coal, and if we compare the amount of work accomplished by the energy from either source of foot-pounds, we will find it to be exactly equal in both cases. Now the general principles involved in a storage battery are very simple. When we charge a battery from a dynamo or other external source of electricity, we are manufacturing lead, and when we discharge a battery through an electric motor or series of lamps, we are simply burning lead. But there is this difference between the action of coal and lead, that whereas coal apparently disappears when burnt, the lead does not, but is converted into sulphate of lead to be converted back to metallic lead again by a reversal of the current; so that the storage battery is alternately burning and reducing lead to and from one of its salts. This is why the storage battery lasts and does not disappear in the extraction of the energy as coal apparently does. In fact, the storage battery is an ideal illustration of the conservation of force and the indestructibility of matter.

When the storage battery first became known in a practical and commercial form, by the experiments of Plante in 1859, scientists foresaw for it a great future, and when corporations were formed later on to exploit and introduce the storage battery, the people of Europe, influenced by what might have been considered the extravagant praises of Sir William Thomson and other well-known scientists, put an enormous amount of capital into storage battery enterprises Almost all of those enterprises, however, proved to be commercial failures; first, because the exploiters were ahead of their time; and secondly, because the public were led to expect more than the storage battery, in its then crude form, would do.

There probably have been few things more difficult to accomplish than to bring the storage battery to its present stage of commercial value. Notwithstanding all that had been written about its nature and characteristics, its treatment both in manufacture and use, has, until very recently, been purely empirical. That stage, fortunately, has been passed; so that, with intelligent care, the storage battery to-day is not only a valuable adjunct in lighting, but is becoming a very prominent factor in traction.

The advantages of storage battery traction, assuming that it is practical and economical, are too obvious for me to occupy your time in recounting.

The obstacles in the way of the success of the system are largely if not wholly overcome. The chief of these was the handling of the batteries. That was the most difficult and the last obstacle to be overcome by us. Two improvements removed these difficulties. First, the flexible connector, which enables us to couple up or remove cells with great rapidity; and secondly, the battery rack, occupying a floor space of 24x7 feet on each side of the car, wherein we can store a sufficient number of batteries to run from ten to twenty cars, according to its location. This rack represents stall room for 150 horses, or say 6,000 square feet. I regard this rack as the greatest improvement hitherto made in storage battery traction. By its aid we remove the batteries from a car and replace them by another set in from two to three minutes Indeed, our cars on Madison Avenue and I may say here, that we begin to-day to run ten in daily service, have to leave the station on six minutes headway. In the afternoon trips, there is but six minutes interval between their arrival and departure; and they all receive their batteries from the same rack. When the car enters this rack, its panels are dropped down on either side and thus form bridges over which the batteries are withdrawn from and replaced in the car. While this change is being made, a competent person inspects the regulators of the car. The motors, gearing and connections are only inspected once a day, and that at the end of the day's work. You will thus perceive that the great bugbear of how to store the batteries is no longer an element in storage battery traction.

From my observation of our recent work on Fourth and Madison Avenues, now that we are running a number of cars, and under very unfavorable conditions as to station room and the like, I am led to believe that the storage battery car is as free, if not freer, from accident, as cars that are run by the overhead system. The motors are, I think, subjected to less trying conditions, owing to the fact that the e. m f. is always uniform. The batteries never give out on the trip. It is impossible for them to do so, as they leave the station with 35 electrical horse power hours stored in them, and do not consume quite 12, in the round trip of twelve miles. We have never short-circuited the battery in service. When the current required exceeds 150 amperes, the battery is automatically cut out. When we used rigid connectors, we frequently had difficulty with their breaking, and the flexible connector, has, until recently, given us some trouble, from time to time, by jumping out of position, while the car is in service; but with our recent improvements, disconnection of the batteries, while the car is in service, is now rendered almost impossible. For several months past, we have had absolutely no trouble from our regulators. In any event, there are two on the car, so that if one should fail, the car may be operated from the other end. You will thus perceive that the likelihood of accident or break-down, is reduced to a minimum. Our first standard car has run in three months over 6,000 miles, and carried over 80,000 passengers, never having missed but one-half a trip in that time; and that arose from a bent axle. It has never had an accident or stoppage of any kind while in service. Do not be skeptical at the assertion, when I tell you that we have never spent a dollar on that car in the way of repairs or alterations.

At this stage, you will naturally ask, how about the life of a battery? I answer that from our observation we have nothing to fear on that score. We only ask a life of six months from the positive plates; we know that they will last much longer than that. The chief reasons why the short-livedness of a storage battery has been so much talked about and feared, is that it has, until recently, cost so much to manufacture the battery. Now, the material for your battery you have to buy, in a great measure, but once, for the reason that the discarded battery can be made over new. The raw material in two sets of battery, capable of running a car 120 miles a day, costs, exclusive of the containing jars, about $300. Have you machinery and devices requisite for manufacturing this raw material cheaply into a battery? If you have, you need have nothing to fear on the score of economy. It will cost $4,000 to purchase enough horses to run a 16 foot car 120 miles a day; it will cost about $1,500 to purchase enough battery to do that work. The batteries can be maintained for about one-half what it costs to maintain the horses; and by maintaining I mean replacements as well as feed. This I know for a fact. Can we then have any further doubt as to the relative economy of storage battery traction?

Our cars on the Madison and Fourth Avenue line take one electrical horse-power hour per mile. The road has

some long gradients. The grade at Centre street is over 4½ per cent., and 600 feet in length.

The cost of motive power for a car-day of 75 miles, we estimate at $3.40, as against $7.50 for horses. Five dollars for 75 miles, ought to cover the cost in winter. By motive power we mean the cost of energy at two cents per horse power hour, and $700 per annum for maintenance of batteries and motors. To those who may think that two cents per horse power hour is a low escimate, we would say that power has been offered to us in New York, to be delivered at our station at the price above named. In towns outside of New York, offers have been made to supply current at lower figures. The more level the road, the cheaper obviously will be the cost of motive power. This is more particularly true of the storage battery, which in excessively steep and long grades, becomes heated. The chemical energy instead of exhibiting itself in the form of electrical energy, exhibits itself in the form of heat, with consequent injury to the battery. Our cars will ascend very steep grades; but we do not deem it economical to attempt grades of more than 6 per cent., and they must be short at that rate. But there are few roads offering more and steeper grades than the road we are now operating on in New York. Each car has two sets of battery. A set is easily charged in about two thirds of the time the other is in service. No time is lost in charging, as the battery is automatically put in circuit with the dynamo as soon as it is withdrawn from the car. Now, that we have a complete group of cars in service in New York, and hope to follow those by another group of ten, we will all know more about storage battery traction at our next annual meeting

Electric Railways.

BY GEORGE W. MANSFIELD.

The application of electricity to street railways has been so rapid that we are liable to lose sight of many valuable points in our herculean efforts to supply the demand. Those who are engaged in it know that they let many opportunities slip by. They cannot help it. The more generally the points are known, however, the quicker will be the reward to some directly, and to them indirectly.

The application of electricity during the past decade has been astonishing. In the face of an industry a half century old, and of enormous wealth and power, it has won the leading position. In every direction that honest effort has been made, it has succeeded. Commercial barriers have been broken down and physical obstacles swept aside. When once the feasibility was demonstrated the end could not be predicted.

For the transportation of the people in the streets of our towns and cities the demonstration has been witnessed, the application made and a wonderful luxuriant growth started. There is no industry so far-reaching in character, so vital to a community's interests, and yet one so little known as the street railroad business. Neither the scientific world, the commercial world, nor the people themselves have realized its vast importance. Eliminate the horse-car from every city or town in the Union and forecast the results.

In 1828 the now great Baltimore & Ohio railroad started and horses were used to draw the cars. This might be called the first horse-car line in the United States. In 1830 there were 12,866,020 persons in the United States, and not a mile of street railroad, nor scarcely of steam road. As a rule the New York and Harlem railroad, incorporated in 1831, is spoken of as the first street railroad in the country. The first car was run in November, 1832, from Prince street to Harlem bridge. In 1837 it temporarily succumbed to steam cars, but resumed in 1845.

The census of 1850 gives our country a population of 23,191,876, and published history but one street railroad. The child had been born, however, and in ten years the street railroad was in almost every city of any magnitude in this country. To what has this child grown? In 1880 our population was 50,155,783. Estimating on an increase of 33⅓ per cent. in 1890, or six months hence, the population will be 66,874,354. For the transportation of this number of people in the streets of our cities and towns, the most accurate figures it is possible to obtain show the engagement of about 425 companies, employing 28,000 cars, 125,000 horses, and operating some 3,500 miles of track. The capital invested is variously estimated from $175,000,000 to $200,000,000.

The number of passengers carried is so enormous that it is impossible to obtain figures of any great degree of accuracy. As a result of most careful compilations and estimates, it is reasonably sure that at least 1,500,000,000 passengers are transported.

Still more striking is the importance of the street railroad business when compared with the magnitude and extent of the steam railroads of the United States. The figures of 1887 show a tabulation of 147,998.60 miles of railroad and 20,582 passenger cars, and passengers carried but 428,225,513. With nearly an equal number of cars and forty-two times more road, only one-fourth as many passengers were carried. Behold the yet more amazing figures: The horse-cars of the city of New York carry 199,491,735 passengers, almost half as many as are carried by all the steam roads in the United States. If to this number are added those carried by the elevated roads, we have the total of 371,021,524, or almost as many passengers are carried in New York City alone as are annually carried by all the steam roads in the whole United States. The street railroads of the state of Massachusetts carry over 44,000,000 more people than all the steam roads in that state. One road alone, the West End of Boston, carries nearly 10,000,000 more than all the steam roads combined.

To show somewhat in detail where this tremendous traffic is, I have prepared Table I. Most of the figures showing passengers carried were obtained from reliable sources, and the balance were estimated from an average obtained from those I was sure in regard to.

If you figure for each car six horse power of electric energy it will give you a rough idea of the size of an electric central station needed to operate all the cars. In New York City dynamo capacity of 13,800 horse power would be demanded, in Boston 9,504 horse power, and so on. This is destined to come as surely as the days succeed each other. In Boston it has come, and a station of approximately 8,000 horse power is already in the hands of the engineers.

If the conservatism of Boston permits it, how can the result be but inevitable for the other great cities of the Union? This enlightened age will have these facilities for transportation, and as soon as it is possible and wise. The universal cry to day in almost every large city the length and breadth of the land is for cleaner, surer and more rapid transit.

Unfortunately the tendency of the time is to concentrate in or around large cities. This means congestion with all its deplorable results. The solution lies to a very great extent in the street railways. These must be the cities' arteries and veins, extending from the heart in all directions to its extremities. Improve, then, the street railways. Almost every method of applying energy to street cars has been applied, and they all have finally "bitten the dust" in the great battle for life.

The Baldwin Locomotive Works have for years been engaged in the manufacture of steam dummies for street railways.

Unquestionably through them the highest order of talent and skill has been lavished upon the solving of the vexed problem, as to how to use steam for the haulage of street cars. Motors weighing from 13,000 to 27,000 lbs. when in working order and ready to run, have been built. In most cases two engines have been employed, with cylinders and strokes ranging from 8″x 10″ to 12″x 16″. The power of these engines can be judged from their pulling capacity, which varies from 320 tons to 634 tons on a level, and from 16 to 43 tons on a four per cent. grade. Ordinarily they were built to seat from 15 to 20 people.

The wheel base was generally six feet and the wheels 31″ in diameter. Naturally they were built to run at speeds from 10 to 15 miles per hour, and to be provided with all possible safeguards and conveniences.

Powerful brakes were used, coke was burned to avoid smoke, mufflers provided for the exhaust and safety-valves, and every other possible contrivance adopted to eliminate all objectionable troubles. Their economy in working has not been very freely published. From reliable and authentic sources we learn that the lowest fuel consumption is 6⅓ lbs. of coke per mile run. The average is from 10 to 12 lbs. when ordinary grades are ascended. The total cost of operating per mile has been in some instances reported to be but 3½ cents, but in other cases it was found to be over 20 cents per car mile. It is needless to say that in spite of all the skill, time and money spent upon them, they have not proven, except in a few isolated cases, either satisfactory or economical.

Electricity, the youngest of them all in application, shows already the sturdy, vigorous growth that inevitably will result in its complete supremacy.

TABLE I.

CITIES OF 100,000 POPULATION AND OVER.

Name.	Companies. Elevated.	Companies. Horse.	Miles Single Track.	Total Track-age.	No. of cars.	No. of Horses.	Locomotives.	Total Passengers Carried.
New York	2	.....	60	89	948	.....	291	171,529,789
	.....	19	143	268	2,300	14,441	.....	199,491,735
Brooklyn	3 Miles Cable included.	14	135	207	2,355	8,410	.....	105,975,749
	3	.....	24	35	247	.....	91	18,632,082
Boston	.....	1	211	231	1,534	7,684	.....	97,039,919
Providence	.....	1	54	54	289	1,414	.....	15,582,732
Chicago	44 Lines in 1 System.	7	325	325	2,400	8,279	.....	99,348,000
Philadelphia	.....	12	302	326	1,512	7,322	8 Dummies.	143,433,959
St. Louis	3 Cable.	14	169	169	1,058	4,231	.....	50,772,000
Baltimore	.....	12	158	158	460	3,167	.....	34,837,000
Cincinnati	2 Cable.	30 Lines 7	164	164	530	2,644	4 Dummies.	31,728,000
New Orleans	.....	7	140	140	499	2,019	18 Dum's. 7 Loco.	24,228,000
San Francisco	2 Steam. 8 Cable.	10	163	164	707	1,724	3 Loco. 39 Dum's.	130,860,000
Buffalo	.....	2	39	56	198	1,276	.....	13,108,203
Washington	.....	5	63	63	336	1,084	.....	21,892,000
Newark	.....	3	53	53	219	1,264	.....	15,168,000
Louisville	.....	2	112	112	378	Mules. 2,270 Horses.	....	24,970,000
Cleveland	.....	7	123	123	523	2,521	.....	30,252,000
Pittsburgh	6 Cable, 1 Elec.	13	113	113	347	1,924	3 Dummies.	39,688,000
Jersey City	.....	2	35	35	132	825	.....	10,725,000
Detroit	3 Elec.	4	65	65	203	1,682	....	32,184,000
Milwaukee	.....	3	68	68	208	1,188	2 Loco.	16,744,000
Albany	....	3	19	30	103	424	.....	4,278,927
Indianapolis	Consol'd.	1	40	40	99	648	.....	9,720,000
Kansas City	6 Cable.	7	124	124	469	613	38 Dummies and motors.	33,969,000
St. Paul	1 Cable.	1	74	74	154	816	.....	23,608,000
Omaha	2 Cable, 3 Elec.	1	61	61	167	580	24 Motors.	20,540,000
Minneapolis	Con'd.	1	66	66	160	1,104	.....	14,352,000
Total	.....	189	3,103	3,414	18,645	77,884	.....	1,434,057,595

Five elevated roads, 27 cable, 147 horse, 7 electric, 3 steam and horse combined—189, total; 18,645 cars, 394 locomotives, 134 dummies and motors; 77,884 horses, 2,270 mules—80,154. About 24,000 horses are annually disabled.

TABLE II.

ELECTRIC STREET RAILROADS.

	1885.	1886.	1887.	1888.	Jan. 1-July 1, 1889. Operating.	Jan. 1-July 1, 1889. Building.	Jan. 1-July 1, 1889. Total.	Total.
No. of Electric Railways	3	5	7	33	19	42	61	109
No. of miles of road.	7.5	28	29	130.5	113	267	380	575
No. of cars	13	39	81	265	174	364	538	936

The figures of Table II certainly show that the facts warrant the prediction. They were most carefully prepared and include every road of any record. It does not show it all either. That remarkable contract which the West End Street Railway company of Boston, the largest street railway company in the world, signed recently with the Thomson-Houston Electric company, is not included under the heading "roads building in 1889."

I think that this contract in responsibility and importance is one of the greatest that has ever been signed in the history of electricity. In electric railroading it is the greatest and probably will be for many years to come.

The West End Street Railway company of Boston, owns 217 miles of track and 1,584 cars, all of which are to be equipped so as to be operated with electricity. Add these to the list, and how does our list stand? If it be within the bounds of the supply men, at least 75 miles will be built this summer, and 100 or more cars equipped. Will not this give the electric railroad industry a standing warranting the attention of the whole railroad world?

As an interesting comparison regarding the new industry, if I may call it such, note the following figures:

	1870.	1880.	1890.
Total horse power, both water and steam, engaged in the whole man'f'g industry of the United States.	2,346,142	5,410,837	Estimated. 5,255,582
Total horse power engaged in the electric lighting and power industry	0	1,000	500,000
Total horse power engaged in electric railway industry	0	0	30,000

In meeting this demand of the age for better transit, there are many considerations that claim our most careful attention.

The conditions to be met are widely different from all other electrical applications. Essentially we have first a steam engine; second, a dynamo; third, a conductor; and fourth, a motor mounted upon a vehicle, and subjected to mechanical and physical conditions more extreme and severe than ever heretofore have been imposed upon any piece of electrical machinery. In the battle for success the engine has to stand the bulk of the fighting. Anything wrong with it affects directly the electric system, and in many cases it also has to stand the blows if anything is wrong with the electrical system. Dr. Bell has pointedly shown in his valuable paper many well known facts, and clinched them by figures taken on one particular road. They can be taken with certain allowances as fairly representing the conditions imposed upon the steam engine by an electric road.

The extreme liability of short circuits on the road from falling wires, careless drivers turning the current on too suddenly when starting, and a variety of accidents that may happen on the very best roads, render of the first importance that the engine have its main moving parts at least 20 per cent. heavier than ordinarily. Under the extreme fluctuations of load, keys, nuts and bolts will work loose. An engineer in a large station recently told me that he practically took to pieces and put together nearly every month a 100 horse power engine running an 80 horse power dynamo, whereas prior to the time it had been connected to a railway dynamo it had given practically no trouble, although worked well to its capacity.

Hanscom of cable railroading fame writes: "We do not consider it good engineering to design an engine to suit the general average of all lines in the country." He argues special engines for every road. Mr. C. B. Holmes, president of the Chicago Cable company, writes: "I would recommend that the strength of parts and weight of flywheel be at least one-third greater than the usual run of engine power." Our business is analogous, and I think we should heed their counsel.

A compound engine rated at 109 horse power, running an 80 horse power dynamo under test recently, gave the following:

Friction card with dynamo, but no current, 11.65 horse power; aggregate horse power of cards, 1247 74 horse power; average horse power of cards, 56.67 horse power; maximum card, 120.79 horse power; minimum card, 15.56 horse power.

The cards were taken at ten minute intervals for four hours. There were at the time three electric cars on the line, each towing another. As the day was a pleasant Sunday, every car was crowded. During the same time current and potential readings were taken on the line at the station. The average gave 30 horse power, or an average efficiency of 54.6 per cent. for the total time. Every moment deducted that no current was flowing would raise this efficiency. At times the efficiency was far higher than this

The road conditions were severe, the grades ran as high as 10 per cent., and had numerous others of 5 and 7 per cent. The extreme current fluctuations were noted in one minute's variation from 45 amperes to 140. The potential was very constant.

On another small road the extremes varied from the friction load to nearly 85 horse power on a 100 horse power engine. These extremes would happen even during the time a three impression card was being taken. Under such conditions the question of coal economy is a troublesome one. On large roads, unquestionably a far better showing would be possible.

Laying aside the question of coal economy, which is cheap in comparison to food for horses, the best engine is the one that handles the average work with the least repairs. On some small roads the ratio of engine friction to average daily load may be large. The great majority of roads, however, will have a sufficient number of cars to so reduce the ratio of extremes to the average load that the engine can work at its most economical point of cut-off the major part of the time, and raise the average load to such a point above the friction load that the per cent. lost will be comparatively small.

Almost the first question asked by the manager of an electric light company when an application has been made to him for power, is: "How much electric power must I allow per car?" No man can give a definite answer to this question that will meet all conditions.

If the following facts are known a fair judgment can be made, although I am much afraid that the accuracy of the judgment would not be a William Tell:

1. Number of cars simultaneously operated.
2. Speed and nature of service.
3. Maximum grade, and number of grades.
4. Scheduled location of cars in reference to grades.
5. Motor cars to be used to tow other cars or not.
6. Any peculiarities in regard to the distribution of cars.
7. Condition of track.
8. Location of track in reference to power house.

A moment's thought over any of these points, I think, will convince you of its importance.

On a portion of the Cambridge division of the West End Street Railway company's road of Boston, the Thomson Houston company's motors commenced running February 16, 1889. Up to July 1st 165 781 miles, and 25,505 round trips had been made with a loss of but 325 miles, or .19 of 1 per cent, and forty-nine round trips, or the same per cent. of loss. During this time nearly 1,500,000 passengers were carried. This, in view of the fact that during the entire time, one and part of the time two tow cars were drawn, is remarkable. It must also be known that the route extends over one of Boston's most crowded business thoroughfares, and is the main street connecting Cambridge and Boston.

On a portion of the route there is an open bridge about 1 800 feet long on which is located one draw, which is opened from 20 to 30 times per day. Over this bridge 1,810 cars per day pass or on the average of one every three-quarters of a minute, and at some portions of the day they run at half-minute intervals. The teaming on this street is also very heavy. necessitating constant stopping You will see from these figures what the loss of current or a motor burn out causing delay would mean

As the dynamos are run by the Cambridge Electric Light company, and are so arranged that the same engines furnish power and lights for their own purposes, as yet only approximate data as to the fuel consumption, etc., have been possible.

A few electrical tests have been made, as well as it were possible. Ammeter and voltmeter readings were taken at the station every 15 minutes, four readings per minute, or at 15 second intervals. This was kept up from 6.30 A. M. to 12.30 A. M. next morning for five days. In all, 1,480 readings were taken. The average of these readings gave for 12.6 cars in continuous service, 111.6 amperes, 500 volts, or 74.8 horse power. Per car this is 8.8 amperes and 5 9 electrical horse power. The average number of passengers carried was about 58 per round trip. We now have 32 cars in operation, and observations, in so far as they have been taken, show a marked decrease in horse power per car. At Richmond, Va., some rough tests gave the electrical horse power required per car at the station as from 4 to 5. On the Asbury Park road, at Lafayette, Ill., the figures of Dr. Bell show the remarkably low figure of 2.5 electrical horse power. There are a number of circumstances on this road that would tend to make this figure so low. The cars are smaller than those ordinarily used, and I should judge that there were other circumstances entering into the calculation that would tend to reduce it. However, it well shows, possibly, one extreme in railroading.

The other extreme might be cited in the case of the Lynn road, Highland division. Here only one car is in operation. In the course of its route it ascends a hill graded at the rate of 8.7 per cent. for 300 feet, and immediately passes down on the other side. In this case the engine was indicated. Five cards were taken when the car was ascending the grade, the average of which was 52.2 hor e power. If we allowed a dynamo efficiency of 90 per cent. this would indicate an electrical horse power of 47 horse power. This is, unquestionably, a very extreme and exceptional case. I might add, incidentally, that the car pays handsomely.

At Plymouth, Mass., a road having many heavy grades, the maximum being over 10 per cent., and operating but three electric cars each with tow cars, the electrical horse power at the station per car was approximately 7 72 horse power. On the cars the extremes vary obviously according to speed, grades, load, etc. It frequently reaches from four to five times the average value during total time. In Lynn the variation is enormous. In Cambridge the current frequently rises to from 65 to 70 amperes, or about 42 horse power. Especially is this the case on starting.

You can see from these figures the impossibility of giving only the most approximate figures in this direction unless every detail as to operation and conditions is known.

I feel, however, that on roads having no grades over 5 per cent., and operating under 10 motor cars with tow cars, 15 horse power per car would be a safe figure for dynamo capacity. On large roads this figure could be reduced to 12 and possibly 10 horse power per car, while on small 3 or 5 car roads with heavy grades, 18 or 20 horse power might not be any too much.

At Cambridge tests show that of the total time consumed by a car in a round trip, it was taking power only 61 8 per cent. of the time. and that 6.7 per cent. of the total time the car was stopped.

At Washington, where the streets were freer and not so thickly populated, the figure for time when power was used, rose to 66 per cent.

Neither of these roads is what you might call large. It seems, however, that from 30 to 40 per cent. of power in excess of the absolute requirements can be planned for. I do not think, however, that this can be implicitly relied upon as in other power business, since there are many factors in the general operations of a railroad system that might at any moment tax the central station to its utmost. In regard to total electrical and total commercial efficiencies, it is impossible for me or any one else to give accurate figures. There are so many fluctuating factors entering into such a determination, that, whereas a test made today would give me certain figures, a test made to morrow, or a week later, would give me entirely different figures. The time factor must enter largely into such a test.

From estimates based upon many figures I feel certain that a total electrical efficiency of at least 70 per cent. can be obtained, and a total commercial efficiency measured from the indicated horse power of the engine to the car-wheel horse power (W. H. P.) of from 45 to 50 per cent. If the road bed, rolling stock, and all the electrical apparatus is maintained as it should be, I hope and see no reason why this figure cannot be exceeded.

Unquestionably, to the railroad man, one of the most vital points is the cost of repairs. We all know that in so far as power is concerned, a horse power can be produced and delivered 10 hours per day the year round, with a profit at about $75 per year. The cost of maintaining a horse for only about four hours' work per day on a horse car is not far from $190.

There is one point which is of vital interest to the managers of electric light companies, and that is how they shall charge the railway companies for the power which they desire. I have already shown you that i is an exceedingly difficult thing to estimate upon the requisite power, as the conditions are so fluctuating and so variable. After, however, the question of the amount of power has been settled, the next point to determine is whether they shall charge the railway company by the hour, by the day, or by the car mile. We have a large number of roads already hiring power of local companies; all of the methods just mentioned are in use. Upon small roads where the schedule of the railway company is such that they have only a few cars running continuously, meeting emergencies by extras, and where the grades are heavy, a satisfactory basis has been to charge so much per day per car, the price ranging all the way from $3 to $5, $6, and even $7 When the roads are of moderate size, or are subject to many variations and sudden demands on the part of the public for better facilities, or when the line runs to some resort and the main bulk of business lies in picnics, etc., charges on the hour basis is sometimes preferred. This price varies from 15 to 30 cents per hour. On larger systems, where the schedule is definite and fixed, the mileage basis is the preferable by far. The prices on this basis range from two to six cents. You can readily see that if the cars ran at infrequent intervals, and if the morning and evening traffic was especially heavy and required a larger number of cars, while during the major part of the day only a few cars were out, the mileage basis would be quite unsatisfactory, since on the whole you would have to make steam possible for the maximum railroad output, and maintain it throughout the day. All of these estimates, however, can only be determined by knowing the local conditions and circumstances.

In the east where coal ranges from $4 to $5 per ton, naturally the prices could not compete with the railroads of the natural gas and coal regions where fuel can be obtained for almost nothing, as in some cases for 10 cents per ton.

I would like now to enter a wedge here in favor of the very best of construction. Your own experience has probably dictated that there is no economy if the original construction be put in with either inferior or faulty material or apparatus. It is more important in railroading than possibly in lighting that the overhead construction, the track circuit, the wiring of the cars and all other details be as perfect as it is possible for the best skill and brains to make them.

If the light companies would require proper and reasonable guarantees in this direction, whenever they do supply power, it would not only be a surety in regard to their own protection, but also would be a strong inducement for the very best of construction work.

The railroad man should see that it is for his interests, since there is no trouble that will consume profits more rapidly than break-downs. There is no excuse now for electrical break-downs. When such do happen it is either carelessness or cheap construction.

Railroading is an exact business. The cars must be ready and go precisely on time. Delays in railroading are ruinous. All such can be avoided by perfect honest work. I call upon electric light men to strongly urge this most vital of all considerations upon the railroad world. It is an experience we have gained at a tremendous cost. Is it not to our interest to see that others becoming associated with us do not suffer? Should not all electricians bend all their energies toward making this new and richly promising field a magnificent success? Have you not millions to gain and nothing to lose? Are you ready for it? Are you going to do it?

There are some 1,600 central electric light stations already located throughout the country, and some 425 railroad companies that sooner or later will have to have electric power. Is there any reason why you should not do it? I know of many a station that has to stint and save to tide over the years' dull seasons. You have no day circuits; are held by the sun to one schedule and by the moon to another. The municipal authorities jump at you from behind one post, and your commercial customers from behind the next. Stygian darkness is ever your salvation, and all conditions have to be met and illuminated by your beautiful light. You cannot afford to lose anything. Here is an opportunity for still one more chance at profit. If necessary, enlarge the scope of your charters. It will pay you. Your securities will be worth more, and can be more easily and satisfactorily placed. Railroads have an older and better standing in the financial world and on the money market than electric light companies. Can you afford to let the opportunity go by? From careful research, my own judgment would be that in many cases it would be the company's salvation. I believe the time is rapidly coming when great electric stations, from 5,000 to 20,000 horse power, are to be established. There are plants of from 5,000 to 10,000 horse power already built for manufacturing purposes I have been told that the Calumet and Hecla plant has in the neighborhood of 12 000 horse power. The New York Steam Heating company has about 10,000 horse power of boiler capacity in its stations at Greenwich, Conn.

There are many mills equipped with power of from 1,000 to 5,000 horse power. Even our ocean steamships are plants of from 8,000 to 12,000 horse power. Why cannot electric plants of such power be built? Why are they not? Is there not business enough in lighting, power and railroading? Almost every station I go into the country over is adding to its capacity. "New occasions teach new duties, time makes ancient good uncouth" The horse is uncouth. Electricity is our life.

DISCUSSION.

MR. MARTIN: I would like to ask the gentleman who made that report what he means by a "day" in running street cars; does he mean twelve hours or twenty-four hours?

MR. MANSFIELD: Ordinarily it is a day of eighteen hours; that is about the maximum number of hours that a car runs per day.

MR. PHELPS: Mr. Mansfield gave us some very interesting and somewhat surprising figures as to the relative magnitude of street-car traffic, and of the railroad traffic of the country on steam roads, but I would like to ask him if he has made the comparison as to the number of passengers carried per mile between the steam railways and horse-cars—the difference between the number of passengers carried per mile?

MR. MANSFIELD: I attempted to make that division, but could not, because it is such a difficult thing to get at the mileage of horse cars on the various roads in the country and distances carried. The passengers get on and ride two blocks and then get off. It is such a difficult thing that I could not get any correct figures.

More Electric Cars for Cleveland.

The success of the East Side electric railway, in Cleveland, Ohio, has been so great, and its popularity with the citizens of Cleveland so marked, that it is not surprising that we have to record that another street railway company in Cleveland has decided to adopt electric power upon its lines.

This company is the Broadway & Newburgh Street Railway company, of which Mr. Joseph Stanley is president, and which is at present operated by horses. The contract, calls for 16 Sprague improved electric railway motor, necessary dynamos, station equipment and other necessary apparatus.

H. H. Littell, of Louisville, and J. B. Speed, of Cincinnati, were in Chicago lately, and favored us with a call.

E. P. Allis & Co., Reliance Works, Milwaukee, Wis., have sold a 14" x 24" Reynolds Corliss engine to the Ottumwa (Ia.) Electric Railway Co.

New Method of Operating Cable Cars.*

Extensive experiment with the cable railway stystem now in common use has thus far proved that it requires many improvements before the cost of operating and maintaining can be reduced to an economic basis. The first and paramount objection being the enormous annual outlay for cables, which, with the most careful usage rarely last more than a few months, owing to the defective gripping arrangements used with the system.

Referring to the accompanying drawings, Fig. 1 is a side view of the improved device for propelling cable cars, and Fig. 2 an end elevation of the same.

This invention consists of two frames N, B, of of a suitable size hinged to operating levers O, within the car, the one capable of sliding within the other. Attached to the outer frame N, are two small sheave wheels P, which carry the cable A, the inner frame B, being provided with a similar sheave wheel N, and adapted to move along the top of the cable A. Secured to the short shaft M to which the top sheave N is affixed, is a pulley K, which is connected by a wire rope belt L to a pulley mounted near the top of the inner frame B. Attached to the shaft G, at the top of the frame B, are two pulleys F, which are connected to one of the axles J, of the car, by means of belts L1 and L2, and two loose pulleys I1 and I2, which revolve independent of the axle J. Between these two pulleys I1 and I2, is arranged an ordinary friction clutch Q, which is operated by a hand lever P, projecting upward within the car, and in reach of the gripman.

It will be seen that by moving the two frames N, B, in an opposite direction that the sheave wheels P and K are brought towards each other, thereby creating a friction which rotates the sheave wheel K, on the top of the cable A, which in its turn rotates the several others connected thereto, giving the pulley I1 on the one side of the clutch Q, an opposite rotary movement to the other, I3, by means of a cross belt L1.

Preparatory to starting a car, the lever O, connected to the inner frame B, is held stationary by means of an ordinary ratchet, and the other lever attached to the outer frame N, pressed forward and allowed to remain in that position. This gives the two loose pulleys I1 and I2 on on the axle J, a powerful rotary movement on their axis.

When desired to put the car in motion, the lever p, operating the clutch Q, is moved sidewise, which engages the friction with one of the pulleys I1, and thereby rotates the axle J, which propels the car forward. A backward movement of the car may be obtained by engaging the clutch Q, with the other pulley I2.

The advantages of this method in operating cable cars are many and obvious. In the first place the car may be propelled in either direction by a slight movement of the lever operating the clutch. This will be found useful for sudden stops, or can be used as a brake while descending heavy grades.

Another and great advantage is that the speed of the car may be made entirely independent of the speed of the cable; that is, the car can be run at any desired speed, either backward or forward.

The wear of the cable caused by this device is hardly perceptible, while that of the old gripping device has been a constant source of trouble and expense. By this device cars can be easily transported over the lines of other cable companies by simply pressing forward the two levers *O*, and thereby disengaging the sheave wheels from the cable and elevating the entire device above the obstructing cable.

It is also easy on the gripman, as it requires but a slight effort to engage the clutch with either of the driving pulleys.

The invention can be applied to any cable railway without change in construction of the road or cable.

An illustrated description of the Isaacs system of cable railways will appear in our September issue.

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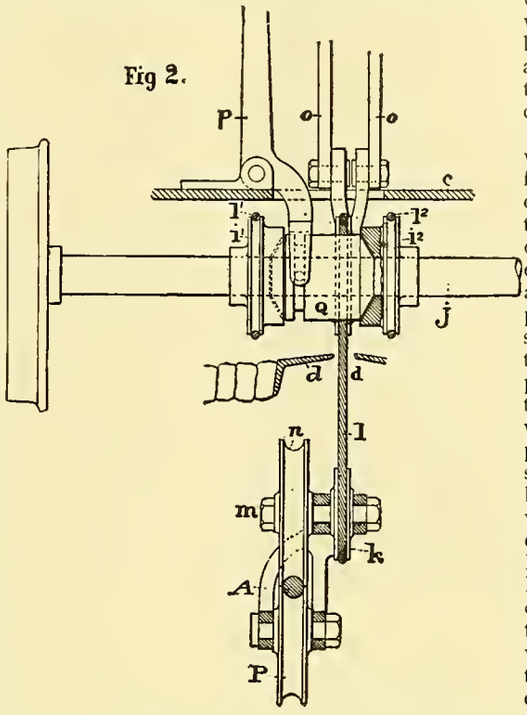
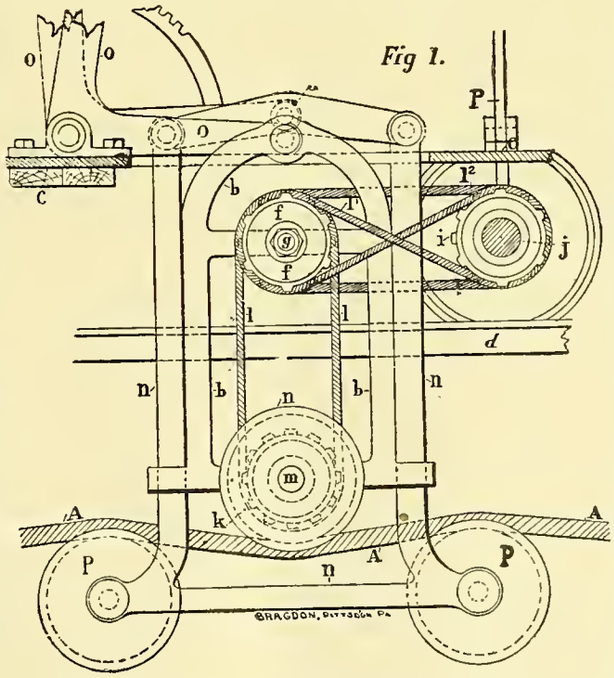
* Joseph Williams, Jr., Pittsburgh, Pa., inventor.





Rapid Transit.

Referring to street railways in general and rapid transit in particular, Mr. Max J. Becker, pres. of the American Society of Civil Engineers, in his address, delivered at the Annual Convention of the Society at Seabright, N. J., on June 20th, said :

"The rapid growth of our cities gradually forces the inhabitants to seek their homes in the suburbs and surrounding country, more or less distant from the business and manufacturing centres where their employment lies. The desire for economy of time, and the necessity of punctuality and prompt attendance, have led to the introduction of various modes of conveyance beginning with the street car tramways, propelled by horses, followed more recently by elevated railroads and cable car lines, and still more lately by the electric railroad ; which latter system has, within a few years, developed much more rapidly than any of the preceding methods.

At the close of the past year, there were completed and in course of construction, in this country, 85 electric railways, comprising about 450 miles of track, and the reports show that during the last year over eighteen millions of passengers have been carried over these lines.

The cheapness of original construction and subsequent maintenance and operation commends their adoption in smaller cities, where the old systems would be out of the question ; and the practicability of their application in situations which would exclude cable lines and horse-traction has led to their introduction in places like my own home, Allegheny City, where an electric railway is now in successful operation, which, in a distance of one mile out of a total length of four miles, ascends with a speed of fully four miles per hour a hill over 400 feet high, upon gradients of 12½ per cent., with numerous curves of 40 feet radius, the cars being often loaded with 75 people. Upon the lower portion of this line the electric conduit is supplied by means of an under-ground conduit, and on the upper portion of the line by the ordinary over-head conductors.

But while, undoubtedly, the electric railway will be generally preferred in the immediate future, it is by no means to be inferred that the cable lines are to be considered as the motors of the past. On the contrary, their use will not only be continued, but greatly extended wherever the conditions and circumstances favor their adoption. Among the advantages which they possess are uniformity of motion, generally satisfactory speed and the ease with which, in times of heavy travel, the vehicles can be multiplied and combined into convoys, and the facilities which they afford to converging horse car lines whose cars they can attach to their own at the points of junction, saving thereby transfer of passengers. The machinery used at the power houses of some of the principal cable lines is of very superior character, and some of the details employed are models of skill and ingenuity. Noteworthy among these are the engines of the Brooklyn bridge cable line, which many of us admired during the excursion at the time of the last annual meeting, and which are very interestingly described in a recent contribution to our "Transactions," by Mr. Gabriel Leverich, one of our members, and at one time secretary of this society.

Elevated railways propelled by steam must necessarily remain confined to larger cities, where the volume of traffic promises a return for the capital invested in their expensive construction, and where the distances to be reached are sufficiently great to make the saving of time by means of their superior speed an inducement for patronage."

The Chicago West Division Railway has ordered 75 grip cars from the J. G. Brill Co., to be delivered by the first of the year. These cars are to be similar to the several lots that the Brill Co. has furnished the Missouri Railroad Co. of St. Louis, excepting that they are to have the Brill style of grip carrier with independent pedestal. The principal features of this carrier are that the grip-carrying frame is supported from an independent pedestal cushioned on the top of the boxes, and by simply removing a brace at the bottom of the pedestal the wheels and axles can be taken out and others replaced in a very short time, and without disturbing any of the machinery. This feature has also been applied to the electric trucks made for the Pleasant Valley Ry., of Pittsburgh.

Experience is an expensive, but an accurate school. Our readers will remember our mention of the fact, as well known then as now, that Messrs. Wright & Meysenburg would not be content to build the Milwaukee Avenue cable lines of the Yerkes Syndicate, in any slip-shod way. So successful a civil engineer as is Mr. Wright, is certain to know that "a line, a curve, and a grade is perfect," before he will allow it to go into the hands of inspectors. Of course the methodical Meysenburg can, faithfully and well, attend to the financial end of the lever, but no one expects him to see with Mr. Wright's eyes, or to know by intuition just how the work is progressing.

"The Gazette" wishes Mr. M. and all other interested parties to understand that sections of their work which it has most carefully examined on the avenue, are, in its opinion, second to none in this, or any other country, in all the requisites of perfect construction.

The Street Railway Gazette.

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Promote Street Railway Enterprises.

Who, possessed of even an average degree of ordinary intelligence, can raise a doubt as to the many advantages that a city derives from having a well organized and properly operated street railway system? Street cars save time, each one economizing space by doing the work of three omnibuses in half the time, thereby keeping the streets clear of a number of lumbering vehicles; it secures a comfortable mode of transportation, with comparative freedom from noise and almost perfect safety from accidents. By providing rapid and cheap communication in cities between manufacturing and business centres and the suburbs, it enables workingmen to purchase cheap and healthful homes, and to remove their wives and children from the contaminating influences of back slums and overcrowded tenement houses. It benefits alike the manufacturer, the merchant, the capitalist, the real estate dealer, the workingman and the stockholder, in ways which, while they are as various as these classes, are at the same time apparent to all.

The following regarding a cable that was recently removed from the California street cable road we clip from the *Pacific Lumberman:*

The diameter of the cable was an inch and a quarter when it was laid, but twenty months of constant hauling and wear thinned it down nearly an eighth of an inch.

Its length was 17,513 feet, and its weight 44,604 pounds. For nineteen hours a day it kept moving every day of the twenty months, and as its speed was seven miles an hour, the distance it traveled was 79,800 miles. It carried nearly 6,000,000 people, or about six times the population of the state, and turned over to the company $300,000 worth of nickels, being at the rate of $15,000 a month or $500 a day. As the total power of the road is 400-horse power, it may be calculated this rope was doing as much hauling while in motion as 200 horses, and as each car hauled by horses uses four teams a day, the daily work of this cable was equal to that of 800 horses, with a deduction, however, for the great power required to move 44,604 pounds of cable.

The cable was composed of six strands of steel wire cables, each one containing nineteen wires varying in size from six to eight wire gauge, and twisted around a stout hempen core five-eighths of an inch in diameter.

Mr. Charles T. Yerkes, President of the North Chicago Street Railway company, in common with other observing minds, saw in the regularity and celerity of or by which the thousand trains per day of the Chicago City Railway company's lines brought in and carried out its patrons, without a skip, that there must be a wire rope Warwick in the service of the pioneer company. The certainty that there is, is a long step towards the discovery of the cause. Yerkes was not long in finding the brothers Nash, and his tempting offer for the services of those experts could not be resisted. While the resignation from the service of one company, and the grasping of the knotty problems of the other, was like many another business transaction, very quietly done, it did not escape the ears of many a faithful toiler who had served Mr. T. C. Nash these many years, in a line of service often so dangerous, and always so swift as to require a band of temperate, level-headed men; men who slept on telephone wires, so that, the very instant the "*strand*" came in, the decks of the power house could be cleared for action; noting as they did the transfer of their general, what more natural then that their esteem should be shown by the presentation of a sold silver set of six massive pieces, costing $250, coin for coin.

The sequel of the change thus so auspiciously begun now comes out and the Brothers, not having secured the co operation of the Yerkes company, in the carrying out of imperative reforms, have severed their connection with it.

Mr. T. C. Nash goes East on a business and pleasure trip combined, and the Gazette is fearful that some of those eastern street railway magnates will prevent his return to us.

Don'ts.

An exchange comes out with the following very sensible list of "Don'ts" which appear to pretty well cover the points: —

For persons who patronize horse cars the following points might be interesting:

Don't ring the indicator to stop the car. The car will not stop and the ring will cost you or the conductor a nickel.

Don't try to beat the conductor out of his fare. Nine times out of ten you will be detected, and the tenth time your conscience will trouble you later.

Don't try to monopolize space from the fat woman. She invariably gets there, and you will feel uncomfortable when she sits on you.

Don't, if you are a woman, alight from an open car before it stops, and especially with your back toward the driver. You will generally wish you hadn't.

Don't tell the conductor he doesn't know his business, when he fails to stop at the lower crossing. He has rules to obey if he cares to hold his place.

Don't swear if you are carried ten feet past your corner, after the conductor has stopped there, and you forget to hear him call out the street.

Don't try to pass bogus or plugged coins on conductors. They are pretty good and watchful judges, and the scheme seldom succeeds.

Don't threaten to report the driver or conductor when either requests you to do your smoking on the rear platform, This is another rule the employees must enforce. If they don't the other passengers will protest.

Don't sit on the dashboard and get your clothes besmeared with grease from the brake and then blame the conductor for not notifying you.

Don't kick with the conductor if he waits a minute for some belated passenger, and then thank him and give him a bad cigar when he does the same favor for you.

Don't think all carmen are chumps, for you will get left. There are many smart men among them whom reverses have caused to work for $2 a day or less and receive bushels of abuse.

Follow these few words of advice and there will be less gray hairs in the heads of the carmen.

The Valley City Street & Cable Railway Co., of Grand Rapids, Mich., has ordered a number of open cars from the Pullman Co. for immediate delivery, and half a dozen Pullman standard grips, for delivery next month.

Street Railway Associations.

OFFICERS, DATES OF MEETINGS, ETC.

AMERICAN ST. RY. ASSOCIATION.

President, George B. Kerper ..... Cincinnati, O.
First Vice-president, Jesse Metcalf ..... Providence, R. I.
Second Vice-president, Henry Hurt ..... Washington, D. C.
Third Vice-president, W. H. Martin, Jr. ..... San Francisco
Secretary and Treasurer, Wm. J. Richardson ..... Brooklyn

EXECUTIVE COMMITTEE.

Geo. B. Kerper ..... Cincinnati, O.
Jesse Metcalf ..... Providence, R. I.
Henry Hurt ..... Washington, D. C.
W. H. Martin, Jr. ..... San Francisco, Cal.
Charles B. Holmes ..... Chicago
John Scullin ..... St. Louis
James H. Johnston ..... Savannah
Henry A. Sage ..... Easton
E. J. Lawless ..... Kansas City

The annual convention of the Association will be held at the West House, Minneapolis, Minn., commencing on Wednesday, Oct. 16, 1889.

N. Y. ST. RY. ASSOCIATION.

President, Chauncy C. Woodworth ..... Rochester
Vice Presidents, John N. Partridge ..... Brooklyn
John S. Foster ..... New York
Secretary, William J. Richardson ..... Brooklyn

The annual meeting of the Association will be held in New York on September 17, 1889.

MASS. ST. RY. ASSOCIATION.

President, Chas. H. Odell ..... Salem
Vice-Presidents, H. M. Whitney ..... Boston
Amos F. Breed ..... Lynn
F. O. Stearns ..... Swanson
Secretary, F. H. Monks ..... Brookline
Treasurer, J. H. Eaton ..... Lawrence

Regular meeting day, first Wednesday in each month.

The annual meeting of the Association will be held in Boston, Mass., Sept. 4, 1889.

THE ST. RY. ASSOCIATION OF THE STATE OF NEW JERSEY.

President, John H. Bonn ..... Hoboken
Vice-President, S. S. Battin ..... Newark
Secretary and Treasurer, Charles Y. Bamford ..... Trenton

EXECUTIVE COMMITTEE.

John H. Bonn ..... Hoboken
S. S. Battin ..... Newark
C. Y. Bamford ..... Trenton
C. B. Thurston ..... Jersey City
John Hood ..... Camden
A. Q. Keasbey ..... Elizabeth

OHIO STATE TRAMWAY ASSOCIATION.

President, M. A. Hanna ..... Cleveland
Vice-President, A. G. Clark ..... Cincinnati
Secretary, H. A. Everett ..... Cleveland
Treasurer, J. B. Hanna ..... Cleveland

EXECUTIVE COMMITTEE.

John M. Doherty ..... Cincinnati

The annual convention of the Association will be held in Cleveland, O., on November 20, 1889.

WESTERN ELECTRIC RAILWAY ASSOCIATION.

President ..... T. J. Evans, Council Bluffs, Ia.
Vice-President ..... H. E. Teachout, Des Moines, Ia.
Secretary ..... W. L. Allen, Davenport, Ia.
Treasurer ..... W. R. Moore, Moline, Ill.

Next meeting will be held at Minneapolis, Minn., Oct. 14, 1889. Regular annual convention will be held in Des Moines, Ia., in January, 1889.

Execution by Electricity.

In view of the recent arguments for and against the execution of criminals by means of the electric fluid, it is interesting to note that, on the ninth day of the present month, Mr. A. G. Davids, Superintendent of the Steubenville (O). Electric Railway, which is being operated under the Sprague patents received the full shock of a 900 volt current which knocked him to the ground, and rendered him temporarily unconscious.

Power for operating the railway is furnished by an Edison machine of 900 voltage. The trolley wire broke and one end fell to the street. The electrician being absent, Davis undertook to repair the damage himself by using insulated tools. The plyers were dull, and he had some difficulty in cutting the wire, but suddenly it parted, and he received the full force of the current. He was soon revived, and, beyond considerable nervous prostration, is uninjured. Other employés of the railway have received shocks in a milder form, and all assert their fearlessness of coming into contact with the supposed deadly current. It leaves some of them qualmish at the stomach, but so far, no fatal results have ensued.

Exhibits at the Convention.

The following letter received from Sec. W. J. Richardson is self-explanatory :

Gentlemen — Inquiry has been made as to whether there will be a street railway exhibit this year at Minneapolis. You may announce that facilities will be afforded all manufacturers, inventors and others desirous of putting their products on exhibition, as heretofore.

Application should be made at once to Thomas Lowry, pres. Minneapolis St. Ry. Co. for space either inside the hotel, or on the street.

Yours truly,
W. J. Richardson, Sec.

Root vs. Third Avenue Railway Co.

OPINION OF JUDGE WALLACE.

In the matter of Root vs. Third Avenue Railroad Co. of New York, in the United States Circuit Court for the Southern District of New York, the following is the opinion of Judge Wallace in granting the decree of injunction in favor of the complainant:

The patent in controversy in this suit is No. 160,757, granted to William Eppelsheimer, March 16th, 1875, for "Improvement in clamp apparatus for connecting street cars, etc., with endless traveling devices." The complainant alleges that the defendant has infringed the second claim of this patent. The claim is as follows:

"2. In combination with the lower jaw *l*, the transverse bar *o*, with its vertical rope-supporting pulleys *p*, substantially as described."

This claim is for a combination, in a gripping device for connecting a street car or other vehicle with an endless moving rope or cable for propelling the vehicle along the track, which consists of two elements, (1) a movable jaw, and (2) a transverse bar, carrying pulleys.

The specification describes and the drawings show a gripping device provided with two jaws, one fixed and one movable, the lower one of which is caused by suitable mechanism operated from the car to advance toward the other and grip a cable moving upon pulleys between them, and to recede and release the cable. The transverse bar *o*, described and illustrated, has vertical rope supporting pulleys, one at each end, so located and arranged that the movable jaw can be raised and lowered between them and carry the cable resting on the pulleys into contact with the fixed jaw when it is raised and release it when the jaw is lowered so that the cable will rest upon the pulleys. The bar is a longitudinal frame to which the pulleys are journaled and held in a fixed relation to the movable jaw. This bar may be connected with the movable jaw so as to be partially rotated by the movement of the jaw as it advances to or recedes from the upper jaw, but this feature may be dispensed with, and it may be secured immovably to the fixed jaw.

The lower movable jaw and the transverse bar with the pulleys, constructed and arranged substantially as thus described, are the elements of the claim. The function of the devices in this combination is to enable the pulleys to support and carry the cable when the jaw is lowered, and hold the cable in such a relation to the two jaws that the lower jaw, when raised again, will restore its contact with the upper or fixed jaw. The combination is confined to parts which co-act when the movable jaw is lowered.

The patentee was not the first to employ a jaw and pulleys as parts of a gripping device for propelling the vehicle by an endless cable, constructed and arranged so that the pulleys support and carry the cable when the jaw is opened and hold the cable in such relation to the jaw that it is removed from the pulleys to the jaw by the closing of the jaw. A combination of these parts having these functions is described and shown in the patent to Andrew S. Hallidie, No. 129,130, granted July 16th, 1872. The gripping jaws of this patent are moved toward or from each other by means of a wedge actuated by a hand-wheel. The pulleys are oblique, two at each end of the jaws, operate in pairs, and are carried by a transverse bar. When it is desired to stop the vehicle the wedge is lowered sufficiently to free the laws from the rope without dropping it from the pulleys. The rope will then be carried by the pulleys at its ordinary speed, ready to be gripped when the wedge is lifted by turning the hand-wheel and the jaws are forced together.

The Hallidie patent is the nearest anticipation of the invention claimed, which is shown in the prior state of the art as exhibited in the record. Except as showing devices which perform in combination the function of the combination of the claim, it is of no value. The other patents in the record, which have been adduced by the defendant for the purpose of negativing novelty, do not merit attention.

It is apparent from the Hallidie patent alone that the claim in controversy does not extend to every combination of pulleys and releasing jaw which will perform the functions mentioned. Consequently the claim is limited by the construction impressed upon it by the prior state of the art, as well as by its reference to the specification, to a combination in which the jaw and transverse bar are substantially such as are described, and in which the pulleys and jaw co-act by the same mode of operation to discharge the function assigned to them.

The real question in the case is whether the gripping devices of the defendant which discharge the same functions, are substantially those of the patent. The gripping device of the defendant has no transverse bar as a distinct and independent element of the combination; but the lower jaw itself supports the pulleys. The lower jaw is the movable jaw, and when raised or lowered carries the pulleys with itself toward or from the fixed jaw. The pulleys are one at each end of the jaw, and have their upper faces on a plane above the jaw. When the two jaws are in contact, the fixed jaw rests upon the lower jaw between the two pulleys, and the seat of the fixed jaw is below the plane of the upper faces of the pulleys. When the movable jaw is lowered the cable is released from the grip of the fixed jaw, and rests wholly upon the pulleys; and when this jaw is raised again the cable resting on the pulleys is held by the grip of the two jaws.

Plainly the lower jaw does the work of the transverse bar, and also of the lower jaw of the complainant's patent. The doubt is whether it should be considered as embodying both a jaw and a transverse bar, or should be deemed a single device which dispenses with one element of the combination claimed. If the claim had been one for the lower jaw and the pulleys, substantially as described, it would have appropriately specified the combination described in the patent, and would have covered in terms the combination of the defendant. The transverse bar of the patent is nothing but a pulley carrier. The movable jaw of the defendants apparatus is a pulley carrier besides being a jaw. It supports the pulleys in the requisite location as respects the fixed jaw, which is the only office of the transverse bar of the patent. If the transverse bar of the patent had been called a pulley carrier in the claim, the movable jaw of the defendant's apparatus would answer the descriptive term. The lower jaw of the defendant's combination does the work of transferring the cable from the gripping jaws to the pulleys, and enables the pulleys to support and carry the cable when the jaw is lowered and hold it in such a relation to the two jaws that the lower jaw, when raised again, will restore the contact of the cable with the upper or fixed jaw, precisely as does the lower jaw of the combination of the patent. The only difference between the two gripping devices is that the pulleys in the defendant's device are connected with the movable jaw, while in the device of the patent they are connected with the fixed jaw; and in the patented devices the movement of the lower jaw to release the cable is a vertical movement, both as respects the fixed jaw and the pulleys, while in the defendant's apparatus the movement of the lower jaw is a vertical movement, as respects the fixed jaw, but not as respects the pulleys. These are merely formal differences. They do not involve any inventive thought, and are immaterial as respects the function and mode of operation of the parts of the combination.

The usual decree for an injunction and accounting is ordered for the complainant.

Our "M. E." Interviewed.

ELECTRIC—CABLE—ELEVATED.

A gentleman from Boston recently called at our office and reversed the usual rule of being interviewed, by himself interviewing our mechanical expert as follows :

(It is not our fault if the persistent Yankee has succeeded in unlocking the store house of our experience, *nolens volens*.)

QUESTION.— "Do cable roads give all the rapid transit in Chicago that is needed ?"

Ans.—"I think they do not ; it would be quite impossible for any one system, as good even as our own (C. C. R.R. Co.'s lines) cable roads to supply the immense and ever increasing demands of this phenomenal city."

"Have you, as an engineer, any prejudice against elevated railways ?"

"Not as such, but I certainly should object to any system of elevated roads which merely transferred a surface, steam road to the top of a structure fourteen or more feet above grade, which from the style of the work as shown by plans or by an unwise application of the 'art imitative' excluded light and air ; and any system which did not render derailment an impossibility. The mere hoisting of a steam surface road into the air, leaving behind the apparent safety which the solid earth gives, to avoid surface traffic, must be a very poor, not to say criminally careless method for accomplishing so great a good as is rapid transit."

"How much faster time do you think the elevated road would give the people of this great city ?"

"Twenty miles an hour including stops would bring the people from the south east corner of the 34th ward or from Evanston to their business with the regularity of clock work, there being no crossings, no traffic hindrances would give an overwhelming impetus to the long-distance business of such a railway."

"Are the cable railway lines worked anywhere near their full capacity ?"

"Not by any means or in any sense; their capacity can only be measured by the obstructions which the ever-increasing surface wheel traffic brings to hinder the regularity of their movements. There is positively no solution to the hindrance question save in an arcade, which the low lying surface of our city precludes, or an elevated."

"Can the whole system of your favorite lines carry twice as many passengers as it does now ?"

"Certainly, if the traffic was healthy and natural enough to warrant the management in such an extensive outlay for rolling stock, the cables could carry the whole city."

"Then you think that, when there is a larger increase of population, and judging from what I see all around me there is really no limit to Chicago's possibilities, an elevated road will become a necessity even in the same territory that your cables traverse ?"

"Yes, or better yet, I am confident that the two systems would be the cause of a large increase in population. I would not follow the population but would lead it."

"Would the elevated railways be patronized for rapid transit in preference to surface roads ?"

"Yes, for two miles or over where the surface roads come in contact with a heavy street traffic, this relates exclusively to that line of patronage which is called 'business traffic,' by the management something like 60 per cent of all street railway custom, but the balance would go as the whim seized them resulting in going out by the 'surface' and back by the elevated lines; again perhaps there would be some local attraction at the terminal, a feature which all successful managers will encourage, in such case either lines would control the traffic in both directions."

"What, in your opinion, is the comparative cost of operating the several systems of horse, cable and elevated lines per mile ?"

"In the order of $6, $3 and $1."

"Do you think that there should be any antagonism between the cable and elevated systems ?"

"Not in the least, not if they are wise enough to see that public benefits produce private or corporate benefits. It would simply create a healthy competition and would give 'elbow room.' By

this I mean that eAery citizen would have his ideal home, pure air and as much cleanliness as his personal habits would warrant."

"Then you think that both systems would be satisfied with the receipts?"

"Oh yes, the more so because receipts follow success and success follows good management and good management follows selection. So you see it all depends upon the prime mover, sometimes called superintendent, sometimes president or general manager. Do the trains move with the regularity of clock work to the infinite satisfaction of the patrons, or are breakages and delays the rule and not the exception then success or failure as the case may be, will be found trending rapidly behind."

"What is the real cost per mile of cable railways?"

"That is a question that is much more easily asked than answered, but there is a legitimate cost as there certainly is to all other structures or classes of merchandise, even; as a rule all things of the same intrinsic value have the same price or cost; that is to say in the same commercial center of the world, but pioneers do not, I do not say why not, construct their cable roads as cheaply, if as well, as those who come after them, again, the notable substitution of steel for iron should and has reduced the construction item while it has enhanced the value of the way immensely. Excuse me, but I am reminded of the fact that the war of the rebellion, were it to be fought over again would require one thousand millions less than the first; judge for yourself how much of this enormous amount would be the result of experience and personal honesty; but to answer your question, cable roads have cost $110,000 per mile and $72,000 per mile, the latter the better structure. I know nothing about the cost of makeshifts."

"Are there any radical defects in the C.C.Ry. Co.'s lines?"

"No, they are all minor, and have been and are rapidly being removed. I refer to the fact that the primitive power houses and machinery have all rapidly given way to the best methods, a very few probably remain, such as depressions in city grades for momentum, utterly useless but insisted upon at the time. Again the twists in the tracks at the pick ups are not only unsightly but a constant menace to the life of construction material; but our worthy brother whose pets they are was probably blissfully ignorant of the graceful curves which follow Hogarth's line of beauty. He has probably by this time found that the true geometrical lines of curvative, which his brother officer urged upon his consideration would have formed a veritable gold mine if they had been used."

"Are your cable conditions healthy?"

"Yes, to a wonderful degree, thanks to the care of the same and other officers in the company's employ, the conditions are very healthy, and as soon as the Walker Mfg. Co.'s Differential Drums can replace the old ones the conditions should and would be satisfactory to all."

"Unfortunately, I find that many criticisms of the North Chicago Street Railway Company's cable lines have much foundation in fact. What is the cause of this?"

"I know that I shall surprise you when I presume to say that, aside from the irregularity of lines and grades, on that road indicating at least faulty construction, the trouble is all in the street machinery as placed in the so-called pits or vaults; by this I mean to say that the movements of the cable are unhealthy, and, till remodeled, we think, always will be so, a hemp rope could not live under such conditions; sea-faring men will tell you that, rather than disturb the healthful conditions of their standing rigging, as they would be obliged to do in lowering the top mast for the purpose of entering certain harbors, they prefer to 'lighter,' or sail many an extra mile. Wise men learn from experience, others never."

"Where do you place the electric motor?"

"Oh they are 'sawing wood.' The time will come speedily when those motors will move all elevated and many surface roads, but where the cable can be well and economically built, with a vast patronage at hand, in my opinion, the electric will not and can not distance it, except as herein indicated."

Correspondence.

MINNEAPOLIS Aug. 11

Until two months ago Minneapolis and St. Paul with a combined population of 400,000 people within a radius of ten miles, were serene and placid in the enjoyment and utilization of the best systems of horse car railroads in the United States. Both systems were owned largely and controlled wholly by President Tom Lowry of Minneapolis. The fine residences of St. Paul are on St. Anthony Hill and Daytons Bluff, and so for a matter of convenience President Lowry had given St. Paul a couple of cable lines. Then Minneapolis became jealous and could only get indefinite future promises for her cable lines. President Lowry held a supposedly exclusive franchise in both cities. Anderson and Douglas local real estate men and capitalists, then came up and told the Minneapolis council that they had powerful Philadelphia backing and if given the privilege, would build some fifteen miles of trunk cable lines in Minneapolis, and at their own expense test the validity of the Lowry franchise in the courts. They also offered to submit to a tax of $25 a car, provide transfer tickets, etc. Public sentiment at once divided, and people and press discussed the question for a month. The city attorney held that the Lowry franchise was good only for cars propelled by horses or pneumatic power. Then Mr. Lowry came forward and offered to do all that Anderson and Douglas would. After a long and bitter fight, the city council by a majority of one vote, agreed to stand by Lowry, and he entered into a bond to the city in the sum of $225,000 to fulfill his promise. He is to build and have in operation, before fall 1890, three trunk cable lines on Washington avenue, from Plymouth to Cedar, on Bloomington avenue and on Central avenue, to that section of Northeast Minneapolis, known as New Boston. He also agrees to experiment on any line that the council may name with electricity, and when it is found satisfactory will adopt electric cars on all other lines as may be ordered by the city council. He will have to change some 40 miles of track from a narrow gauge to standard gauge, give transfer tickets and submit to an annual tax of $25 per car.

This proposition was satisfactory to Minneapolis, and then St. Paul objected. Lowry promised to extend the Selby avenue cable line in St. Paul to Merriam Park for a bonus of $100,000, but St. Paul thought others would build without bonuses. Three or four electric line companies composed of St. Paul capitalists applied for a franchise, and Anderson and Douglas transferred their contest to St. Paul, and asked for the privilege of building 17 miles of cable lines. The St. Paul franchise gives Lowry the right to put horse car lines on any street in that city except Third and Summit avenue. The St. Paul fight is still before the council, and $90,000 of the $100 000 bonus for the Selby avenue extension is pledged. St. Paul is disposed to be very strict with Mr. Lowry and will, unless sentiment changes, exact a promise that all other lines of other companies may cross his tracks, and use certain portions of his trunk lines across bridges, etc. This Mr. Lowry will not submit to and the outcome is uncertain. Meanwhile to head off opposition, Mr. Lowry has suddenly ordered extensions of his St. Paul horse car lines, and has some 500 men now at work laying rails out West Seventh street and University avenue. The latter avenue leads directly to Minneapolis, and it is now only about 4 miles between the University avenue termini of his Minneapolis and St. Paul systems. Yesterday Mr. Lowry promised to rail this gap and run electric cars between the two cities if given a franchise, but St. Paul again objects. The round trip fares on the Milwaukee & St. Paul and Manitoba steam car short lines, is 50 cents for the round trip distance of 20 miles, and if competition could once be secured, the company giving a 5 or even 10 cent fare would have a bonanza far in excess of the celebrated eye water in which Col. Sellers saw "millions."

Before snow flies Lowry or his opponents will be permanently victorious, and the twin cities next spring will see an era of electric and cable car projects that will make real estate men rejoice, and eventually yield a thrifty harvest of nickels to be placed on the profit side of the ledger.

One-third interest in the electric line at Stillwater has been sold for $10,000.

Grand Forks, North Dakota, is agitating for an electric car line. Mayor Griggs, Ex-Secretary McCormack and Wm. Budge are among the agitators.

Forty-five pound rails will be used for the Kearney, Neb., electric lines.

Kearney, Neb., has ten miles of electric railroad.

The Edison Electric Power company, of Minneapolis, offers to furnish power to President Lowry for $2.70 per day per car. Another company proposes to put in an electrical plant and not ask a cent unless it proves entirely satisfactory.

The Western Engineering company, of Kearney, Neb., last spring, put in an electric tramway for the Kearney Brick company, and is at present engaged in equipping street railways with electric power, including motors, dynamos, trucks, and the entire electrical equipment, in the following cities: Salt Lake City, Utah, Plattsmouth, Neb., Omaha, Neb., and two roads in St. Joseph, Mo. The company has just received a 75 horse power Sprague motor. This is the largest motor in the United States used for commercial purposes. It will be employed at the works of the Kearney Brick company. Not only is it large, but it is wonderfully efficient; 94 per cent. of the power being available at the yards, which are almost a mile from the station.

This motor weighs 14,000 pounds. It will be put into service immediately. Both the pulverizing machinery and the presses will be run by it.

I. C. U.

Ho, for Minneapolis.

Delegates and visitors to the annual convention of the Am. St. Ry. Assn. dated to be held in Minneapolis on October 16, will be interested in knowing something about the Chicago, Milwaukee & St. Paul Railway company which now owns and operates over fifty-six hundred miles of thoroughly equipped road in Illinois, Wisconsin, Minnesota, Iowa, Missouri and Dakota. Each recurring year its lines are extended in all directions to meet the necessities of the rapidly populating sections of country west, northwest and southwest of Chicago, and to furnish a market for the products of the greatest agricultural and stock raising districts of the world. In Illinois it operates 317 miles of track; in Wisconsin 1,287 miles; in Iowa 1,566 miles; in Minnesota 1,122 miles; in Dakota 1,213 miles; in Missouri 142 miles, and the end is not yet. It has terminals in such large cities as Chicago, Milwaukee, La Crosse, St. Paul, Minneapolis, Fargo, Sioux City, Council Bluffs, Omaha, Kansas City and St. Joseph Mo, and along its lines are hundreds of large and small thriving cities, towns and villages. Manufacturing interests are cultivated, and all branches of trade find encouragement. The Railway Company has a just appreciation of the value of its patrons, and its magnificent earnings are the result of the good business tact which characterizes the management of its affairs.

The popularity of the line is attested by the fact that notwithstanding the strongest kind of competition of old and new lines, the Chicago, Milwaukee & St. Paul Railway continues to carry the greater proportion of all the business between Chicago, Milwaukee, St. Paul and Minneapolis.

On all its through lines of travel the Chicago, Milwaukee & St. Paul Railway runs the most perfectly equipped trains of Sleeping, Parlor and Dining cars and Coaches. The through trains on all its lines are systematically heated by sfeam. No effort is spared to furnish the best accommodations for the least money, and, in addition, patrons of the road are sure of courteous treatment from its employees

Messrs. Lemieux & Stevens have laid 300 feet of cable conduit in Duluth, Minn., for the purpose of giving their reversible grip a thorough practical test.

Street Railway News.

DOMESTIC.

(See also "New Enterprises," "Extensions," "Franchises Granted," "Incorporations," "Elections," etc.)

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a verification of each item received by them in time for each issue:)

ARKANSAS.

Argenta—The Street Railway company formerly reported in the Gazette as having been incorporated here, has commenced the construction of its line.

Little Rock—The board of directors of the Little Rock Street Railway, on the third day of August 1889, declared a dividend of ten per cent. on the capital stock, payable out of the earnings of the first six months of the present fiscal year.

CALIFORNIA.

Petaluma—Work on the Petaluma street railway is progressing rapidly. The road extends from Sunny Slope avenue in the extreme west of the city to the Sonoma and Marin District Agricultural Park in the eastern portion.

COLORADO.

Denver—The Bowman Still Cable Railway Construction company is about to put its system to a practical test, full details of which will appear in a subsequent issue of the Gazette.

CONNECTICUT.

West Haven—We understand that the West Haven Horse Railroad company will probably adopt steam motors. The company will probably expend about $6,000,000 in improvements.

GEORGIA.

Macon—It has been decided to adopt electricity on all the street car lines here at once.

ILLINOIS.

Bloomington—$400,000 worth of the bonds of the Bloomington Street Railway company have been sold to four New York banking houses. The securities run for twenty years and bear 5 per cent interest. They were sold at 96 cents. The company operates ten miles of street railway tracks.

Jacksonville—The street railway here will be actively pushed to completion.

Joliet—Work on the construction of the Thomson-Houston Electric Co.'s Line is being actively pushed.

Lockport—The Street Railway company of which Mr. C. H. Bacon is president and A. L. Moodey is secretary will build its line in the immediate future.

INDIANA.

Richmond—The Street Railway company will adopt the electric motor system at once.

IOWA.

Clinton—Work on the line of the new street railway here is being pushed to completion.

MICHIGAN.

Detroit—The National Electric Traction Co. has increased its capital stock from $100,000 to $200,000.

Saginaw—The Union Street Ry. Co., of which J. Seligman is president, will adopt electricity as a motive power.

MINNESOTA.

St. Paul—Capt. Henry A. Cassell is interested in the Rapid Transit Line which will be built to North St. Paul.

Stillwater—H. R. Hewitt has disposed of his third interest in the electric street car line to E. D. Allen, of Davenport, Iowa. The exclusive owners of the road now are Dr. W. L. Allen, president; T. O. Swiney, vice-president, and E. D. Allen, secretary and treasurer.

MISSOURI.

Kansas City—Mr. W. B. Knight has been awarded the contract for the construction of the Northeast Street Ry.

Judge Slavens has commenced an examination of the franchises of the various street railway companies at the request of the city license inspector, for the purpose of ascertaining whether they can be compelled to pay a license of $25 on each car run on the roads. It has been the custom of some of the street railway companies to send in an annual report giving the daily average of the number of cars run. The city counselor will submit a written opinion.

President Broadwell, of the Union Cable Railway Co., recently stated that all arrangements had been made for the completion and equipment of the road from Missouri avenue and Oak street to the power house at Third and Highland avenue. The company expects to extend the road to the eastern city limits as soon as it is fully demonstrated that the Terry system, upon which the road is built, is a success.

It has for some time been understood in street railway circles and particularly among the Metropolitan officials that the Broadway horse car line would have to be changed to a cable or electric road. It has been definitely decided now that the grades on Broadway can be easily overcome by electric power, and that as soon as practicable the change to an electric road will be made. The question as to the exact route of the line has been an unsettled one however, but the present plan and the one almost sure to be adopted is to run directly over the old line and extend to Twenty-third street, turning west, however, at Seventeenth and Madison, the present terminus, to Dripps and making its terminus at Twenty-third and Dripps.

Two years ago when a petition was being circulated to build a cable railway on Broadway it was proposed to build directly south on Broadway to Twenty-third. The section of road from Fourteenth and Broadway to Seventeenth and Madison would then have been operated by horse power as a branch line. Officials of the road say there is no plan at present to extend the new electric line out Broadway over the route proposed in the cable petition, but a number of cable men say that it would be to the company's advantage to extend out Broadway even as far as Westport, making the section from Fourteenth and Broadway to Twenty-third and Dripps a branch of the main road.

The route of the road according to present plans will be from Sixth and Main on Sixth to Broadway, on Broadway to Fourteenth, on Fourteenth to Madison, on Madison to Seventeenth, on Seventeenth to Dripps, and on Dripps to Twenty-third. The present mule and car barn at Seventeenth and Madison will be converted into a power house. The change will be begun as soon as the Armourdale line has proven a success and the necessary arrangements can be made. General Manager McCarty is at present in Topeka, where he has gone to examine the working of the electric system at that place.

St. Louis—The Olive Street Cable Road has contracted with the Broderick & Bascombe Rope company for a new cable 50,000 feet in length, to weigh about 125,000 pounds. This will be long enough for the entire route to Forest Park. The present cable is still all right, the new one being held in reserve.

NEBRASKA.

Nebraska City—The Nebraska City Street Railway company has decided to adopt electricity as a motive power.

Omaha—The Omaha Street Railway company has been granted permission to double track its lines.

NEW YORK.

Brooklyn—A. Brinkerhoff, comptroller, will sell at public auction on August 26th the right, franchise and privilege to construct and operate a service line in this city.

The Brooklyn City Railroad company has ratified the recent purchase of the Crosstown, the Calvary Cemetery, the Greenpoint and Brooklyn, the new Williamsburg and Flatbush, and the Greenpoint and Lorimer Street Road. This action increases the capital stock of the Brooklyn City Road to $3,200,000.

Niagara Falls—The Niagara Falls & Suspension Bridge Street Railway company has decided to adopt electricity as a motive power.

Saratoga Springs—Thomas Murray, of New Brunswick, has secured the contract for the construction of the new street railway here reported in the July issue of the Gazette.

Utica—The Peoples Railway company is preparing for the construction of its lines.

The Utica and Mohawk Street Railroad company has purchased a piece of land adjoining the Utica driving park from William Wilsey, which will be made into a public park, to take the place of the old park, which has been adopted as the site for the masonic asylum. The site of the new park adjoins the Utica driving park on the east in Herkimer county and contains about eighty-two acres of land. It is nearly square in shape, and in the center of the plot is a grove, covering twenty acres. The site borders on the West Shore tracks for two thousand feet.

OHIO.

Cleveland—The following preamble and resolution, passed by the Franklin club of this city, will shortly be presented to the city council :—

"Whereas, It has been publicly stated in the daily papers that the presidents of the various street railroad companies are engaged in drafting an ordinance providing for the joint occupancy of Willson avenue; and

"Whereas, such an ordinance so drafted will be far more likely to have in view the prospective profits of said companies than the convenience and welfare of the general public; and

Whereas, many English municipalities, notably Liverpool, Glasgow, Manchester and Sheffield (see Political Science Quarterly, June 8, page 224) are finding it more profitable to lay their own street car tracks, and are deriving a considerable revenue from the rentals paid by the corporations running cars over said tracks;

We, the members of the Franklin Club, citizens of Cleveland, hereby request your honorable body to pass a resolution directing the City Solicitor to draft an ordinance providing that the city shall lay such tracks as may be needed in Willson avenue, and that no private corporation shall be allowed the use of the same without paying the city a just rental therefor."

Hamilton—The Hamilton Street Railway company, of which Mr. H. L. Morey is at the head, is considering the advisability of the adoption of electricity as a motive power.

Lancaster—The Lancaster Street Railway company, previously reported in the Gazette as having been incorporated, has awarded to T. William Harris, of New York, the contract for constructing its first route from the Union railway station north on Broad to Main, west on Main to Columbus, and north on Columbus to Forest Rose cemetery

Toledo—Mr. William E. Hale of the Hale Elevator company and Mr. Norman B. Ream, both of Chicago, have purchased all the city railways here, and will consolidate them under one management. The Consolidated Street Railway company, as the new concern will be known, has a capital of $1,500,000, and every share of the stock is owned by Messrs. Ream and Hale. The property was formerly owned by three companies, the Consolidated, the Metropolitan, and the Central.

Mr. Ream will be president, Mr. Hale the treasurer. They will shortly assume possession. We understand that Mr. A. E. Lang, of this city, will probably be created manager of the new company.

Electricity will, in all probability, be adopted as the motive power.

OREGON.

Portland—The contract has not yet been awarded for the construction of the Waverley-Woodstock Electric Motor Line at this point.

At a recent meeting of the directors of the Portland Railroad company a semi-annual dividend of 2½ per cent. was declared.

PENNSYLVANIA.

Pittsburgh—The East End Street Railway company, which is now a chartered corporation, will build a three-mile line, capital $20,000, from Penn avenue, at the corner of Shady lane, Pittsburgh, to the city line, to the Pennsylvania Railroad crossing in Wilkinsburg, returning by the same route. The directors are W. H. King, G. E. Gilmore, H. L. Trees, Frank Wilcox and G. H. Christian.

RHODE ISLAND.

Olneyville—The Olneyville Business Men's Association here is interested in the cable railway at this point.

TENNESSEE.

Chattanooga—The Union Ry. Co. will probably adopt the storage battery system.

Messrs. Chas. A. Lyerly, Ed. Watkins and Sam W. Divine, who own and operate the new electric railway system in this city which has been successfully operated for about a month, has closed a deal with the City Street Railway company for a controlling interest in that system. The deal is a big one, involving about $450,000. The City Street Railway company owns and operates about 21 miles of street railway, using 35 cars and operating five different lines running to various parts of the city. The new company will discontinue the use of horse power as soon as possible and adopt electricity on all its lines. Ten miles of extension of the two lines are already under contract and are being pushed to completion.

Nashville—We understand that the McGavock & Mt. Vernon St. Ry. Co., which is being operated under the Thomson-Houston patents, and which was illustrated in the July issue of the GAZETTE, will probably adopt the same system on all its lines in the near future.

TEXAS.

Laredo—George Hartson, electrical engineer of the Sprague Co., has arrived here to install its electrical system of car propulsion on the street car line of the Laredo Improvement Co., previously reported in the GAZETTE.

A contract for the cars has been made with Bernard H. Schmidt, of Chicago, western selling agent of the J. G. Brill Co. of Philadelphia, Pa. Mr. J. W. Greer, of the Austin City St. Ry. Co. has been appointed superintendent of the line.

WASHINGTON TERRITORY.

Olympia—Mr. G. M. Savage is interested in the proposed Electric St. Ry. Co. previously reported in the GAZETTE.

WISCONSIN.

Janesville—We understand that the entire plant of the Janesville St. Ry. Co. will probably be sold in the near future. Mr. S. G. Clark is pres. of the company.

NEW ENTERPRISES.

ARKANSAS.

Pine Bluff—The Pine Bluff & Sulphur Springs Railroad & Land Co. is being organized to build a dummy line to Sulphur Springs, six miles. The capital stock is to be $100,000.

CALIFORNIA.

Oakland—E. F. Preston, Edward Pollitz et al. have petitioned for the right to construct and operate a cable road at this point.

San Diego—As reported in the July GAZETTE, a syndicate of capitalists recently purchased the Copeland Street railway franchise here, and it has now been incorporated under the name of The San Diego Cable Railway company. According to the terms in which the articles of incorporation are couched, the amount of the capital stock will be $500,000, divided into sundry shares, of which $300,200 have already been subscribed. The time for which the corporation is to exist is fifty years, and the objects of the corporation are to construct, maintain and operate a cable street railroad over the streets and avenues of the city of San Diego.

COLORADO.

Denver—The Denver Tramway Co. will build about fifteen miles of line and probably adopt the Thomson-Houston overhead system of electrical propulsion.

The Denver Tramway company will at once commence the construction of an electric line here.

DAKOTA.

Sioux Falls—The directors of the Electric Street Railway company are about ready to invite bids and contracts for the construction of its line.

Yankton—Robt. Yates, of the Western Portland Cement Co., will receive proposals until Aug. 12, for the construction of four and one-half miles of street railroad here.

GEORGIA.

Athens—E. G. Harris, of Macon, has purchased the Classic City Street Railroad here, and will improve it at a cost of $20,000, changing to either a dummy or electric road. If electricity is adopted a plant for lighting the city in addition to furnishing power will, probably, be built.

Atlanta—The Metropolitan Street Car company will build a street railway here.

Washington—The Washington Street Railway company will soon commence the construction of its line.

ILLINOIS.

Aurora—A street railway line is to be built here at once.

East St. Louis—An electric street railway will probably be constructed here in the near future. Mr. J. T. McCasland is interested.

Pullman—G. W. Grant is interested in the electric railway to be constructed here.

Quincy—A street railway project, in which Mr. Osborne, of this city, is interested, is now assuming tangible proportions. Electricity will probably be adopted.

IOWA.

Cedar Falls—A project is on foot to build a motor line from this point to Waterloo.

INDIANA.

West Indianapolis—We understand that the Cincinnati Street Railway company contemplates the construction of a line here.

KANSAS.

Argentine—The Metropolitan Street Railway company will build its line at once.

Armourdale—A company is being organized for the purpose of building a street railway at this point, intimation of which was given in a previous issue of the GAZETTE.

Pittsburgh—The Pittsburgh Electric Light & Ry. Co., recently reported in the GAZETTE as having been incorporated, will build an electric street railway at this point. F. E. Doubleday is secretary and treasurer of the company.

LOUISIANA.

New Orleans—The Morgan Ry. Co. is asking a franchise to lay tracks upon certain streets in this city.

MASSACHUSETTS.

Cottage City—B. F. Goodnough, of Boston, is surveying the route of the proposed electric railway at this point.

Lowell—The Lowell Horse Ry. Co. will build a large stable and car barn at once.

MICHIGAN.

Detroit—Henry T. Thurbur, Albert Ives, Jr., and L. B. Sinclair have petitioned the city for a franchise to construct a cable railway here.

East Saginaw—Permission has been accorded the street railway company here to adopt the overhead electric system on its lines, and it will shortly commence work on the same.

MINNESOTA.

St. Paul—The St. Paul Street Railway Co. will construct a cable line to Miriam Park.

Chas. A. Moore is interested in the projected railway to Ft. Snelling, and may be addressed regarding details of same.

MISSOURI.

Kansas City—Proposals for the construction of the Second Street belt line will be received by Pres. F. L. Martin until August 3d.

St. Louis—A franchise for the construction of an electric line has been asked for by the Carondelet, Fourth Street and Fairground Railway Co.

NEW YORK.

Deerfield—During the last 20 years the people of this place have been talking and wishing for a street railroad from that village to Utica. Their desires are about to be realized, as the proposition of Wm. Wharton, Jr. & Co. of Philadelphia, to build the line through the Deerfield turnpike from the Genesee street river bridge, a distance of 5 780 feet, has been accepted. Work on the road will be commenced September 1. The construction will be finished on or before October 1, and if no delay is experienced in the procuring of the cars the road will be in operation immediately after that date. Forty-seven pound rails will be used. The line will be located a little to the right of the center of the turnpike.

Utica—A. D. Barber is interested in the construction of the proposed street car line to Deerfield.

OHIO.

Cleveland—We understand that work on the new cable line on Superior Street will be commenced at once. Col. W. H. Paine, of N. Y., the engineer who built the cable line across the Brooklyn bridge, is the chief engineer of construction, and Hathaway & Robison the contractors. Rails 80 pounds to the yard are to be used, slot rails 58 pounds to the yard, and yokes weighing 400 apiece. The yokes will be laid four feet from center to center and the base of the yoke will rest on a body of concrete six inches deep, and the concrete surrounding the body of the yoke will average twelve inches in thickness. This concrete will extend to within ten inches of the top of the rail, allowing two inches of sand as a bed for the paving stones. The tracks will be paved with the best Medina stone with concrete filling throughout. The manholes, or pulley vaults will be thirty feet apart, and the manhole plates will not be over two feet square. (In Pittsburg they are two feet wide and four feet long.) A new feature of special value is that every four feet there will be placed a tension rod which will be fastened by the slot rail on one side, and pass through a drilled hole in the yoke on the other side. This rod will be three-fourths of an inch in size and inch double nuts at each end. This will make it impossible for the slot rails to close, no matter how cold the weather is, thus obviating the only really serious obstacle cable lines have ever had to encounter.

The power house will probably be built on Superior Street in the neighborhood of Case Avenue, and will be 160 or 200 feet front and 200 feet deep.

The estimated cost of the line on Superior Street is about $600,000, and when the Payne Avenue and St. Clair Street lines are completed, over thirty miles (single track) will be included in the system.

The company will use 30 independent grip cars and 30 closed cars. It is proposed to operate the cable at a speed of 14 miles per hour, beyond Case Avenue, 9 miles an hour between Case Avenue and the square and, by means of an auxiliary cable, at 4½ miles an hour from the P.O. to Wats Street. To Mr. Frank De Hass Robison is due the credit of the promotion of this scheme, his pluck, perseverance and marvelous energy having pushed it through to a success.

PENNSYLVANIA.

Alleghany—The Alleghany Traction Co., recently incorporated, will commence work at once on the Manchester line.

Beltzhoover—A franchise for the construction of its line has been asked for by the Mt. Olivet Incline Plane Street Railway Co.

TENNESSEE.

Chattanooga—Chas. A. Lyerty, Ed. Watkins and Sam W. Devine have purchased the City Street Railway Co's. lines and will adopt electricity.

The Mt. Short Line Incline Railroad Co. has filed articles of incorporation.

TEXAS.

Fort Worth—H. C. Johnson, Robert McCarty and others will build a six mile rapid transit line from the center of the city to University Heights. The line when completed will probably cost in the neighborhood of $100,000.

WASHINGTON TERRITORY.

Olympia—N. H. Owings, of this city, and H. A. Clark, of Spokane Falls, have organized the Olympia and Pacific Railway Co.

WISCONSIN.

Green Bay—H. Burkholder, of Chicago, is endeavoring to secure a street railway franchise here, and will commence the construction of the line at once if the franchise is granted.

FRANCHISES GRANTED, ETC.

ALABAMA.

Montgomery—The Montgomery Terminal & St. Ry. Co. has been granted a franchise to construct a street railway here.

DAKOTA.

Grand Forks—An electrical street railway company has been organized here, and will build a

road as soon as possible. John L. Lewis is one of the projectors of the scheme, and is aided by local capitalists.

ILLINOIS.

Chicago—The Chicago, Madison & Northern Ry. Co. has been granted its franchise by the City Council.

IOWA.

Davenport—The Davenport Electric Street Railway company has been incorporated, which will undertake the construction and operation of a railway system and supply electric light and power within the city of Davenport. The capital stock is $50,000, and the incorporators are Wm. Laller, W. J. McCullough, T. O. Swiney, John P. VanPatten, A. L. Hughes.

Dubuque—The Main St. & High Bridge Ry. Co. has been granted a franchise for a street railway.

Sioux City—The Sioux City Electric Railway company has been incorporated to build and operate a street railway here. The capital stock is $1,000,000. The directors of the company are James E. Booge, John Hornick, F. C. Hills, Fred F. Evans, Jr., Wm. R. Smith and Zeno R. Brown, et al.

INDIANA.

Crawfordsville—I. C. Elston, of this city, has a franchise for the construction and operation of a street railway at this point.

KANSAS.

Paola—The Paola Street Car and Electric Light company has been incorporated with a capital stock of $500,000. Directors, August Lohman, Louis Kiefer and William B. Bragman, of Paola; Julius Herold, of Kansas City, Mo.; Thomas Short, of Detroit, and A. H. Lewis, of Kansas City, Mo.

NEBRASKA.

Omaha—The Sutherland Hotel company has filed its articles of incorporation. Its principal place of business will be Omaha. The company will erect hotels, lay out town sites, loan money, purchase, build and operate railroads, horse car lines, etc. The capital stock is $120,000, and C. T. Taylor, E. L. Bierbower, Jacob Diston, W. W. Lowe, Morris Morrison, James A. Beverly, G. H. Mack, V. H. Coffman and William C. Richardson are the names of several of the incorporators, who will constitute the board of directors until the first annual election. The company's property is in Florida.

So. Sioux City—Articles of incorporation of the South Sioux City Electric Motor Railway company have been filed with the county clerk at Dakota City. The capital stock is $200,000, and the company will commence business when one fifth of the stock has been subscribed. The greatest amount of indebtedness at any one time shall not exceed $26,000. The incorporators are, R. M. Bowler, of DesMoines, Ia., president; J. M. Brown, secretary; Frank Hunt, treasurer; and Atlee Hart, E. C. Palmer, William Luther and Thomas L. Griffey constitute the board of directors, The company has already commenced work laying track.

NEW YORK.

New York City—The Jerome Avenue Ry. Co. has been incorporated, with a capital of $250,000, by W. B. Whitney, J. Romane Brown and Frank Yoran.

Weatherford—The Weatherford City and Suburban Ry. Co. has been organized with a capital of $100,000.

OHIO.

Cleveland—A new departure has just been made by the Brush Electric company, of this city. It has become the largest stockholder in the Short Electric Railway company, incorporated under the laws of Michigan, for the purpose of building electric railways in this and other countries. The capital stock is $1,000,000 in 40,000 shares, of which 14,860 shares are held by the Brush company. The other stockholders are Sidney H. Short, of Cleveland, 2,500; N. B. Abbott, of Columbus, O., 2,000; James J. Tracy, of Cleveland, 10; George W. Stockly, of Cleveland, president of the Brush Electric company, 10; C. F. Brush and J. Potter, of Cleveland, 10 each. The only Michigan stockholder is Wells W. Leggett, of Detroit, who is credited with 100 shares. It is further stated in the articles that the stock subscribed for is paid in full in cash, and by the transfer to the company of valuable rights and franchises which are regarded as worth $500,000. We understand that the central business office will be in Detroit.

(The interest held in this new concern by the Brush Electric Co. is guarantee sufficient to ensure its success.—EDITOR.)

Zanesville—W. B. Chapman, of Akron, has been granted a franchise to build an electric street railway at this point.

PENNSYLVANIA.

Lebanon—The Lebanon Electric Railway Co. has been granted a franchise to construct a line here.

Pittsburgh—The Pittsburgh & Mansfield Railway Co. has been chartered with a capital stock of $50,000. Richard A. Roberts and Wm. J. Dick, of this city, are interested. The East End Street Railway Co. has been chartered with a capital of $20,000, by Wm. H. King and P. E. Gilmore, of Allegheny, Pa.

The Pittsburgh & Wilkinsburg Street Railway company has been chartered, and will build a line five miles long, from the intersection of Penn avenue and Matilda street, Pittsburgh, to the Morning Side road, to Stanton avenue, to Meadow at so near the intersection of Fifth avenue and Frankstown avenue, along Fifth avenue to Grazier, to Brighton avenue, to Amanda, to Wood, Wilkinsburg, to Main or Penn avenue, to Water street, to Walnut, Wilkinsburg. The capital stock is $30,000. The Directors are W. W. Young, P. J. Urling, Erastus Haeviler, James Fitzsimmons, and W. G. Hastings, all of this city.

The Swissvale & Wilkinsburg Street Rail-way Co., capitalized at $3,300,000, has been incorporated by Joseph M. Wilson and Robert Fraser, of Pittsburgh, to build an electric motor line. These gentlemen are also interested in the Sylvan Street Railway Co., which has been incorporated with a capital of $24,000.

The Swissvale and Wilkinsburg Street Railway company, has been chartered with a capital of $33,000. The line will begin in Pittsburgh, on Sylvan avenue, at the northwestern end of the Sylvan bridge, thence along Sylvan avenue to Forward avenue, to Swissvaleavenue at the city line, thence along Swissvaleavenue to Braddock avenue or road, Trenton avenue to Alfred street, to Main street in Wilkinsburg, and thence returning along same route to place of beginning. The line will be operated by electric power. The officers are Joseph M. Wilson, president; W. W. Murray, Henry T. Ronley, David Moore and Robert Frazer, all of Pittsburgh, directors.

The Sylvan Street Railway company has been incorporated with a capital stock of $24,000. The officers are the same as those of the Swissvale & Wilkinsburg Street Railway Co.

Shamokin—The Shamokin Street Railway Co. has been incorporated, with a capital stock of $12,000.

TEXAS.

Galveston—The Galveston & Western R. R. has a franchise for a street railway here, and will build the same at once.

Sherman—The College Park and Electric Belt Line Street Railroad of this city, has been chartered, with a capital of $100,000. Incorporators: N. M. Lee, J. M. Binkley, D. A. Simmons, H. N. Tuck and others.

EXTENSIONS.

Aurora, Ill—The street railway company at this point will extend its lines.

Brooklyn, N. Y.—The South Brooklyn Railway company is preparing to extend its lines.

Columbia, S. C.—The Columbia Street Railroad company will extend its road about 1½ miles.

Dayton, O.—The Dayton and Soldiers' Home Railroad company, recently organized, will be built as an extension of the Fifth Street railway from the city out to the home.

Duluth, Minn.—We understand that the Duluth Street Railway company will at once extend and improve its lines.

Fond du Lac, Wis.—Mr. Burkholder will probably extend his line to the Sixth Ward in the immediate future.

Lockport, N. Y.—The street railway company here will be extended in the immediate future.

Louisville, Ky.—The Central Passenger Railway and the Louisville City Railway contemplate important improvement and extensions.

Memphis. Tenn.—The street railway company here is making improvements and extending its lines.

Oakland, Cal.—We understand that the Oakland Cable company is considering the extension of its line.

Omaha, Neb.—Dr. Mercer will probably extend his motor line to Benson.

Omaha, Neb.—The Omaha Street Railway company will considerably extend its lines.

Racine, Wis.—The Belle City Street Railway company will probably extend its line in the immediate future.

Salem, Ore.—The street railway here is to be extended at once.

St. Joseph, Mo.—The Wyatt Park Railway company, operating under the Sprague patents, will extend its lines to Eby Park.

Seattle, W. T.—The Seattle trustees have granted a franchise to the Front Street Cable Railway company, to extend its lines.

Syracuse, N. Y.—The Third Ward Electric Railway company will extend its lines.

Topeka, Kan.—A. G. Bradstreet, receiver of East Side Street Railway company, has been authorized by Judge Guthrie, in the district court, to borrow $12,000, of which sum $7,000 is to be used in an eastern extension of the line, and $5,000 in the purchase of additional equipment. The extension will be built at once into Ament's park and quarries.

ELECTIONS.

Hartford, Conn.—At the recent annual meeting of the stockholders of the Hartford and Wethersfield Horse Railroad company, the following named officers were elected:

President and Treasurer—E. S. Goodrich.
Secretary—Daniel R. Howe.
Directors—Henry Keney, Roland Mather, James J. Goodwin, Charles L. Lincoln, Daniel R. Howe, Atwood Collins, Samuel G. Dunham, E. S. Goodrich.

Kansas City, Mo—The following officers of the Union Cable Railway company have been elected:

President—M. M. Broadwell.
Vice-president—John O'Grady.
Secretary—Wm. J. Broadwell.
Treasurer—Wm. Weston.
Assistant Secretary—John W. Moran.

Minneapolis, Minn.—At the annual meeting of the Judson Pneumatic Street Railway company the following officers were elected:

President—W. L Judson.
Vice-president and General Manager—H. D. Cook.
Secretary and Treasurer—H. L. Earle.
Attorneys—James F. Williamson, Minneapolis; Gen. W. W. Dudley, Washington, and Hoadley, Lanterbach & Johnson, New York.
Consulting Engineers—Robert Gillham, Kansas City, and Capt. T. W. Symons.

Pittsburgh, Pa.—The Duquesne Electric Railway Construction company has elected the following officers:

President—W. J. Hammond.
Vice-president—John V. Patton.
Treasurer—W. J. Hammond, Jr.
Secretary and General Manager—W. J McElroy.

Seattle, W. T.—At a recent meeting of the Front Street Cable Railway company, Dr. A. P. Mitten was appointed manager.

San Diego, Cal.—The following officers of the San Diego Cable Railway company have been elected:

President—D. D. Dare.
Vice-president—John C. Fisher.
Secretary and Treasurer—John W. Collins.
Directors—D. D. Dare, J. W. Collins, John C. Fisher, San Diego; J. W. Woodside, Philadelphia; W. R. Stebbins, New York.

Patents.

The following is a complete list of such patents as relate to Street Railway Interests, issued during the past month, especially prepared for the STREET RAILWAY GAZETTE, by John C. Higdon, solicitor of patents and trade-marks, room 29 St. Cloud Building, opposite U.S. Patent Office, Washington, D C. A printed copy of any patent here named will be furnished by him for 25 cents (stamps).

Issue of July 2, 1889.

406,391. System of Electric Propulsion, H. D. Dibble, Rochford, Dak. Ter.
406,170. Station or Street Indicator, C. H. Jenne, Indianapolis, Ind.
406,142. Passenger Register, H. Kershaw and T. Sutcliffe, Rochdale, County of Lancaster, Eng.
406,301. Cable-Railway Grip, Rapid Transit Cable Co., New York, N. Y.
406,302. Cable-Railway Structure, Rapid Transit Cable Co., New York, N. Y.
406,303. Cable Railway, Rapid Transit Cable Co., New York, N. Y.
406,300. Cable-Grip, Rapid Transit Cable Co., New York, N. Y.

Issue of July 9, 1889.

406,415. Dynamo, W. S. Andrews, New York, N. Y., and T. Spencer, Westbrook, Conn.
406,420. Electric Railway Switch, F. O. Blackwell, New York, N. Y.
406,421. Electric Railway Circuit, J. L. Blackwell, New York, N. Y.
406,820. Cable-Guide Pulley, J. Crowther, Elmwood Place, Ohio.
406,429. Dynamo-Armature, United Electric Improvement Co., Gloucester, N. J.
406,743. Electric Railway, W. H. Knight, New York, N. Y.
406,752. Curve and Crossing Device for Cable Railways, A Martinez, Philadelphia, Pa.
406,599. Dynamo-Electric Machine, W. L. Silvey, Lima, Ohio.
406,600. Electric Railway Motor, Sprague Electric Railway and Motor Co., New York, N. Y.
406,797. Closed Slotted Conduit for Electric Railways, C. J. Van Depoele, Lynn, Mass.
406,798. Mechanism for Controlling Electric-Railway Motors, C. J. Van Depoele, Lynn, Mass.
406,802. Railway, Electro-Automatic Transit Co., Baltimore, Md.
406,803. Carrier for Electric-Railway Systems, Electro-Automatic Transit Co., Baltimore, Md.
406,804. Electric Railway, Electro-Automatic Transit Co., Baltimore, Md.
406,805. Electric Railway, Electro-Automatic Transit Co., Baltimore, Md.
406,806. Electric Railway, Electro-Automatic Transit Co., Baltimore, Md.
406,492. Armature-Winding for Dynamos, J. J. Wood, Brooklyn, N. Y,
406,493. Self-Regulating Dynamo, J. J. Wood, Brooklyn, N. Y.

Issue of July 16, 1889.

406,874. Electric Motor, J. Buckley, Boston, Mass.
407,171. Cable-Railway Brake, O. Cope, San Francisco, Cal.
407,188. Electric Railway, D. D. Field, trustee, S. J., C. W., H. M. and S. D. Field, New York, N. Y.
406,915. Switch for Pneumatic Street Railways, Judson Pneumatic Railway Co., Minneapolis, Minn.
407,014. Regulator for Electric Motors, United States Electric Lighting Co., New York, N. Y.
406,917. Electric Track-Sweeper, W. H. Knight, New York, N. Y.
407,225. Commutator Brush and Holder, Loomis Electric Manufacturing Co., of New York, N. Y.
407,094. Car-Propelling Apparatus, W. Main, Brooklyn, N. Y.
406,922. Electric Motor, M. H. Robinson, and O. A. Foster, Boston, Mass.
406,928. Traction Gripper for Cable Railways, M. A. Michales, Allegheny, Pa.
406,961. Regulating Device for Electric-Railway Cars, W. M. Schlesinger, Philadelphia, Pa.
406,968. Dynamo-Electric Machine, N. Tesla, New York, N. Y.

Issue of July 23, 1889.

407,327. Electric Generator, C. E. Buell, Newark, N. J.
407,470. Circuit for Electric Railways, H. H. Cutler, Newton, Mass.
407,441. Grip, W. Johnson, Penn Yan, N. Y.
407,369. Car Starter. J. H. Palmer, Philadelphia, Pa.
407,745. Electrical Railway, S. H. Short, Denver, Colo.
407,496. Electrical Railway, United States Electric Co., Denver, Colo.
407,749. Extensible Upward-Pressure Contact Arm, C. J. Van Depoele, Lynn, Mass.
407,389. Automatic Signal for Crossing of Cable Railways, G. H. Wright, San Francisco, Cal.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents (stamps).

Expire during August.

130,275. Car Starter, C. B. Broadwell.
130,499. Portable Fare Box, W. J. Hooper.
130,500. Portable Ticker Box, W. J. Hooper.
130,470. Lubricator for Car Axles, G. A. Brannan.
130,756. Change Box for Conductors, J. B. Slawson.

Business Mention.

The Pullman Co. recently shipped a large number of motor and trail cars to Omaha, and will ship twenty or thirty more, to the same place, within a few weeks.

The Willamette Bridge Railway company, in addition to the equipment already contracted for, has ordered a large combination car from the Pullman Co. for service on its Bridge line.

The Pullman Co. has just shipped to the Watertown & Lake Kampeska Railway company, of Watertown, Dakota, one large open excursion car, with a seating capacity of ninety, for use in connection with a steam motor.

The Pullman Co. is designing something new in the line of electric cars, which it expects to have in operation on the Pullman railroad some time this fall.

An order has just been given the Pullman Co. by the Federal Street & Pleasant Valley Passenger Railway Co., of Pittsburgh, for twenty-five vestibule motor cars, for delivery November 1st.

The Tacoma & Fern Hill RR. Co. of Tacoma, Wash. Ty., has ordered of the Pullman Co. one motor car, to be the duplicate of the one recently shipped to the same concern.

The Ottumwa Street Railway Co. (Ia.,) has contracted with the Pullman Co. for four cars, to be operated by the Thomson-Houston system.

The Union Street Railway Co , of Sterling, Ill., has placed an order with the Pullman Co. for nine cars, to be operated by the Sprague system.

"OFFICE OF ST. LOUIS CABLE & WESTERN RY. CO, ST. LOUIS, May 25, 1889.

John Walker, Vice Pres. The Walker Mfg. Co. Cleveland, O.

DEAR SIR: In answer to your inquiry, we take pleasure in testifying that your Differential Cable Drums have been at work successfully at the St. Louis Cable & Western power house for over eleven months, and that the Differential Rings show no perceptible wear and are entirely loose on the drums. We cheerfully testify to having seen targets inserted in the rings, which showed the differential movement of same while under full duty. The cables are lasting much longer than formerly with a considerable saving in fuel. Very respectfully,

(Signed) A. W. FIGUEINDO, Manager.
M. A. SHIPLEY, Supt.
JOB V. STARR, Chief Engineer.
S. D. COLLIER, Chief Splicer.
R. LEHMANN, Chief Clerk.

Mr. C. C. Warren has been appointed manager of the Leonard & Izard Co., Chicago. Mr. Warren first entered the electric field in 1881, when he installed some central stations in Toledo, Ohio. The following year he was created the sole representative of the U. S. Electric Light Co., which important position he retained until that corporation virtually went out of existence. The control of the Leonard & Izard Co. has now passed into the hands of the Edison company, so Mr. Warren is now really in charge of all the business of that company for the states of Ohio, Indiana, Illinois, Kentucky, Michigan, Wisconsin, Minnesota, Iowa and Missouri, excepting so far as the licensed cities are concerned.

Associated with Mr. Warren is Mr. W. S. Andrews, as superintendent of construction, who has had a vast experience in central station work with both the Edison and the Leonard & Izard companies, and with the valuable assistance of this able gentleman, Mr. Warren can hardly fail to make as great a success in his new field as he did in his old connection.

NEW YORK AND BROOKLYN STREET RAILWAY SECURITIES.

STOCK QUOTATIONS.

NAME OF COMPANY.	Par Value	Amount.	Period.	Rate.	Date.	Bid.	Asked
Atlantic Avenue Railroad	$ 50	1,000,000	------	6	1st July, 1889	105	108
1st mortgage	----	140,500	M. & N.	7	1st May, 1894	107	112
Central mortgages	----	757,000	A. & O.	5	1st Oct., 1909	103	108
Bleecker St. & Fulton Ferry	100	900,000	J. & J.	¾	1st July, 1889	28	30
1st mortgage	1,000	700,000	J. & J.	7	July, 1900	115	120
Broadway & Seventh Avenue	100	2,100,000	Q.—J.	4	July, 1889	182	195
1st mortgage	1,000	1,500,000	J. & D.	5	June, 1904	106	108
2d mortgage	1,000	500,000	J. & J.	5	July, 1914	104	106½
Broadway Surface Rds	1,000	1,500,000	J. & J.	5	July, 1924	105	106
Bonds guaranteed	1,000	1,000,000	J. & J.	5	July, 1905	90	95
Brooklyn City	----	8,200,000	Q.—F.	2	1st May, 1889	140	1 5
1st mortgage	1,000	800,000	J. & J.	5	Jan., 1902	103	105
Brooklyn City & Newtown	100	--------	------	--	----------	132	135
1st mortgage	1,000	--------	------	7	1890	----	-----
Consolidated	----	--------	------	5	1903	----	-----
Brooklyn Crosstown	100	500,0 0	A. & O.	5	1st July, 1889	185	200
1st mortgage	1,000	200,000	J. & J.	5	Jan., 1888	108	110
Bushwick Avenue (Brooklyn)	100	500,000	Q.—F.	2	May, 1889	140	150
1st mortgage	1,000	400,000	J. & J.	6	Jan., 1902	105	110
Central Park, North and East River	100	1,800,000	Q.—J.	1½	April, 1889	99	102
Consolidated mortgage bonds	1,000	1,200,000	J & D.	7	Dec., 1902	118	121
Christopher & Tenth St	100	650,000	Q.—F.	1¾	1st May, 1889	125	128
1st mortgage	1,000	150,000	A. & O.	7	1898	114	116

NAME OF COMPANY.	Par Value	Amount.	Period.	Rate.	Date.	Bid.	Asked
Dry Dock, East Broadway & Battery	100	1,200,000	Q.—F.	2	1st May, 1889	120	125
1st mortgage consolidated	500&c.	900,000	J. & D.	7	June, 1893	107	109
Scrip	100	1,200,000	F. & A.	6	May, 1914	104	106
Eighth Avenue—stock	100	1,000,000	Q.—J.	2	April 1889	142	144
Scrip	100	1,000,000	F. & A.	6	Feb., 1914	106	110
Forty-Second Street & Grand Stree Ferry—stock	100	748,000	Q.—F.	3	May, 1889	218	220
1st mortgage	1,000	236,000	A. & O.	--	April, 1893	108	112
42d St., Manhattanville & St. Nicholas ave—stock	100	2,500.000	------	--	------- ------	39	41
1st mortgage	1 000	1.200,000	M. & S.	6	March, 1910	114	118
2d mortgage, income	1,000	1,600,000	J. & J.	6	July, 1915	59	62
Houston, West St. & Pav. Ferry—stock	100	250,000	Q.—F.	2	Feb., 1886	165	-----
1st mortgage	500&c	500,000	J. & J.	7	July, 1894	109	112
Ninth Avenue	100	800.000	------	3	Sept., 1885	75	83
Second Avenue—stock	100	1,862,000	J. & J.	5	Jan., 1887	98	101
Consolidated convertible	1,000	1,600,000	M. & N.	5	1st Nov., 1909	106	107
Debenture bonds	-- --	150,000	------	5	1909	100	-----
Sixth Avenue—stock	100	1,500,000	Q.—F.	1½	1st May, 1889	165	175
1st mortgage	1,000	500,000	J. & J	7	July, 1890	105	106
Third Avenue—stock	100	2,000,000	Q.—F.	5	1st May, 1889	240	260
1st mortgage	1,000	2,000,000	Q.—F.	7	Jan., 1890	105	107
Twenty-Third Street—stock	100	600.000	F. & A.	2½	1st May, 1889	225	230
1st mortgage	1,000	250,000	M. & N.	7	May, 1893	110	112
Debentures	----	150,000	------	5	1903	101	103

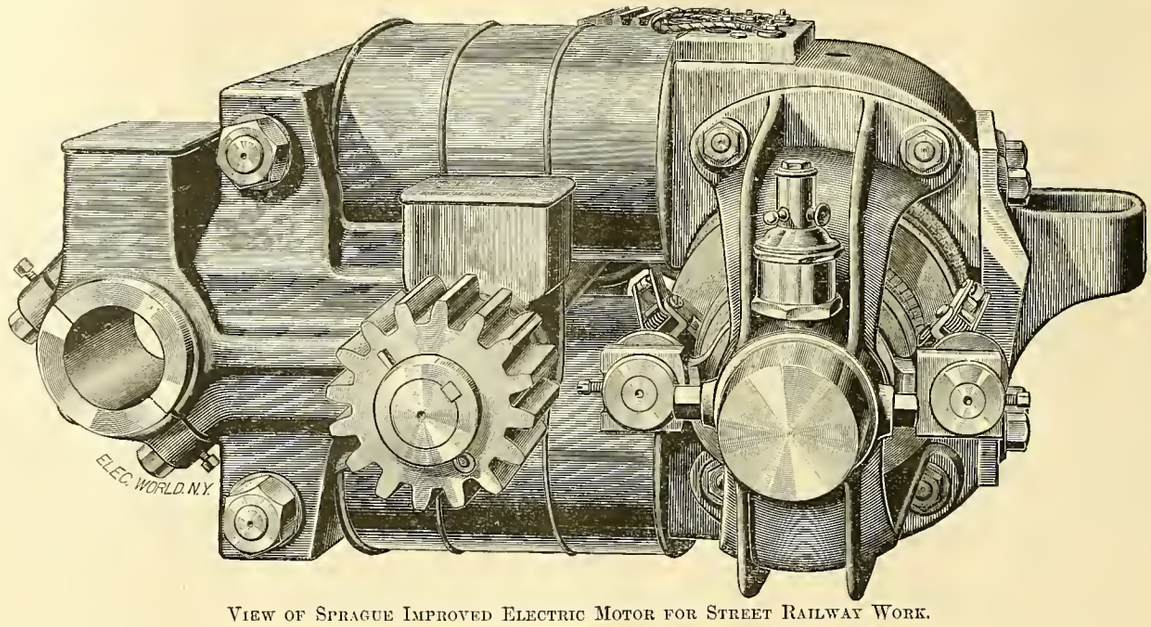
ELECTRIC STREET RAILWAYS IN AMERICA.

(IN OPERATION OR UNDER CONTRACT.)

Corrected to August 12, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Adrian Elec ric Ry	Adrian, Mich	Nat. Elec. Trac. Co.		3
Akron Electric Ry. Co	Akron, O	Sprague	12	6 5
" " " (So. Side Ext.)	Akron, O	Sprague	10	6
Alliance St. Ry. Co	Alliance, O	Thomson-Houston	3	2
Americus Street RR. Co	Americus, Ga	Thomson-Houston	4	5.5
Appleton Elec. St. Ry. Co	Appleton, Wis.	Van Depoele	6	5.5
Asheville St. Ry. Co	Asheville, N. C	Sprague	3	4.5
Atlanta & Edgewood St. Ry. Co	Atlanta, Ga	Thomson-Houston	4	4.5
Atlantic City Elec. RR. Extension	Atlantic City,	Thomson-Houston	4	5
Attleboro & North Attleboro RR. Co	Attleboro, Mass	Thomson-Houston	5	8
Auburn Street RR. Co	Auburn, N. Y.	Thomson Houston	3	3
Balt. Union Pass. Ry. Co	Baltimore, Md	Daft	4	2
Bangor St. Ry. Co	Bangor, Me.	Thomson-Houston	4	5
Bay City RR.	Bay City, Mich.	Sprague	3	5
Bay Ridge Elec. RR.	Bay Ridge, Md	Sprague	2	2
Belt Line	Lynn, Mass	Thomson-Houston	4	4 5
Broadway & Newburgh St. Ry. Co	Cleveland, O	Sprague	16	10
Brooklyn St. Ry. Co.	Cleveland, O	Thomson-Houston	10	10
Buffalo St. Ry. Co	Buffalo, N. Y.	Sprague	4	2.5
Carbondale & Jermyn St. Ry	Carbondale, Penn.	Sprague	3	1.5
Central Passenger Ry. Co	Louisville, Ky.	Thomson-Houston	10	10
Central Ry. Co	Peoria, Ill	Thomson-Houston	15	10
Chattanooga Electric St Ry. Co	Chattanooga, Tenn	Sprague	6	5
Cincinnati & Inclined Plane Ry	Cincinnati, O.	Sprague	20	6
Cincinnati St. Ry. Co	Cincinnati, O.	Thomson-Houston	8	2.7
Citizens Elec St Ry	Decatur, Ill	Thomson-Houston	4	5
Citizens' St. Ry	Elkhart, Ind	Fisher-Rae		7
Colerain Ave. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	5
Collamer Line	East Cleveland, O	Sprague	8	3
Columbus Consolidated St. Ry. Co	Columbus, O	Short	2	2
Danville St. Car Co	Danville, Va	Thomson-Houston	4	2
Decatur Electric St. Ry	Decatur, Ill	Nat. Elec. Trac. Co.		3
Derby Horse Ry. Co.	Ansonia, Conn	Thomson-Houston	1	4
Detroit City Ry., Mack St. Line	Detroit, Mich	Nat. Elec. Trac. Co.		2
Detroit, Rouge River & Dearboro RR.	Detroit, Mich	Sprague	1	1
Davenport Cent. St. Ry. Co	Davenport, Ia.	Sprague	9	3.5
DesMoines Broad Gange Ry. Co	DesMoines, Ia	Thomson-Houston	8	10
Detroit Elec. Ry. Co	Detroit, Mich	----------		
East Cleveland Ry. Co	Cleveland, O	Sprague	32	8
East Detroit & Grosse Pointe	Detroit, Mich	Nat. Elec. Trac. Co.		8
East Harrisburg Pass. Ry. Co	Harrisburg, Pa.	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa	Thomson-Houston	1	
East Reading RR. Co.	Reading, Pa.	Sprague	3	2.5
" " Extension	" "	Sprague	1	1
East Side St. Ry. Co	Brockton, Mass.	Sprague	4	4
Eau Claire St. Ry. Co	Eau Claire, Wis.	Sprague	6	5
Erie City Pass. Ry. Co	Erie, Pa	Sprague	20	12
Eckington & Soldiers Home Elec. Ry.	Washington, D. C.	Thomson-Houston	10	3
Essex Co. Pass. Ry. Co	Newark, N. J.	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa	Sprague	25	9.5
Fort Worth City Ry. Co	Fort Worth, Tex.	Nat. Elec. Trac. Co.		10
Fort Worth Land & St. Ry. Co	Fort Worth, Tex.	Nat. Elec. Trac. Co.		15
Fulton County St. RR	Atlanta, Ga	Thomson-Houston	8	9
Gratiot Elec. Ry.	Fort Gratiot, Mich	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn	Sprague	4	3
Highland Park Elec. Ry. Co	Detroit, Mich	Fisher	4	8 5
Highland Park Ry	Detroit, Mich	Fisher-Rae		3.5
Hillside Coal Co	Scranton, Pa	Thomson-Houston	1	1
Hoosac Valley St. Ry. Co.	N. Adams Mass	Thomson-Houston	6	5
Huntington Elec. Ry. Co	Huntington, W. Va	Short	2	3.5
Ithica Street Ry. Co.	Ithica, N. Y.	Daft	2	1
Jamaica & Brooklyn RR.	Jamaica, N. Y.	Van Depoele	10	9
Key City Elec. Ry. Co.	Dubuque, Ia.	Sprague	4	2
Lafayette St. Ry. Co	Lafayette, Ind	Sprague	9	3
Lafayetta Traction Co	Easton Pa	Daft	2	1
Laredo City RR. Co	Laredo, Tex	Sprague	4	4
Lima St. Ry. Power and Motor Co.	Lima, O	Van Depoele	7	6
Lindell Ry. Co.	St. Louis, Mo	Julien	1	
" Ave. RR. Co	" "	Sprague	10	5.5
Lng. Island City& Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Los Angeles Elec. Ry. Co.	Los Angeles, Cal.	Daft	4	5
Lynn & Boston Ry.Co —Crescent Beach	Lynn, Mass	Thomson-Houston	1	1
" " Ry. Co —Nahant Line	" "	Thomson-Houston	1	5.7
" " RR. Co.—Highl'nd line	" "	Thomson-Houston	3	2
" " RR. Co—Nahan line	" "	Thomson-Houston	1	.8
" " St. Ry. Co.	Crescent Beach, Mass	Thomson-Houston	1	1
" " Myrtle St. Line		Thomson-Houston	4	3
Main St. & Lichy Ave. RR	Nashville, Tenn	Sprague	4	2
Main Street Line Exto., U. P. Ry.	St. Joseph, Mo.	Sprague	4	1
Manchester & Richmond Ry. Co.	Manchester, Va	Sprague	10	3.5
Mansfield Elec. St. Ry. Co.	Mansfield, O	Daft	5	4 5
McGavoe & Mt. Vernon St. Ry. Co.	Nashville, Tenn	Thomson-Houston	6	3
Marlboro St. Ry. Co.	Marlboro, Mass	Sprague	2	3

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Meriden Horse Ry. Co.	Meriden, Conn.	Daft	12	5
Metropolitan RR.	Portland, Ore.	Sprague	4	3
Metropolitan St. Ry. Co.	Kansas City, Mo.	Thomson-Houston	4	4.5
Minneapolis St. Ry. Co.	Minneapolis, Minn.	Sprague	6	6.5
Mt. Adams & Eden Pk. Incl. Ry. Co.	Cincinnati, O.	Daft	3	1
Nanmkeag St. Ry. Co.	Salem, Mass.	Thomson-Houston	6	3
Nayang Cross-Town Ry.	Scranton, Pa	Thomson-Houston	3	150
New Horse Ry.	Meriden, Conn	Daft	12	5
Newburyport & Amesbury H. Ry. Co.	Newburyport, Mass.	Thomson-Houston	2	6
Newport Street Ry. Co	Newport, R. I.	Thomson-Houston	6	4.5
Newton St. Ry. Co.	Newton, Mass.	Thomson-Houston	10	8.
N. Y. & Harlem RR. Co. (4th Ave)	New York, N Y.	Julien	10	8 5
Observatory Hill Pass. Ry. Co.	Allegheny, Pa.	Bentley Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg. Co.	Omaha, Neb.	Thomson Houston	14	14
Omaha & Council Bluffs Ry. & B. Co.	Omaha, Neb.	Sprague	2	4
Omaha Horse RR.	Omaha, Neb.	Sprague	20	10
Omaha Motor Ry. Co.	Omaha, Neb.	Thomson-Houston	26	10
Ontario & SanAntonio Heights Ry. Co.	Ontario, Cal.	Daft	4	8
Ottawa Electric St. Ry. Co.	Ottawa, Ill.	Thomson-Rouston	8	5
Pacific Ave. St. Ry. Co.	Tacoma, Wash. Ter	Sprague	8	6
Passenger RR., Extenaion	East Harrisburg, Pa.	Sprague	4	3
Peoples RR. Co.	St. Joseph, Mo.	Sprague	20	10
Pennsylvania RR. Co.	Atlantic City, N. J.	Sprague	6	6.5
Pittsburgh Sub. Rapid Transit Co.	Pittsburgh, Pa.	Daft	3	
Pittsb., Knoxville & St. Clair St. Ry.	Pittsburgh, Pa.	Daft	4	2.25
Plattsmouth Elec. RR.	Plattsmouth, Neb	Sprague	2	2
Plymouth & Kingston Ry. Co.	Plymouth, Mass.	Thomson-Houston	3	4.5
Port Chester & Rye Beach St. Ry. Co.	Port Chester, N. Y.	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich.	Van Depoele	6	4
Quincy St. Ry. Co	Quincy, Mass.	Thomson-Rouston	4	5
Redbank & Seabright Ry	Redbank, N. J.	Thomson-Houston	3	5
Revere Beach Ry. Co.	Revere, Mass.	Thomson-Rouston	1	1
Revere St. Ry. Co	Revere, Mass. (Ex.)	Thomson-Rouston	4	1.5
Richmond City Ry. Co.	Richmond, Va	Sprague	46	18
Richmond St. Ry. Co.	Richmond, Ind.	Thomson-Houston	6	4
Richmond Union Pass. Ry. Co	Richmond, Va	Sprague	50	7.5
Riverside & Suburban Ry. Co.	Wichita, Kans.	Thomson-Houston	6	9
Rochester Elec. Ry. Co	Rochester, N. Y.	Thomson-Houston	8	7
Ross Park St. Ry. Co	Spokane Falls, W. T.	Thomson-Houston	6	7.5
St. Louis St. Ry Co.	St. Louis, Mo	Short	5	3
San Diego St. Ry. Co.	San Diego, Cal.	Henry	9	4
Sandusky Elec. Ry. Co.	Sandusky, O.	Sprague	6	6.75
San Jose & Santa Clara RR. Co.	San Jose, Cal.	Fischer	6	10
St. C., Merriton & Thorold St. Ry. Co.	St. Catharines, Ont.	Van Depoele	10	7
Salt Lake City RR. Co.	Salt Lake, Utah	Sprague	10	6.5
Sault Ste. Marie St. Ry. Co.	Sault Ste Marie, Mich.	Fischer	2	
Sault Ste. Marie St. Ry	Sault Ste. Marie, Mich	Fisher-Rae		3
Scranton Suburban Ry. Co.	Scranton, Pa.	Thomson-Houston	10	5
Scranton Pass. Ry. Co.	Scranton, Pa.	Thomson-Houston	4	2
Seashore Elec. Ry. Co.	Ashury Park, N. J.	Daft	20	4
Seattle Elec. Ry. & Power Co.	Seattle, W. T.	Thomson-Houston	5	5
Southington & Plantsville Ry. Co.	Southington, Conn.	Thomson-Houston	2	2
South St. Paul Rapid Transit Co.	S. St. Paul, Minn.	Daft	10	8
Squirrel Hill RR.	Pittsburgh, Pa.	Sprague	5	3.5
Stenbenville Elec. Ry. Co.	Stenbenville, O.	Thomson-Houston	6	2.5
Stillwater Elec. St. Ry.	Stillwater, Minn	Sprague	6	5
Tacoma Ave. St. Ry. Co.	Tacoma, Wash. Ter.	Sprague	4	2
The Peoples St. Ry.	Topeka, Kans.	Sprague	20	12
Third Ward Ry. Co.	Syracuse, N. Y.	Thomson-Houston	8	4
Toledo Elec. Ry. Co.	Toledo, O.	Thomson-Houston	2	2
Topeka Rapid Transit Co.	Topeka, Kas.	Thomson-Houston	30	17
Troy & Lansinburg St. RR.	Syracuse, N. Y.	Sprague	6	5.5
Union Pass. RR.	St. Joseph, Mo.	Sprague	8	5
Union Elec. RR.	Sterling, Ill.	Sprague	7	6
University Pk. Ry. & Electric Co.	Denver, Col.	Thomson-Houston	3	4
Vine St. Ry	Kansas City, Mo.	Thomson Houston	6	3
Washington St. Asylum & Park RR.	Binghamton, N. Y.	Sprague	4	5
Watervliet Turnpike & RR. Co.	Albany, N. Y.	Thomson-Houston	16	15.5
West Dallas St. Ry. Co.	Dallas, Tex	Sprague	2	3
West End St. Ry Co , Brookline Brch.	Boston, Mass.	Sprague	1	10
" " Harvrd. Sq. Brch.	Boston, Mass.	Thomson-Houston	23	12
" " Bylstn & Beach sts	Boston, Mass.	Bentley-Knight	20	14
Wheeling Ry. Co.	Wheeling, W. Va.	Thomson-Houston		
Wichita & Suburban Ry. Co.	Wichita, Kans.	Sprague	7	7.5
Wilkesbarre & Sub. St. Ry. Co.	Wilkesbarre, Pa.	Sprague	7	3
Wilkesbarre & West Side RR.	Wilkesbarre, Pa.	Sprague	8	4
Willamette Bridge RR.	Portland, Ore.	Sprague	5	1.5
Wilmington City Ry. Co.	Wilmington, Del.	Sprague	4	3
Windsor Elec. St. Railway Co.	Windsor, Ont.	Van Depoele	2	2
White Line St. RR.	Dayton, O.	Van Depoele	12	9
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo.	Sprague	9	4.5
Wyatt Park Ry. Co.	St. Joseph, Mo.	Sprague	8	5.5



View of Sprague Improved Electric Motor for Street Railway Work.

Our Electric Motor Equipment includes the following Special Advantages: Flexible Suspension for Motors, Noiseless Gearing, Gears, Pinions and All Parts Independently Removable, Brushes of a New Design and Perfection as regards Ease of Running, Motors Move in Either Direction with Equal Facility, Single Movement Control from Either Platform without the use of any Wasteful Resistance, All Wear Reduced to a Minimum, Best Mechanical and Electrical Construction and Workmanship.

Report of the East Cleveland Railway.

(SPRAGUE SYSTEM.)

FOR THE MONTH OF MAY, 1889.

17	Cars on Duty.
487	Car Days.
45,640	Miles Run.
93.72	Average Car Mileage per Day.
193.19	Maximum Car Mileage in One Day.

The following Runs per day were made:

2 runs of	193 miles.	31 runs of	136 miles.
2 "	190 "	23 "	131 "
1 "	170 "	22 "	125 "
1 "	165 "	1 "	121 "
3 "	159 "	23 "	119 "
4 "	153 "	27 "	114 "
6 "	148 "	37 "	108 "
9 "	142 "	34 "	102 "

The duty required of these cars was constant and of the hardest kind. They were obliged to run at the highest rate of speed all the time. The line passes two steam railway crossings.

THERE WERE NO RESERVE CARS.

One Car Averaged 114.08 miles per day for the entire month.

Write for circulars and full information in regard to the Sprague System to

THE SPRAGUE ELECTRIC RAILWAY AND MOTOR CO.

16 & 18 Broad Street, NEW YORK.

The Street Railway Gazette.

VOL. IV. SEPTEMBER, 1889. No. 9

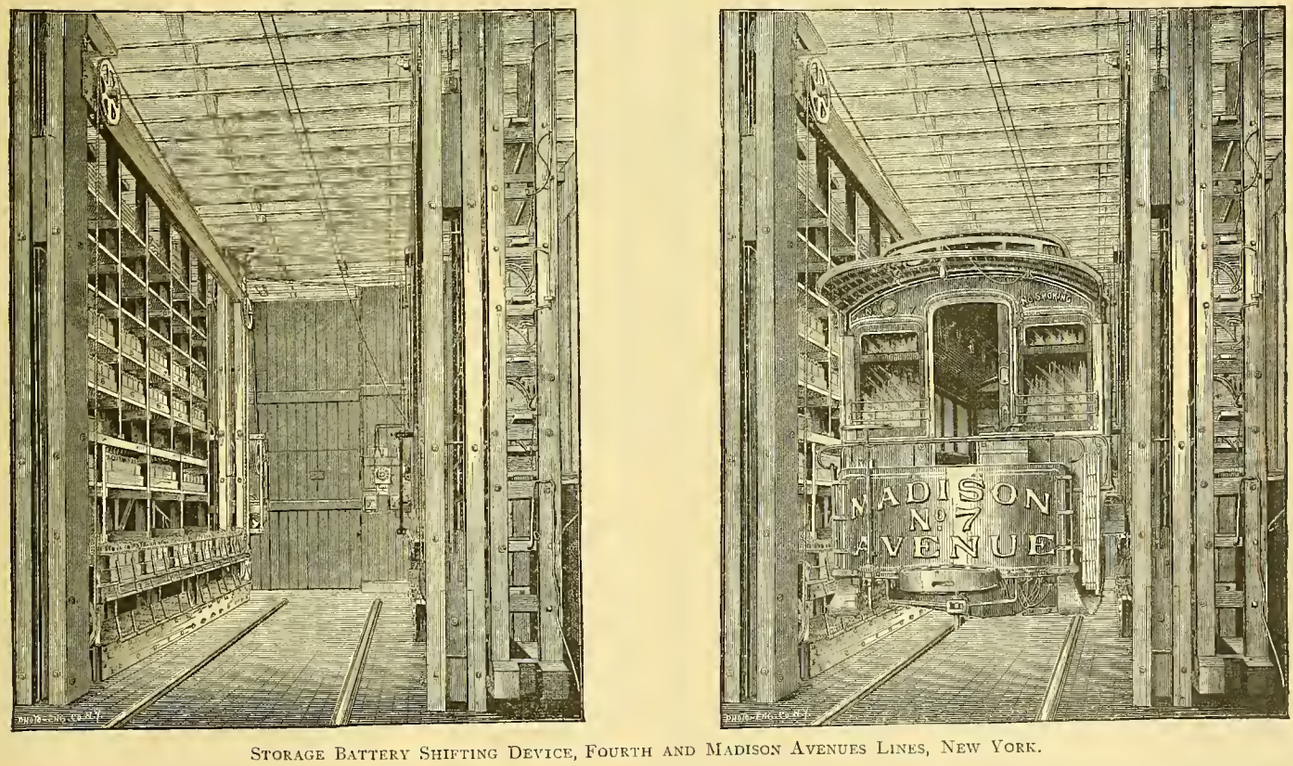
ELECTRIC RAILWAYS.

The Storage Battery System.

Theory in electric traction seems to be a thing of the past. Never has practice followed so closely on the heels of theory as in the case of the application of electricity as a motive power, for the propulsion of street cars. While two years ago street railroad men were justly skeptical as to the success of electricity as a motive power in its then undeveloped form, they to-day seem to vie with one another to be the first in the field to adopt this new and attractive means of transit. In 1886, there were but seven roads operating cars by means of electric power, while to-day there are 109 who are either operating, or have roads already in course of construction. It is conceded that an independently propelled car is preferable for the carrying of passengers in the city streets, to a system dependent on a central source of supply. It has simply been a question to prove that such system could be applied to the propulsion of tram cars so as to be absolutely reliable and economical. The storage of electricity seems to be the only means of obtaining such a result, and it has been the labor of many years to bring this system to its present state of perfection. The first of the standard cars of the Julien company, operating on the Fourth and Madison avenue lines, in New York City, No. 7 ran over 6,000 miles and carried over 80,000 passengers, without costing one dollar for repairs.

Having proved that a storage battery car could be built that would be reliable, the Julien company began the construction of thirty (30) cars at the works of the John Stephenson company, based on the experience gained by car No. 7; the first of these cars—No. 8—was placed on the road June 22, and on Wednesday, August 8, car No. 17—the last of the first group of ten—was placed in service, and have since then run continuously in regular passenger service, to the great satisfaction of the company, and to the officials of the Fourth and Madison avenue road.

The performance of these cars is particularly creditable, when it is considered that they are sent out between horse cars, and are dependent entirely on their self-contained energy, and have never failed to return to the station by their own power. They are placed entirely in the hands of green drivers, who, however, seem to take pride in being promoted from a horse car driver to a position approaching an engineer. The road on which these cars are operated, is in every way unsuited to the operation of a mechanical system; the track, switches and frogs are in many cases of an old pattern, and are very severely worn from the heavy trucking of a large city. The cars are run from the car stables, and owing to a lack of room many of the accessories of an electric system are lacking. The actual operation of these ten cars marks a new era in street car traction, as they solve the problem of storage battery traction, and it is certainly to be hoped that at a not very great distant period, this means of locomotion will be very thoroughly adopted in the streets of New York and elsewhere. Its advantages are too well known to dilate upon; it is simply a question of proving their practicability and economy. Their reliability is proven beyond a question by the record of No. 7, and also by the performance of the ten cars now in service. The absolute cost of operating can not, of course, be given as the result of experience to be sufficiently reliable, until the system has been run as a system, for at least a much longer time. In fact, there is not a company running an electric road in this country to-day, that can tell to a dollar just what it costs it to operate, owing to the uncertainty of the depreciation of motors and overhead construction work. In the minds of the officials of the Fourth avenue line, however, but little doubt exists that the Storage Battery System will eventually prove cheaper than horse traction. It is found on this road, that it requires



STORAGE BATTERY SHIFTING DEVICE, FOURTH AND MADISON AVENUES LINES, NEW YORK.

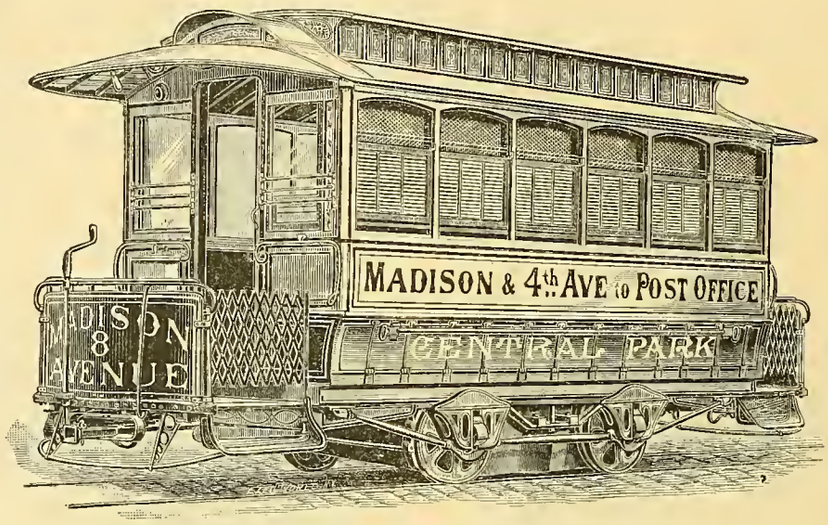
less than 12 horse power hours to make a round trip of 12 miles, and at the rate at which current can be produced, varying from 1½ to 2 cents per horse power hour, it will be seen that for a car day of 75 miles, the actual current required for the propelling of the car, will cost but $1.50 at the most. The other items of the cost of motive power, attendance at the station, and depreciation can be calculated by allowing the positive plates of the batteries a life of one year, and the negatives two years, and allowing ten per cent per annum depreciation on the motors, regulators, etc., it will be found that we will have $700 per car per year or a total of $3.40 per car per day, and adding attendance, say $4.00 as against $6.50 for horse traction on the same line. When cars are turned out in large quantities, the cost of battery will necessarily be reduced and the above figure we may expect to see fall below this estimate. By allowing the battery a life of but six months, the Julien company estimates that it can operate the system at a less cost than horse traction, which, with the advantages it presents, would be sufficient to justify its adoption in a number of cities.

The car illustrated in the accompanying cut is one of ten now operating on the 4th Avenue line and is a 16-foot body mounted on an independent rigid truck with a 6-foot wheel base, on which are placed two 10 h.p. motors. The truck is entirely independent of the car body and may be removed at any time. The weight of the car, mounted on its trucks with motors, gearing and battery in position, is between six and seven tons. The motors are geared direct, one to each axle, and are readily accessible from the car floor through trap doors. The battery consists of 108 cells, which are placed in six trays of nine each on each side of the car; these trays are pushed into the car through the outside panels, under the seats. This battery has a total capacity of about 35 electrical horse power hours. The cars, as operated on the 4th Avenue line, are geared for a speed of from nine to ten miles an hour on the level, though they can be run much faster for suburban service, when not operated between horse cars. Each car requires from 6½ to 8 horse power for generating machinery, according to the number of cars in operation. Cars are operated from either end by a regulator. The movable handle is applied by the driver, and no one is better able to run the car than a horse car driver, owing to his knowledge of the brakes. Putting on and shutting off of the power is learned thoroughly in a few trips.

The regulator used on these cars is a very beautiful feature, the power being applied by different groupings of the accumulators. Thus the variation in speed from the start to ten miles an hour, is so gradual as to be imperceptible. A powerful brake is used on all cars, which in case of emergency can be supplemented by the reversal of the motors from the regulator, and the car stopped when going at full speed within one-half its length. Five 16-candle power incandescent lamps are used to light the car, and a warning gong is also sounded by current from the battery. The truck employed in these cars is to some extent a departure in electric railroad construction, being made of wood, which, in addition to deadening the sound of operation of motors and gearing, takes up all vibration and prevents the loosening of parts, which is found to be so common in cable and other mechanical cars employing iron trucks. The body is supported on rubber cushions, which not only render their riding most delightful, but prevent all strain on the car body proper in suddenly stopping or in the rounding of curves. Since these cars have been placed in service, they have never missed but one trip (caused by a broken wheel flange) and there has not been a cent spent upon them for repairs of any kind.

When storage batteries were first introduced for the propulsion of street cars, the question of the handling and charging of the batteries was considered one of grave importance. It will be seen that each car, requiring 216 accumulators, measuring 6 inches square and 7 inches high, would, in a large installation, be an item of, perhaps, vital consideration, should not the proper means be at hand for their charging and manipulation. One of the most ingenious and attractive features in this system is their battery shifting device, which is illustrated in cuts 2 and 3. The car runs into the station between two elevators 16 feet long, composed of two shelves, the lower one containing the charged set, while the upper one is used to receive the discharged set, when withdrawn from the car. When the fresh set has been put in place through the outside panels of the car, the car goes out, and the elevators are raised up between a series of racks into which the discharged batteries are placed and a fresh set is lowered, which operation is repeated with each car. The batteries, which are in six trays on each side of the car, make automatic contact with the regulator the moment they are pushed in position in the car and they in the same manner make contact with the dynamo as soon as they are placed on the shelves. These elevators are run by stationary motors, and the entire change, from the time the car enters the station until it is again on the road, occupies but three minutes; and while the battery is being changed the regulators and motors are examined. These racks, with motor, etc., occupy a space of but 24x7 feet on each side of the car, or 336 square feet, which represents the stall room of 135 to 150 horses, or 6,000 square feet. This item of the saving in floor space is one of great importance in large cities, where land is at a premium.

The best proof of the favor with which the officials of the 4th Avenue road view the operation of these new standard cars, is the fact that they have recently placed an additional order for a second group of ten cars, which will doubtless be followed by the entire equipment of the road. Two cars have just been sent to Providence, which will be operated by The Union Passenger railway there, and the Pullman Palace Car company is building twelve car bodies, a number of which will be placed in service on the horse car line in Pullman, Illinois.



JULIEN TRACTION CAR ON FOURTH AVENUE, NEW YORK.

Electrical Equipments in Cleveland.

The history of the East Cleveland Street Railway of Cleveland, Ohio, is an instance of the success and satisfaction which electric street railways appear to be giving in every city where they have been installed. The first equipment of the East Cleveland Street Railway Co. was installed by the Sprague Co. about nine months ago, and included overhead line, station equipment and sixteen electric cars. The electric line was laid out to cover some of the principal business and residential streets in the city, and, though at first there was some opposition to its installation from residents who had never seen an electric line in operation and who did not know the advantages which electricity brings with it, the line was finally opened and the cars put in operation.

At first there was a mixed service of horse cars and motor cars, the horse cars running part of the way and connecting with the electric cars, but it soon became apparent that the overhead system, as erected, with iron poles and small silicon bronze trolley wire was hardly noticeable, and that the rapid transit afforded by the electric cars was vastly superior to the slow service given when the cars were drawn by animal power.

So great were the calls for more rapid transit from the citizens of Cleveland that the company has increased the amount of its equipment until now no less than 76 motor cars are to be operated on this one line.

Besides this road there is also another, the Broadway and Newburgh, which is being equipped by the same system. There is nothing which speaks more highly for any kind of apparatus than the indorsement by the users, and there is no indorsement more convincing than the continued addition to an original equipment. The results therefore at Cleveland prove conclusively the good results and satisfaction given by electrical apparatus when applied to street railways, and cannot be too highly commendatory of the style of motors used.

The Huntington Electric Railway.

The Short Electric Railway Co. has received a detailed statement of the expense for running, through July, the electric road constructed, under Short patents, in Huntington, W. Va.

This road is 3.5 miles in length, with a maximum grade of 4 per cent. and connects two thriving Virginia towns. The power station is equipped with a high speed automatic cut-off engine and a 50 h.p. Brush dynamo. The conductors are strung on two rows of poles with cross wires. As there are two wires over each track there is no earth return.

HUNTINGTON, W. Va.,
August 1st, 1889.

The Short Electric Railway Co., Cleveland, Ohio

Gentlemen: — I herewith submit report of the Huntington Electric Railway for the month ending July 31st:

For running two cars 15 hours per day,	
Coal, 75 tons at $1 05, - - -	$ 78.75
Oil, 30 gals. at .22, - - - -	6.60
Two engineers, - - - - -	54.00
Two firemen, - - - - - -	30.00
Three motor drivers, at $25.00, -	75.00
Three conductors, at 37.50, - -	112.50
Respectfully yours,	$356.85

R. L. CALDWELL, Supt.

The results drawn from the statement are significant and encouraging. The cost per car per day including all expenses, drivers, conductors, etc., is $5.95. The cost per car per mile (10 miles per hour) is a fraction less than four cents ($.03965). The cost of motive power alone is less than two cents ($.018+) per car per mile. As each car tows another when necessary, the actual cost is a trifle less.

The road has been a success from the day of starting. On the 4th of July and the date of Barnum's circus the earnings of the two cars were $117.00 and $127.00 respectively.

In this system there are two wires instead of one, which are cut into sections so arranged that each section receives power only for operating the cars upon it. If there is no car on any one section there is no power in the wires of that section to injure persons or animals. There is no electricity on the rail. All power is retained twenty feet above the ground. A fallen wire, it is said, can be handled without receiving a shock, cars run up hill as fast as on the level and there is no power at the ends of the line.

Electricity in Fort Worth.

The West Fort Worth Street Railway company recently equipped by the National Electric Traction company, of Detroit, was opened up for business on the 29th of last month and is, in every respect, a grand success. The first run was made in the morning of that date, when Mr. Frank B. Rae, electrician of the company, accompanied by several officials of the road, and a representative of the "Gazette," went over the line on an experimental trip. Everything proved most satisfactory, and later in the day, the mayor of the city, several members of the Common Council and a number of prominent citizens took their first ride on the electric cars.

The track was found to be in fine condition, and the ride was greatly enjoyed by all who participated in it. The line runs through a beautiful suburb of Fort Worth, which the acquisition of this new style of locomotion brings right into the city, so to speak. From the high ground over which the road passes a magnificent view of the city, as well as a large part of the surrounding country is obtained, and trips on the electric line will doubtless soon become popular diversions for citizens and visitors.

The West Fort Worth company have fifteen of the large, handsome and elegant Pullman cars, which are soon to take the place of the old mule propellers now in use. They are being rapidly fitted up with the electric motors, and all will soon be in running order.

On August 28th a committee of sixteen prominent members of the City Council and the Consolidated Street Railway Co., of Columbus, Ohio, visited Cleveland to inspect the different electric railways. The three systems, Short, Thomson-Houston and Sprague were examined with much interest and the great Brush Electric Works visited.

The gentlemen went home with a fund of information which will doubtless be embodied in the ordinance expected soon from the City Council.

It is said they left their prejudice against poles and overhead wiring behind them.

Ground was broken Aug. 21st at the Brush Electric Works, Cleveland, Ohio, for a Short System Electric Railway. This road will be constructed on the Brush Co. property. It will be oval in shape, running down the street into the yard and back into the street.

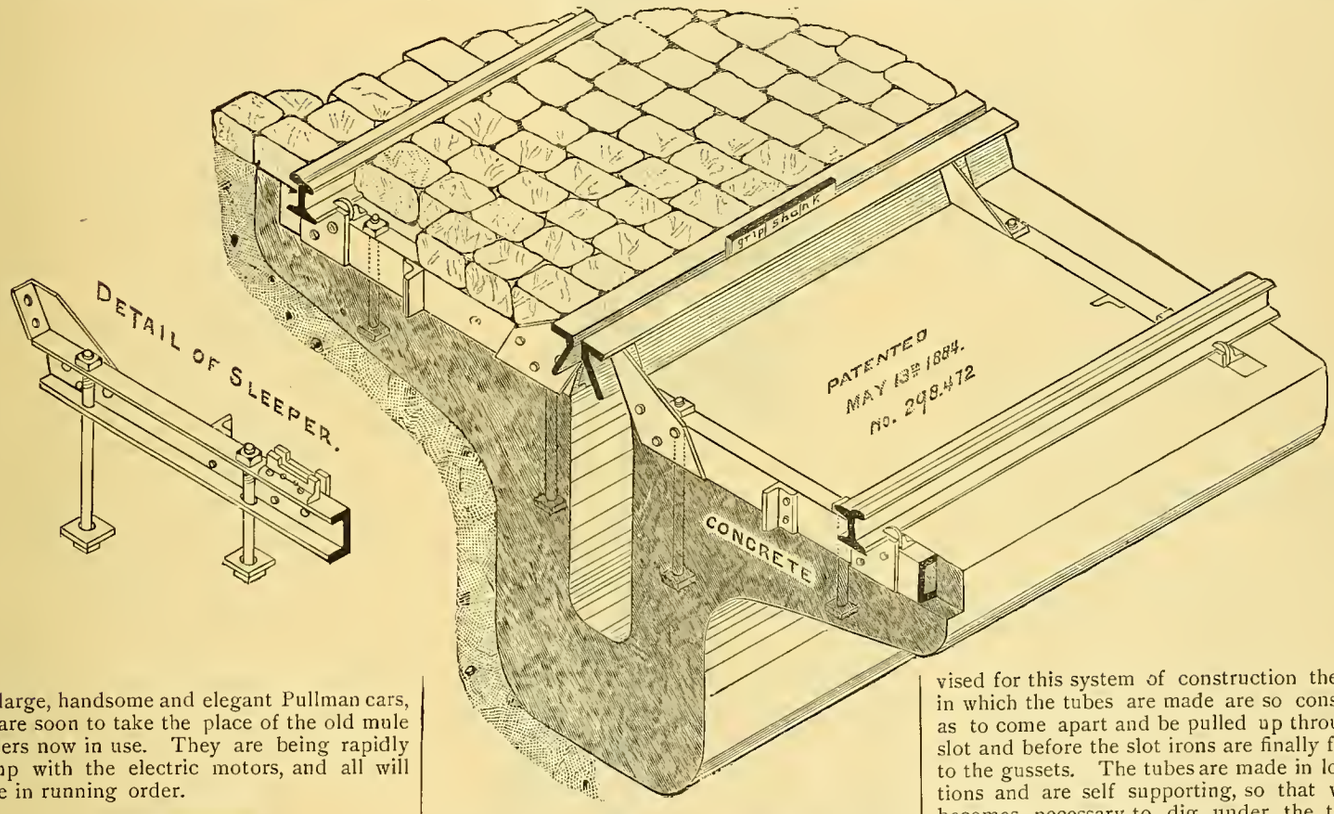
The Brush Works, already the largest electric works in the world, will thus have a completely equipped electric road upon which to test motors and all road appliances.

The advantage of having the road in operation to be visited and examined by railway companies is obvious.

Cable Railways

Oakland and Piedmont Cable Road.

The new cable road about being constructed in Oakland by the San Francisco Tool Co. for the Piedmont Cable Co. is an enterprise of great magnitude, involving an expenditure of over $600,000. The line will consist of two tracks, a single track from Oakland to Piedmont, beginning at a point on Eighth street, half way between Clay and Washington, thence following Eighth street in an easterly direction and turning to the left into Washington street; thence following Washington street up to Fourteenth street and turning to the right into Fourteenth street; thence following Fourteenth street and turning to the left into Broadway. (Where this curve crosses the San Pablo Cable Road, a short tangent is put into this curve.) Thence following Broadway, and turning to the right into Twenty-fourth street; thence following Twenty-fourth street, and turning to the left into Oakland avenue; thence following Oakland avenue and turning to the right so as to follow the line established on Perry street, and on the Flint and Hitchcock track; thence turning to the right and following the line established on the Hitchcock, Sather, Howard and Lincoln tracts; thence following the extension of May avenue up to Vernal avenue.



Isometrical View—Isaacs Cable System.

On Vernal avenue the rope is carried half way around a sheaf of nine feet ten inches in diameter, and the Piedmont-Oakland track follows the line as described, but in the opposite direction, and being nine feet ten inches to the right from the Oakland-Piedmont track.

At the intersection of Washington and Fourteenth streets, the two tracks diverge, the Piedmont-Oakland tracks continuing in a straight line on Fourteenth street and turning to the left into Clay street; thence following Clay street turning to the left into Eighth street; thence following Eighth street to the point of beginning.

The incoming and outgoing track on Vernal avenue converge on a turn table of 9 feet diameter by means of which the train of dummy and car or cars will be arranged for the return trip. The car or cars of one train arriving from Oakland and destined for the Blair Park will be switched off to the left into Vernal avenue; thence following Vernal avenue and turning to the left into the county road; thnce following the county road and turning to the left by a curve; then following the line as established on the Blair Ranch, and finally entering into the Piedmont-Oakland track.

The loop accomplished in this manner is to be a surface road only, and the road everywhere to have such grades that the cars can traverse the road with not less than a proper speed.

As will be seen, this section of the road will be worked upon what is known as the "gravity principle," and is a novel feature in street railroading. The Chinaman who coined the expression "No pushee, no pullee,"etc., when he first saw the cable cars, will have another problem to solve when he beholds the cars moving over this section of Piedmont Road.

As will be seen, the tube is constructed of concrete. The iron work resting in and upon the concrete, and consists of short sleepers, to one end of which are riveted gussets or angle plates, and to the other the rail holders. Near the center a key-piece is riveted for holding the sleeper firmly in the direction of its length. The gussets hold the slot irons rigidly in place, preventing the slot from opening or closing. The gusset is also shaped so that the thin way comes in a joint of the paving, is cut low, and cut angling, so that it can not be struck by wagon wheels as the paving wears. As an additional security, the sleepers are anchored in the road bed with stout bolts, which are riveted over the nuts after the concrete is set. By a method devised for this system of construction the molds in which the tubes are made are so constructed as to come apart and be pulled up through the slot and before the slot irons are finally fastened to the gussets. The tubes are made in long sections and are self supporting, so that when it becomes necessary to dig under the tube for water, gas or sewer pipes, no settling of the road-bed will occur. Guide pulleys for carrying the rope rest in iron frames held in recesses molded in the side of the tube. They are accessible for oiling the bearings or removing the pulleys. Before this method of construction was adopted by the Piedmont Cable company, a section was constructed and severely tested by driving a truck with a ten-ton load over it in every direction possible.

In the power station will be located the boiler room, which will contain a battery of Babcock & Wilcox boilers of 450 horse power capacity; these will be connected with a brick smoke stack 146 feet high. The coal bunkers have a capacity of 150 tons. In the engine room will be located two of the San Francisco Tool company's Compound Corliss Condensing Engines of 340 horse power each, and from records that have been kept it is reasonable to conclude that the Piedmont Cable company will be able to run their plant on a consumption of two pounds or less of coal per hour per horse power expended. The power station will also contain the work shop, store rooms, superintendent's offices, receiver's office, director's room, oil, store and lamp room, uniform room, waiting room, car check office, painting shop and car house—all under one roof, and complete and perfect in all appointments.

Improved Traveling Crane.*

The cut shown herewith represents an Improved High Speed Rope Drive Power Traveling Crane, of three tons capacity, 30 feet 9½ inches span, recently built.

The main girders forming bridge are made of steel of the ordinary "I" beam pattern, and secured at their ends in cast end girders, in which are mounted large diameter flanged wheels for traveling on the main tracks, which wheels are made of the best charcoal iron with chilled rims, and secured to short steel axles on one side of the crane, and to continuous cross shaft on the other so as to insure parallel working of the bridge on main tracks.

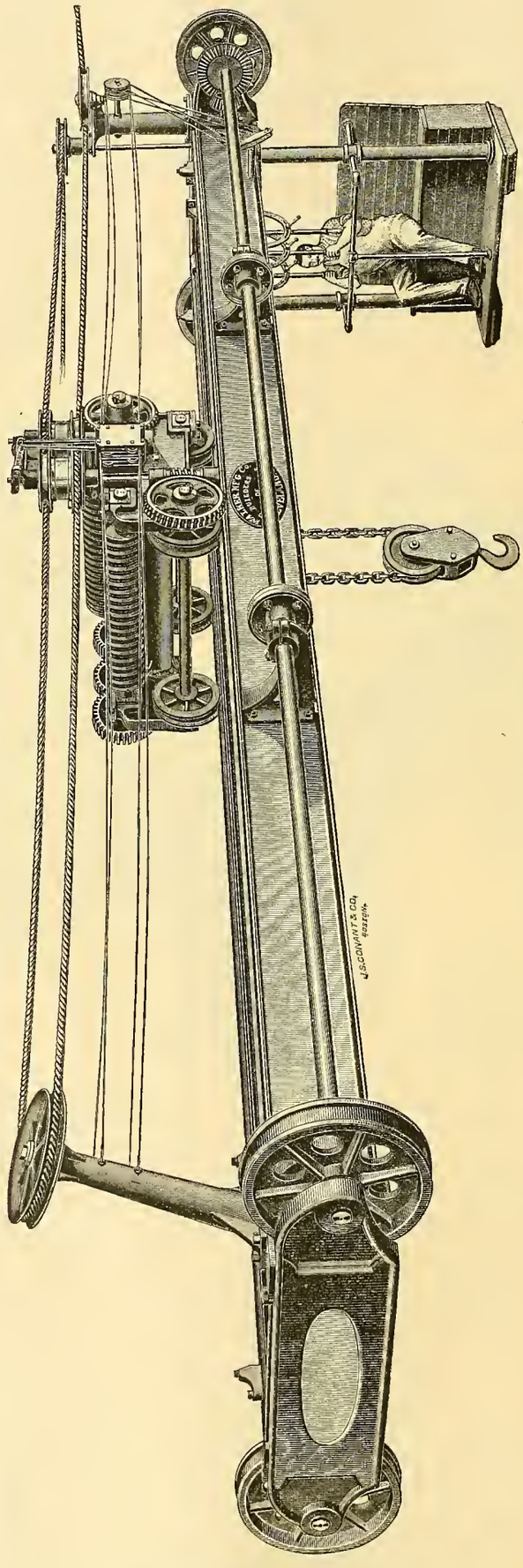
The longitudinal traverse of this crane is effected by means of main driving rope, which is one inch diameter and runs at 2,500 feet per minute along the shop, supported at intervals by carrier pulleys and turning around sheave on vertical worm shaft, to which is attached a steel worm engaging into worm wheel, and bevel gear with pinions engaged with double ended clutch; all arranged immediately above the cage and in the girders, but not shown in cut, along the bridge and back for the purpose of operating the hoisting, lowering and transverse mechanism by friction sheaves on the trolley. From this vertical shaft motion is imparted with bevel pinion and gear to continuous cross shaft, already explained. The worm and wheel is always in motion with the main rope; the operator introducing clutch to the bevel pinions, already described, with one of the three handles shown to operate the crane.

The trolley carrying, hoisting and transverse mechanism is supported on low steel rails secured to top of main girders, and consists of strong cast iron sides mounted on iron wheels having chilled rims, which are secured to steel axles operating in bronze bearings. The cross traverse and hoisting is effected in either direction by engaging either set of the grooved pulleys, which are driven in opposite directions by the main rope, shown above trolley, with the friction ring shown between the two pair of pulleys. These friction rings are raised or lowered by the levers shown in front; the upward or downward motion being imparted to same by the three sixteenths inch diameter wire ropes passing over and under grooved sheaves, which are set in four independent compartments, there being three sheaves and a connecting rod for each motion, so that by the operator moving the levers in the cage in either direction the two three-sixteenths inch diameter ropes, operating friction rings, will move them in opposite directions; either of the ropes being tensioned will pull the lever operating its friction ring into the upper or lower pulley as occasion may require.

The hoisting mechanism consists of two strong cast iron barrels, with right and left hand spiral grooves for the chains; these barrels are geared together to run in the same direction, the chains being suspended from their inner surfaces. The hoisting and lowering barrel is twice the diameter of the idler barrel, so that the difference in their circumferences will be the difference in movement of chain; one strand always going up while the other is going down. The principal features of these two barrels however are, that they are geared together and when the weight is suspended at their inner surfaces, as already explained, same will form a lock on the gears and will hold its load without any tendency to rotate, thus saving strain on the worm and worm wheel teeth and necessitating less power; the hook also is always kept in the center of bridge, irrespective of height of chain hook; the chains when unwound from the barrels being at opposite ends of same, and when fully wound on barrels being at the center of each barrel.

The main driving rope after leaving the driving sheave, passes over upper line of carrier pulleys to tension carriage and back along lower line of carrier pulleys, around the sheave driving longitudinal motion gearing, and over pulleys for lowering and cross traverse; around idler at end of crane, through the second set of pulleys for cross traverse and hoisting, around idler at further end of crane and along the lower line of carrier pulleys to the main driving sheave, which is located at end of shop and is driven by a friction clutch, from the lever of which a hand rope passes the entire length of main track behind the cage and accessible to the operator to stop main driving rope at will.

The cage is suspended at the end of bridge so that the operator is conveniently located to handle the levers for the various motions and at the same time commanding a view of the entire shop; the seat forming a tool box in which all necessary tools may be kept ready for use.



Improved Traveling Crane.

The advantages of this design of crane are, its freedom from noise, ease of working, small amount of power and head-room required, safety in holding the load at all points without brakes or special devices.

*The Walker Manufacturing Co., Cleveland, Ohio.

Handy Formulæ.

To find the length of a curve. Answer—To the radius of the curve add 57 per cent. of itself.

To find the number of tons of rails in one mile of (single) track.

$$\frac{\text{Lbs. per yard} \times 7}{11} = \text{long tons per mile.}$$

The area of triangles. Multiply one-half of either side by the other arm.

The area of parallelograms is found by multiplying side by side.

For trapezoids. One-half of the sum of the sides should be multiplied by the perpendicular.

Area of trapeziums, how found. Divide into triangles and proceed as above.

For the area of circles. Multiply the square of the diameter by the decimal 0.7854.

For the sector of circles. Multiply the arc by half of the radius.

The superficial area of spheres is found by multiplying the square of the diameter by the decimal 3 1416.

For all other surfaces, reduce to standard forms by geometrical or mechanical lines and proceed as specially indicated above.

The area of a pyramid or cone. The area of the base must be multiplied by one-third of the height.

THINGS NOT GENERALLY KNOWN.

That one pound has 27.7 cubic inches when the temperature is at 39°.

That one fathom is 6 feet.

That one cord of wood is 128 cubic feet.

That one perch of masonry is 24.75 cubic feet.

That one liquid gallon is equal to 231 cubic inches.

That hydraulic cements weigh 305 pounds per barrel.

That genuine Portland cement weighs 425 pounds.

That the difference between these two is caused by an excessive amount of silica in the admixture of the Portland.

Materials.

Of all the materials which enter into the construction of our railways, you are advised to take as a standard the United States Engineer's reports, on account of the undoubted accuracy caused by instrumental conveniences and plenty of time and their absolute disinterestedness. And yet it will be observed that one important, yea, vital, line of thought is faulty in their reports, because the history of the product submitted is not obtainable. Thus the question as to the material being a fair sample of the goods which the manufacturing firm offer you, is so shrouded in uncertainty that we must follow one of two courses in purchasing for our needs, to-wit: Either keep testing machines, or purchase by comparisons. The latter is quite readily done when so many reputable firms are supplying your neighbors.

The above is especially true of steel and iron, and our reliance is justified by the fact that only a safe load, not more than 50 per cent. of the maximum is called for. The merchants will readily give you all reasonable guarantees on the above basis. But iron, steel, brass, tin, zinc, copper and lumber are the only materials which you can safely purchase on representation. A careful inspection of all other materials, especially cements, brick, terra cotta, lumber, sand, gravel and crushed stone, is essential.

How to Test Cast Iron.*

Cast iron is one of the most useful of metals, but one of the most variable in its qualities. Its strength in simple tension varies from 15,000 to 30,000 pounds per square inch, or 100 per cent, while its toughness, or ability to resist a shock or blow, varies by over 600 per cent.

For ordinary foundry purposes cast iron should be soft to allow easy working under tools; and tough, to resist the effects of shock. It is probable that cast iron breaks nine times from some kind of jar or blow to once from a static load; and hence its ability to resist a shock is many times as important as its ability to resist a dead load.

Now, when cast iron is tested for strength, whether in tension or in cross-breaking, only its ability to resist a quiescent load is determined. Such a test gives no information as to the strength of the iron to resist a shock. It often happens that the strongest iron is the most brittle, or the least able to resist a jar or blow.

Again, when cast iron is tested by the impact test, or by letting a body fall upon it, every blow causes a permanent set or distortion, and so permanently weakens the specimen for resisting other blows, so that when the specimen breaks the test only shows how much strength was left in the body after the previous blows had been given, and not how much was in the material in the first place.

There is, therefore, but one way in which to determine the original resistance of the body to shocks, and that is by testing to rupture with a gradually applied load, either in tension or in cross-breaking, and observing its distortion under this breaking load. This distortion is a simple stretch in case of a tension test, and the deflection in the middle in case of a cross-breaking test. Both methods are competent to determine the absolute resistance of the body to resist a shock.

The resistance to shock depends on both the strength and on the amount of distortion, or "give," the body will take before rupture. A body which will not bend or distort under a load is said to be brittle, and brittleness is weakness when a shock is to be resisted. When two rigid bodies come together at an appreciable velocity, the force of impact is less as the distortion or spring of the materials is greater. If the bodies were absolutely rigid, that is, if they would not distort at all, the force of impact would be infinite, so long as the weight and velocity of the bodies were appreciable.

That quality of a material which enables it to resist a shock or blow, is called its resilience, or spring. It is not strength, which is measured in pounds, not distortion, which may be measured in inches, but it is the product of both strength and distortion, and is therefore measured in inch-pounds. That is to say, resilience, like work, can only be measured by a unit which includes both distance and force, as inch-pounds, or foot-pounds.

A body weighing 10 pounds, and falling 10 feet, or 120 inches, has stored in it 10 times 120 or 1,200 inch-pounds of energy, or it is then able to do 1,200 inch-pounds of work on some other body. If this body should now strike a bar of cast iron, for instance, the iron must be able to develop more than 1,200 inch-pounds of resilience, or spring, in order to absorb this energy without breaking.

Now, the resilience of a bar of cast iron in cross-breaking is one-half the product of the breaking load into the final deflection. That is, the load increases from zero to the breaking limit while the deflection is being caused, and the total work done on the bar is the mean, or average load, multiplied by the total deflection.

If the load be measured in pounds and the deflection in inches, then the half product is given in inch-pounds.

If the bar be supported at its ends, and broken by a load in the middle, then the whole bar contributes to the deflection, and hence the resilience or resistance to shock of the whole bar is obtained. If we now divide the half product of the breaking load into the final deflection by the weight of the bar in pounds the result will be the resilience of the material in inch-pounds per pound of iron.

*By J. B. Johnson, Professor of Civil Engineering, and Director of Testing Laboratory, Washington University, St. Louis.

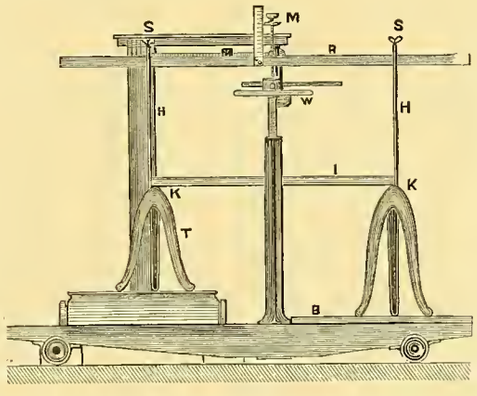
This result is independent of the particular dimensions of the bar, but does depend on its form. For plain rectangular bars, of uniform size from end to end, the result should be the same, when the same iron is used. A different result would be obtained for a round bar, but all rectangular bars of the same iron should give the same result, whether flat, square, or broken across in the direction of the greater dimension.

By this rule no attention need be paid to the dimensions. Take any plain rectangular bar, of any length and of any cross-section, so long as it is uniform from end to end. Break it by a load on the middle, and measure the breaking load in pounds, and also the deflection in inches. Take half their product and divide by the weight of the bar in pounds. The result will vary from 10 for the most brittle and worthless iron to 70 for the strongest and toughest. A result of 25 will correspond to the lower grades of ordinary foundry product, such as is used in water and gas pipes, while a result of 40 to 50 will correspond to the better grades of machine castings. Stove irons should give a result from 50 to 70.

With this rule, any foundryman could determine the quality of his own mixtures, if he only had a convenient machine for making cross-breaking tests, which would give both the breaking load and the deflections.

The writer has now designed such a machine, to operate as an attachment to an ordinary pair of platform scales. It is the weighing part of a testing machine, which is the principal source of expense. By utilizing the ordinary platform scales, therefore, the cost of such a machine is greatly reduced.

The cross-breaking testing machines now on the market cost from 100 to 150 dollars, and have no means of measuring the deflection. These are quite worthless, therefore, for making tests of iron to resist shocks or blows, this being the quality which is many times as important as the simple strength of the metal.



The machine designed by the writer is shown in accompanying figure, being a side view. It is put on rollers and is intended to have one end of the base B run under an ordinary platform scales, which may have to be set up on blocks for this purpose. The two tripods T rest, one on the top of the platform of the scales and the other on the base B of the machine at the opposite end. The specimen to be tested, I, rests on the knife edges K, forming the tops of the tripods. These tripods are movable to suit different lengths of specimens. The load is applied by the hand wheel W, or by a lever through its capstan head. To the tops of the tripods are rigidly fastened uprights, H, which carry the reference beam R, which is clamped in position by the thumb screws S. As the load is put on and the power screw goes down, the micrometer screw M may be turned down to make a contact with the top of the capstan head. This screw registers, by the aid of the adjoining scale and graduations on the head of the screw, to the nearest one-thousandth of an inch through a distance of five inches. By reading the position of the screw when the load on the specimen is zero, and again when any given load is on, the deflection for that load is obtained to the nearest one-thousandth of an inch. The half load is given by balancing the scale beam, provided the specimen is put with its middle point under the screw, which should always be done.

Since the ordinary platform scales register from 1,000 to 2,000 pounds, we are enabled in this way to break specimens requiring a load of from 2,000 to 4,000 pounds, which is quite sufficient for any ordinary test of cast iron in cross-breaking. That is, 2,000 pounds load in the middle will break the best cast iron bar 1 inch square and 16 inches long, or 1½ inches square and 54 inches long. These machines are now manufactured, tested and sold under the writer's special direction. They are accompanied by printed rules and instructions which will enable any foundryman to test his own iron at his works, by the most approved scientific method, and so prove the value of his mixtures to his own satisfaction. It is becoming common, also, for users of cast iron to specify certain tests of strength, and this practice will become practically universal, as soon as the means of making such tests are generally available.

The price of this machine is so low, and its adaptation to the work so simple and perfect that it is hoped it will be generally introduced, and that the new rules given above for showing the resilience or shock-power of the iron will be universally adopted.

The writer has recently contributed to the American Society of Civil Engineers a paper on Tests of and Specifications for Cast Iron, a copy of which will be furnished on application, as soon as it appears. He hopes to help bring about a reformation in the scientific study of this material of almost universal use, but which has been largely overlooked by our scientific investigators in their zealous and astonishingly profitable labors on wrought iron and steel.

Any further information concerning the new testing apparatus, or the methods of using the same, or the limits of strength and resilience to use in specifications for cast iron will be cheerfully furnished by addressing the writer at the address given at the head of this article.

The Isaacs Cable System.

STREET RAILWAY GAZETTE, Chicago, Ill.

Gentlemen: The article in your March number entitled "Conduit Yokes" and giving the results of tests of cast iron yokes made by Prof. J. B. Johnson has undoubtedly been widely read and appreciated. But I have failed thus far to find the reply by Mr. W. B. Knight of Kansas City as published in the Journal of the association of engineering societies for June, from which I quote:

"In this connection it may be interesting to mention the fact that in the course of constructing the 5th street cable railway it became desirable in order to avoid a large gas main *to cut away the bottom part of the yokes* and even to *actually break them in two across the bottom.* About 1,000 feet of track was constructed in this way opposite the Union depot in this city (Kansas City) and there has been at this particular point *absolutely no trouble whatever with the slot* which *maintains its ¾ inch with remarkable uniformity.*"

And the last paragraph reads:

"I think a perfectly satisfactory track could be constructed if desired *without any yoke at all* by simply forming the tube of Portland cement concrete larger in section than usual, thoroughly sub-drained and having suitable iron plates securely anchored in the concrete to which the rails and slot beams would be properly fastened."

In this Mr. Knight substantially describes the Isaacs patents. In Mr. Johnson's reply (March 20th) to Mr. Knight he says: "Perhaps only an actual construction of a cable road *without yokes* will convince an *incredulous public* that yokes are unnecessary."

I am pleased to inform Mr. Johnson that the Piedmont Cable Co. of Oakland do not consider it an experiment but is actually constructing a road-bed [*fully described in this issue—Ed.*] nearly four miles in length without that '*expensive luxury*' yokes.

We maintain that a continuous mass of concrete made with Portland cement will do all the work required. It being a homogeneous mass the contraction and expansion caused by variation of temperature when yokes are used would not occur. By so forming the concrete as not to present sharp angles a maximum strength is obtained. The sleepers are simple angle or channel shaped irons with a ¾ in. diameter bolt anchored through them and set in the concrete.

When it is considered that well made concrete will stand a tensile strain of 15 tons to the square foot and a compressible strain of 200 tons to the square foot the uselessness of yokes is apparent.

The bearings for the carrying pulleys are also anchored in the concrete and set on either side of the tube leaving a clear waterway of three or four inches its entire length, which can be drained into sewers where depressions occur.

The slot irons are fastened to the sleepers by a three-cornered piece of iron called a gussett or by two pieces of 2 x 2 angle set back to back with a half or three-eighths in. bar running back six or eight inches to the sleeper, giving ample strength. The work is done more rapidly than if yokes were used as their accurate adjustment requires much time. The moulding of the tube also requires less time as the moulds are made long enough to reach from man-hole to man-hole and are pulled up through the slot.

The ramming of the concrete is done more expeditiously than with yokes as the iron work is not encountered in the greatest part of the work.

The estimated saving in cost of construction over the present Omnibus cable road construction in this city is $10,500 per mile and on another road constructed a few years since the saving is $42,000 per mile double track.

We therefore claim a maximum amount of strength and durability with the least possible cost for a permanent structure.

San Francisco. Yours truly,

E. H. Marwedel.

Asphalt: Criticism on a Critic.

A Review of "Asphalt, its Uses and Values," as claimed by Veritas, in the August number of the "Western Architect and Building News," Denver.

In his well-written article, advocating the use of the Asphaltum combinations for city pavements, the writer seems to be carried away with what he saw in the California cities, forgetting that those cities and towns when compared with the great central and eastern cities are fitting illustrations of the saying that "God made the country and man made the town," or, following the deductions therefrom, and confining ourselves to the subject under discussion, we may say that "God made our granites and quartzites while man has tried to make an imitation strong and compact enough to serve as a substitute." In this we still claim that he has absolutely failed, not on account of a lack of knowledge of geology and chemistry, nor because he hasn't almost discovered the lost art of the alchemist; but, because of time—when Nature has produced the glittering gems or the solid, massive mountains of granite and quartzites.

She has required countless ages to perfect the combinations known to us by the generic name of stone. Admit for the nonce, that man is equal to Nature in his skill and research, still the time during which it is possible for him to use in the production of anything in the art imitative is entirely too brief, hence failure is certain. If we expect his success as shown at the Pyramids and other inert masses, which, from the climate or from their uses, are free from contact with aught that will cause disintegration, we submit that the Pyramids are not serving stone purposes.

No artificial combination has ever yet been made that could be successfully subjected to the rasping abrasions and wear of the traffic wheels of commerce. In this city of Chicago on some half dozen streets, with not more than a fair average of traffic, thousands of dollars have been expended on asphaltum, and that before the five years guarantee limit has been passed.

Compare these results with the fact that the great quartzites of the Big Sioux River, or the equally famous stone from Berlin or Green Lake, Wis., with proper foundations "and work honestly laid," should last seventy-five years, and then the material may be reversed and serve another generation.

"Veritas" seem to have, in the capacity of an asphaltum colporteur, gathered many favorable opinions for his noiseless material. We quote "noiseless" with a full understanding that that is the only virtue that the material possesses, because it has neither long life nor successful service to recommend it.

Nothing but stone will serve the purposes of stone on the streets of any large city. Objections to the noise are well taken; but this results measurably from the faulty forms of the pavement, like most errors from the art imitative. To illustrate, a heavy lateral crown is entirely useless, the drainage sought for should be longitudinal, forming what is called "drainage waves," then the whole surface of the pavement is at your service, it is flatter, it is less noisy and it is longer lived.

It is not necessary for us to enter into any argument to show how far the best efforts of engineers are neutralized by the want of common honesty on the part of contractors and inspectors, a factor which has always materially assisted in bringing public works into disrepute, especially those of a faulty nature.

Correspondence.

Minneapolis, Minn., Aug. 30.—The street railway interests of the Twin cities are just now in a frightful tangle, which is, however, portentious of big investments and rapid transit in the immediate future. Tom Lowry, president of the Minneapolis and St. Paul street railway companies, after considerable trouble, by one vote in the city council, knocked out the Anderson and Douglas (Philadelphia syndicate) opposition so far as Minneapolis was concerned, but it was only done at the expense of entering into bonds to build and operate before Oct. 1 next, four trunk cable lines, and to experiment with electricity as a motive power with a view to its adoption on all other lines. Then the fight was transferred to St. Paul, where the franchise is more iron-clad, and where the opposition was stronger. There were six applications for street railway franchises before the last meeting of the St. Paul council, and four were granted practically without opposition. The franchises granted were: First, The Dawson-Lindeke ordinance, giving Wm. Dawson, Wm. Lindeke, A. H. Wilder, F. L. Schurmeir and E. G. Rogers the right to occupy such streets with electric lines as the council may hereafter designate by a three fourth vote. Second, the Joseph Lockey and C. A. Moore syndicate, the right to operate an electric line on Wabasha and Sixth streets, Smith Avenue, Forbes, Douglas and Lisbon streets to the Fort Snelling bridge. Third, a general franchise for routes not named to the Thomson-Houston company, provided five miles of track be laid within one year, fifteen miles within two years and thirty miles within three years. Fourth, an ordinance granting the St. Paul street railway company the right to extend its Selby Avenue cable line two and one-half miles out Selby Avenue to Fairview Avenue, Merriam Park. For the latter line the citizens of St. Paul willingly pledged a $100,000 cash and property bonus, believing that it will rapidly develop the inter urban district, and add $3,000,000 to the assessed valuation. The city railway's ordinance to operate electric lines, the Acme Electric company's ordinance and the Allen-Swiney ordinance were rejected.

The St. Paul City Street Car company have an ordinance that gives them the exclusive right to operate horse cars on all except two streets in the city, and in order to head off the rival companies have for a week been laying track on all desirable unoccupied streets. The track is buried so as not to be declared an obstruction, and it serves the purpose of holding the street against the opposition. As soon as the Lockey-Moore ordinance was passed, president Lowry put a gang of one hundred men at work laying track on Sixth and St. Peter streets, a part of the route named in the opposition ordinance. This so incensed public opinion that the city attorney was instructed to take steps to secure an injunction, and the rights of the St. Paul company are immediately to be tested in the courts.

Work will commence at once upon the Selby Avenue cable extension, and the opposition companies have plenty of capital and signify their intention of making use of their granted rights at once. It is the plan of the Thomson-Houston company to apply to the Minneapolis city council for the right to reach the heart of the city by electric lines across the Washington, Franklin and Cedar Avenue bridges, thence by trunk line up First and High street to the Union depot. These streets are without the fire limits, and no objection could be made to overhead wires. If this privilege is granted by Minneapolis, and there is nothing but the opposition of Mr. Lowry to interfere, the Thomson-Houston company will connect their Minneapolis and St. Paul systems, thus solving the problem of quick and cheap transit between the city of Minneapolis with 230,000 people and St. Paul with 200,000 people. The fare will not exceed 25 cents for the round trip (one-half the monopoly charges), and it is believed the trip can be made in 18 minutes. The Thomson-Houston company agree to equip with the most modern of cars, make the fare five cents within the city limits, and agrees to give bonds for $50,000 to save the city harmless from all damages, costs and expenses, and engages to have the lines in operation one year after the passage of the ordinance. The franchise asked for is to last 30 years. The wires and poles are to be erected subject to the direction of the city engineer and approval of the city council. The company agree to pay a tax of $25 per year on each car to the city. The ordinance gives the company 60 days in which to accept the terms of the city. This ordinance will be worth millions of dollars if Minneapolis grants the same concessions already granted in St. Paul.

Minneapolis is to have in operation before snow flies the largest manufactory of street cars and omnibuses in the United States, with a capacity of 4 cars a day. The firm which is back of the enterprise is Robinson & Moan, of Chicago, Ill. The main building is to be 220 feet long by 60 wide, with an ell 80 feet long by 60 wide, and two stories high. Mr. W. S. Robinson, the head of the firm, has closed a deal with the H. C. Akeley Lumber company for 300,000 feet of lumber, and the contract has already been signed. The site of the street car works consists of about five acres of land at Parker's station, on the Manitoba road, at Crystal Lake, and the plant which will ultimately be put in will employ in the neighborhood of 1,000 skilled mechanics. The firm will still retain an office in Chicago. The main building will probably be completed by the middle of October, and sooner if possible. A foundry will be built in the spring, or possibly this fall, and all of the modern conveniences in the shape of dry kilns, engine and boiler houses and blacksmith shops will be put in this fall.

For the Minneapolis system of cable lines four power houses will be required. The house located at the Thirty-first street junction will be used to operate the First avenue south cable line, and the other adjacent to the general offices of the company on Third avenue north, will be utilized for operating the Washington avenue line, and the loop. These lines are to be completed and in operation by July 1, 1890. Mr. Lowry has let the contract for 8,000,000 pounds of yokes and castings for these lines to Mysenburg & Co., of Chicago, agents for the Blakeney foundry, of Springfield, O. The price is given out as $28 a ton, the lowest of a number of bids. Contracts remain to be let for the furnishing of slot and girder rails, power house engines and materials necessary for the construction of the two power houses.

Two more power houses will be located soon, and be finished in time to operate the Hennepin and Bloomington Avenue cable lines, to be in operation by Nov. 1, 1890. George Poole, of Baltimore, the representative of the Robert Poole Manufacturing company of that city, is a prominent bidder for the motive power machinery necessary for the actual operation of the cable. The machinery includes the enormous compensating carriages, the entire four to be modelled after the one in use at the Selby Avenue power house in St. Paul.

The bids for the machinery have not been opened yet, but the work will be awarded to the most responsible party, all other things being equal.

The bids now being received concern only the Washington and First Avenue south lines, which will be completed before work on the other lines commences. I. C. U.

Exhibitors will do well to have their goods ready for inspection in Minneapolis before the 16th of October.

New York State Association Annual Meeting.

The seventh annual meeting of the Street Railway Association of the State of New York was held at the Fifth Avenue Hotel, New York City, on Tuesday, September 17th, 1889.

The meeting was opened by President Woodworth, with Secretary Richardson on his right The following delegates were present: John W. McNamara, President Albany Railway, Albany; William Richardson, President Atlantic Avenue R. R. Co., Brooklyn; H. M. Thompson, Secretary Brooklyn City R. R. Co., Brooklyn; John N. Partridge, President, and John L. Heins, Superintendent Brooklyn City and Newtown R. R. Co., Brooklyn; John Hodge, President Lockport Street R. R. Co., Lockport; Milton I. Masson, Secretary Central Crosstown R. R. Co., New York; C. D. Wyman, Vice-President Central Park, North and East River R. R. Co., New York; George Green, President Forty-Second Street and Grand Street Ferry R. R. Co., New York; Edwin Bedell, Secretary Harlem Bridge, Morrisania and Fordham Railway Co., New York; George S. Hart, President, and Henry E. Doremus, Treasurer Second Avenue R. R. Co., New York; Lewis Lyon, President Third Avenue R. R. Co., New York; William J. Richardson, Secretary Atlantic Avenue R. R. Co., Brooklyn; Thomas H. McLean, Secretary Twenty-Third Street Railway Co., New York; C. C. Woodworth, Secretary, and Thomas J. Brower, Superintendent Rochester City and Brighton R. R. Co., Rochester; Michael Leary, Superintendent Utica and Mohawk R. R., Utica; E. T. Landon, Auditor Dry Dock, East Broadway and Battery R. R. Co., New York; Walter G. Howey, Superintendent Grand Street and Newton R. R. Co., Brooklyn; John S. Foster, President, and S. M. Sisson, Superintendent Forty-Second Street, Manhattanville and St. Nicholas Avenue Ry. Co., New York; Joshua Crandall, Superintendent Broadway R. R., Brooklyn; D. B. Hasbrouck, Secretary and Treasurer Houston, West St. and Pavonia Ferry R. R. Co., New York. Letters of regret in not being able to send delegates were read from the Buffalo Street R. R. Co., Troy and Lansingburg R. R. Co., and the Buffalo East Side Street Ry. Co.

ADDRESS OF THE PRESIDENT.

Gentlemen of the Association:

It is with pleasure that I meet you at this, the Seventh Annual Meeting of the Street Railway Association of the State of New York.

The year has been one long to be remembered by a large number of the companies belonging to the Association. In the early part of the year "strikes" occurred on nearly every road in the City of New York; on one road in Brooklyn and later in the City of Rochester. All the companies were successful in maintaining in operation their lines and fully established their ability to transact business in spite of the combination to paralyze by violence the operations of their roads.

The appeal to the mob of the unemployed or to the vicious elements of society to back up the apparently peaceable propositions of the striking employees was met with a firmness long needed in the management of street railways. We can congratulate ourselves on the result, in the better discipline and more faithful work of employees who hold their positions by good service and not by threats of violence.

The wages paid by the street railway companies are uniformly higher than for a similar grade of labor in other kinds of service; and the steadiness of the employment causes an abundance of applicants to choose from. Any attempt to interfere with the operations of the great commercial law of supply and demand may be temporarily successful, but the reaction is disastrous to interferers, and the reaction has commenced in all industries.

The Railroad Commissioners' Report for the for the year 1888 shows that the street railways of this State have cost in round numbers sixty million dollars, and that the gross income from all sources for 1888 was 6 20-100 per cent. upon the investment, being a decrease of 2 38-100 per cent. from the previous year, which amount represents the increase in operating expenses, as the gross earnings were practically the same as in the previous year. There are 103 companies of which only 35 are reported as paying dividends last year, leaving 68 companies that were unable to pay a dividend.

The injustice which has been shown to our companies in methods of taxation still remains. The state exacts a tax on gross earnings, a tax on dividends, and a tax for the support of the Railroad Commissioners; three separate taxes instead of one. Adding to these taxes the city and county taxes, and in some cases a tax on gross earnings exacted for the city, and a license for each car used, it is apparent why so many companies are unable to pay a dividend.

The street railways of the state paid $812,000 in taxes last year. To a fair and just taxation we do not object; but the cumulative method in present operation certainly is very unjust and oppressive. It is illogical, without system or uniformity, and should be attacked.

The number of passengers carried in 1888 was 361,727,660, a gain of only 183,730 over the previous year.

The average cost to transport a passenger in 1887 was 3.68 cents, which was increased in 1888 to 4.02 cents.

These facts, without comment, show an increasing regard for the convenience and comfort of the traveling public. We have cause to be thankful that no particularly adverse legislation was enacted during the last session of the Legislature.

Great progress has been made in utilizing electric power, and it may be said now that the electricians have succeeded in giving us a practical method, so far at least, as the overhead system is concerned.

We note the fact that the West End Railway company operating all the lines but one in Boston, and running about one thousand cars, has secured permission to use the overhead wire, and that they are making preparations to extend this system over all their lines. The success of this scheme will practically decide its usefulness in large cities. But I am trespassing on this subject which is to be treated in able manner by the committee on an electric street railway motor.

Thanking you for the honor which you conferred upon me at your last meeting, in selecting me for your presiding officer, I will not further detain you with a lengthy address. We can more profitably spend our time in a discussion of the subjects which may claim our attention during the progress of the meeting.

C. C. WOODWORTH, President.

The report of the Executive Committee was presented, and after touching upon some changes in the membership, brought on principally through consolidation and leasing, read as follows:

KNIGHTS OF LABOR.

The Executive Committee of last year, in its report commenting upon the subject of the organization known as the Knights of Labor in connection with the street railway business, said: "The day of strikes should be wholly past; and we believe that a severely tried public will no longer tolerate interference with its rights, which railroad employes as well as railroad managers, are bound to respect." In the light of the experience of the present year, this language would seem to have been almost prophetic. In the early spring, the organization of the Knights of Labor set its machinery in motion to bring about a strike on the roads of one of our members, namely, the Atlantic Avenue Railroad company, of Brooklyn; and thus, "without rhyme or reason" for so doing, subjected the residents of a large part of the city of Brooklyn to great inconvenience, and severely crippled the company, not simply for a period of days, but weeks. The "strike" inaugurated on that company's lines extended to all the roads in the City of New York, which could be to a similar extent controlled by that organization. The result was the realization by the Knights of Labor of the fact that a severely tried public would no longer tolerate interference with its rights; and railroad employees who would willingly subject hundreds of thousands of people to the great inconvenience which resulted from the stoppage of so many lines of street cars, without any other justification than that of sympathy, and by what they called falsely "moral support," were taught a lesson that will never be forgotten.

In this connection, it is with deep regret that the committee announces that Mr. Lewis Lyon, president of the Third Avenue Railroad company, who had agreed to prepare a report on "Free and Organized Labor for Street Railways," has been prevented from so doing by the death of an only son.

LEGISLATION.

In the matter of legislation, the companies are especially to be congratulated on the fact that the determination of the question of the substitution of improved motive power has been transferred from the local authorities to the State Board of Railroad Commissioners. This Board having specially to do with the affairs of railroads is the proper authority to have the cognizance of this important subject. The question of motive power for street railways is, doubtless, receiving greater attention than any other single subject in connection with our business.

OBITUARY.

The committee is much grieved to make mention of the death of Walter A. Jones, who for many and at the time of his death was vice-president of the New Williamsburgh and Flatbush Railroad company. Mr. Jones was a man widely known and highly respected in street railway circles; being one of the original movers in the organization of the American Street Railway Association. He was a genial companion, a faithful friend and estemed most by those who knew him best. Respectfully submitted,

CHAUNCEY C. WOODWORTH,
LEWIS LYON,
GEO. S. HART,
WM. J. RICHARDSON,
Committee.

The treasurer's report was made next, and showed:

Balance, Sept. 18, 1888,	$354.55
Receipts during the year,	830.00
	$1,184.55
Expenses during the year,	$815.49
Balance on hand,	$369.06

Mr. John W. McNamara, president of the Albany Railway, had been appointed to prepare a report upon the subject of "An Electric Street Railway Motor." Mr. McNamara was present and apologized for not having prepared the report. He said that if he had permitted to choose his own subject, it was quite likely he would have been able to submit a paper that might be entertaining if not instructive. It would have embarrassed him, he added, to attempt to make a report on the subject of electricity, for the reason that for more than three years the company with which he was connected had been considering the proposition of using some kind of electric motor, and he had been busily engaged for the last two years in trying to find out what was best. It could be readily seen, therefore, that it would be quite impossible for him to submit a report upon the subject, there being such a diversity of opinion concerning such motors. One of the companies in the western part of the State, after a thorough investigation, after its officials had traveled from Boston to San Francisco, and from New Orleans to Montreal, had decided that the Sprague motor was the best in the market, and had equipped their road with it. Another member of the Association, after like investigation, and perhaps traveling even a greater number of miles, had come to the conclusion that the Thomson-Houston motor was the best. The officers of another member had undertaken an equal amount of investigation and travel, and had determined that still a third system was the best; and so it went on, until one was utterly at a loss to know which system it was best to adopt. He complained that in his investigation he had not been able to learn much about electric motors from the men who are using them; that there seemed to be an indisposition on their part to show them up. It was all right when they were on parade; you could get on the cars and ride, but when they came to the power house or storage station they would rather not have you look at them. On the other hand, companies operating by horses would let you ride on the cars, take you to the stables and car houses, and show you

everything; but not so with the happy possessor of an electric motor. As to getting into the machine shop, that was next to impossible. They will show you how splendidly the motor works, but beyond that you can not get any information.

Mr. Hart, of the Second Ave. R.R.Co. inquired if the systems referred to were not all overhead.

Mr. McNamara. They are.

Mr. Woodworth, of the Rochester City and Brighton Railroad, said that his company had built a road five miles long, using the Thomson-Houston system. The system worked very nicely, and gave perfect satisfaction. After the first week there had not been a hitch. The road had been in operation since July, 1889.

Mr. McWhinnie said that the system in use on the Troy and Lansingburgh road was successful beyond all expectation; that the movement of the cars was even, strong and steady. The Sprague system was in use.

Mr. McNamara stated that his road was ready to adopt a system without delay; that since leaving home he had received a telegram that the common council of Albany, which had hitherto refused to grant a franchise to the company to erect the necessary poles and other equipment, had at last, by a vote of fifteen to four, granted the desired privilege; and this meant that in the near future the road would be operated by electricity.

Mr. Thompson, of the Brooklyn City railroad, said that his company was prosecuting thorough investigations in the electrical field; but had not yet arrived at a conclusion as to which system it should adopt.

Mr. Hodge, of the Lockport Street Railroad company, announced that his company also was investigating the subject, and had determined to equip its road with electricity, but were at present unable to decide upon a system.

Mr. Lewis Lyon, president of the Third Avenue Railroad company, had been appointed to prepare a report on the subject of "Free and Organized Labor for Street Railways"; but owing to the death of an only son had been prevented from so doing.

On motion of Mr. McLean, Messrs. McLean, McNamara and Hodge were appointed a nominating committee.

Mr. Richardson inquired if any delegate present could explain an easy and simple method of placing the date on transfer tickets. The business of transferring on his road had reached such proportions that the preparation of the tickets had reached the limit of one man's ability, and he thought there might be some system of stamping which would facilitate the work.

Mr. Thompson stated that on his road they used about two million tickets a month; that they used no stamp, but had special tickets printed for each day in the year, at a cost of twenty cents a thousand. The estimates for the number needed were based on the business of the preceding year, adding an increase of ten per cent. An extra supply of tickets undated was furnished the transfer agents, so that if the regular supply should become exhausted, they could stamp and use these. A supply for three months was ordered at a time.

The nominating committee then reported as follows:

For President, John N. Partridge, President Brooklyn City and Newtown Railroad company, Brooklyn;

First Vice-President, Daniel B. Hasbrouck, Secretary and Treasurer Houston, West St. & P. F. Railroad company, New York;

Second Vice-President, P. B. Brayton, President Fifth Ward Railroad company, Syracuse;

Secretary and Treasurer, Wm. J. Richardson, Sec., Atlantic Avenue R. R. Co., Brooklyn.

Executive Committee: Daniel F. Lewis, President and Secretary Brooklyn City R. R. Co., Brooklyn; C. D. Wyman, Vice-President, Central Park, N. & E. R. R. R. Co., New York; George Green, President Forty-second street & Grand Street F. R. R. Co., New York.

On motion to select place of meeting for next year, the vote stood:

Brooklyn,	4
Rochester,	9

The new president, John N. Partridge being duly installed, the meeting adjourned until the third Tuesday in Sept., 1890, at Rochester, N. Y.

American Electrical Apparatus Abroad.

While electrical railways have become quite a common sight in different cities on this side of the Atlantic, electrical railway science has not made the same advance abroad as here, and most of the installations which have been made in Europe have been experimental in their character and have been novelties rather more than commercial plants.

Europeans visiting this country have always been surprised to see the good commercial results attained in electrical installations in this country, and therefore it is not surprising to hear of American electrical apparatus going abroad, and of dynamos and motors taking the place of the overtaxed horse on the streets of the cities of the old world.

The first European city to adopt American motors is Florence, Italy, the largest street railway company of that city recently having ordered of the Sprague company of New York, a complete equipment. The apparatus ordered includes overhead wires of the regular type, ten complete car equipments, using two motors on each car and station equipment complete.

The present method of running street cars in Florence is partly by animal power and partly by small steam dummies, and it is thought that the electric cars, which combine the safety of the horse car with the speed of the steam car, and can be operated much cheaper than either, will have a large field to fill.

It is said that this equipment is only a small portion of a very large equipment which will be ordered by this company, and if the result proves successful it is thought that very many other Italian cities will adopt electricity for their street cars.

To the Convention, via the Erie.

Delegates to the Minneapolis convention will be interested in knowing that Pullman has just delivered to the Erie Railway complete equipment for the New York & Chicago Limited trains Nos. 5 and 8, including baggage and smoking composite cars, day coaches with smoking compartments, sleeping cars and palatial dining cars. The entire train is vestibuled, and the dining cars are improvements on the best results hitherto attained by Pullman; embracing novelties in form, finish and furniture warranting the claim that they are "The finest in the world." The meals are prepared on the cars after the style of the finest restaurants, there being a complete corps of cooks and waiters, who have at command every facility — large kitchen, ranges, ovens, ice chests, and an abundant supply of the best that the country affords in the substantials as well as the delicacies of the season. The dining cars accompany the train the entire distance between New York and Chicago, permitting more freedom to passengers in selecting their hours for meals than would obtain if the dining cars were run only a portion of the way.

A round hundred thousand dollars might about cover the cost of this new limited train, which every day leaves New York at 3 p.m., via the picturesque Erie, for Chicago, Cincinnati, St Louis, Cleveland and Minneapolis, and a corresponding train of the same plan and appointments starts eastward from Chicago daily at 10:15 a.m., for the places just mentioned.

Delegates to the convention, from New York, Boston and Philadelphia, will do well to buy their tickets via the Erie.

To St. Paul and Minneapolis.

Not the oldest, but the best railway in many respects, is the Chicago St. Paul and Kansas City Railway. It is the only line running the celebrated Vestibuled-Compartment Sleeping Cars; it is the line that reduced the time from 19 hours to 14 hours to and from Chicago, St. Paul and Minneapolis. Delegates to the October convention will find this line the most comfortable and expeditious to travel over. For any information regarding time of trains, rates etc. adress or call upon the city ticket agent Mr. C. D. Dunnan, at 204 Clark St., Chicago.

R. S. Hair agent, 323 Broadway, N. Y.

W. P. Cooley agent, 836 Chestnut St., Phila.

A. P. Massey agent, 196 Washington St., Boston.

The Storage Battery in Brussels.

The Julien electric cars have now been in regular passenger service for a little over two years in Brussels; and a report has just been prepared of the cost of motor power during that time. The motive power includes the renewal of batteries, the wear and tear on motors and machinery, the generating and storing of the energy and repairs and replacements generally—in fact, every element that can be understood by an engineer to be motive power.

It has been found that the cost of motive power has been a trifle less than three cents per kilometer, or about five cents per car mile; in this, the cost of maintaining the batteries has amounted to one and three-fifths cents per car mile.

It may be interesting to know that the estimate of the cost of motor power as based on the cost of operating the 4th and Madison avenue line in New York, and prepared prior to the report at Brussels and without any knowledge of the cost there, is within a fraction of being the same. The cost of motive power on Madison avenue line is found to be 5.3 cents per mile. In the cost of motive power as estimated in New York, however, was included interest on investment, amounting to 1.8 cents or 3 5 cents per car mile net, including depreciation on battery, cost of generating current and handling of batteries.

Off for South America.

H. C. Simpson, the late Secretary of the Lewis Fowler Manfg. Co. of Brooklyn, N. Y., sailed on Aug. 26, for South America, where he intends to embark in the manufacture of Car Springs. Mr. Simpson was the pioneer in introducing permanent registers in the horse cars of this country, and is well and favorably known to every Street R. R. Manager in the United States. He will not only be missed by his former employers, but his many friends in every city where street cars run, will regret his departure. He takes with him the good will and best wishes of his North American friends, and we commend him to the trade of South America, and after his fortune is made, we will welcome him home and help him distribute his wealth. We give you three years, Brother Simpson, from October next.

Office of the Street Railway Association of the State of New York.

The Street Railway Gazette, Chicago.

Dear Sirs:—The Seventh Regular (Annual) Meeting of the Street Railway Association of the State of New York will be held at the Fifth Avenue Hotel, New York City, Tuesday, September 17th, 1889, at 10:30 o'clock A. M., in room D-R.

Special committees will present reports upon important subjects, and it is earnestly hoped that your company will be represented at the meeting.

Yours truly,

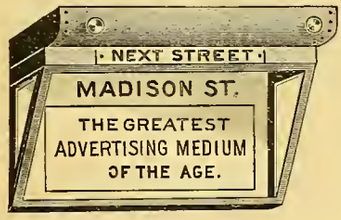
Wm. J. Richardson, Secretary.

The eastern delegation to the annual convention of the N. A. S. E. recently held in Detroit, speak in the highest terms of the way in which they were treated by the officials of the West Shore road, between New York and Buffalo, en route to Detroit. The ride over the road was most comfortable and delightful, the smoothness of the track and the magnificent scenery along the route making the trip one of absolute pleasure. Delegates to the forthcoming annual convention of the A. S. R. A. will find the popular West Shore one of the best routes to Minneapolis, and its accommodations can not be surpassed.

The seventeenth annual exhibition of the Inter-State Industrial Exposition of Chicago, which opened on Sept. 4th, is as far ahead of the one held in 1888, as the exposition of that year was ahead of its immediate predecessor. The policy of the management has been from the beginning to subordinate everything else to the promotion of the business and educational interests of its patrons, whether exhibitors or visitors, and a strict adherence to that policy has made the exposition a permanent success. The displays this year in all the departments is one of which Chicago may well be proud, and the management certainly deserves to be highly complimented upon the exposition of 1889.

Street Car Indicator.

One of the simplest, and at the same time one of the cleverest and most useful devices that has yet been offered to Street Railway men is here shown. It consists of an attractive box, made of wood to match the interior wood work of the car, and is placed over the front door of the in-



side of each car. The words "Next Street" appear on the front of the box, and just above the glass door through which is seen the display curtain. The box is fitted up with an independent series of display curtains, on the top of each one of which is printed the name of the next street, while the rest of the curtain contains an advertisement. The entire round trip is placed within the box in regular order so that when the end of the line is reached the box requires no adjusting or setting. At each street crossing the box is operated and the next curtain is dropped down, announcing the name of the next street one block in advance, and displaying also the advertisement on the curtain. Simultaneously with the dropping of the curtain a bell rings similar in sound to a telephone bell.

The advantages of the Indicator to the public are obvious, inasmuch as the street announcement is made one block in advance, thus enabling passengers to collect parcels, etc., and prepare to leave the car. It is particularly advantageous at night, when the exact location of the car can not be determined, or in winter when the windows are covered with ice. It is also beneficial in that it is not necessary for the conductor during the cold weather to open the door and make the street announcement. The opening of the door at each street crossing is thus avoided, and those near the door do not complain of the cold air which naturally rushes in on the opening of the door. The advantages to the conductor are obvious, as it saves him the trouble of opening and closing doors, making street announcements, and keeping constantly in mind the desires of passengers to be left off at this street or that street. He simply requests the passengers to watch the Indicator and they will know when to get off, and thus he is relieved from the responsibility, and there can be no dispute about passengers being carried beyond their destination. The operation of the machine is simple, a simple touch of the cord being all that is required to drop the curtain.

The United States Indicator Company is a comparatively young organization, having been formed the first of this present year, and having properly been in active operation only since the middle of February. During this time it has organized companies in Cincinnati, O., Indianapolis, Ind., Washington, D. C., Buffalo,

N. Y., and Chicago, Ill. These companies are independent organizations, in each of which the parent company retains an interest. Machines are in operation in Cincinnati, Indianapolis, and Washington.

The Indicators for the cars of the Buffalo St. Ry. Co. and the Chicago City Ry. Co., are being built, and these lines will be equipped at once.

Mr. Wm. P. Williams the President and General Manager of the Company is the patentee of the device. Wm. J. McMullen is Vice President. and Wm. P. Johnson, Secretary and Treasurer. Office 415 Home Insurance Building, this city.

Northwestern Notations.

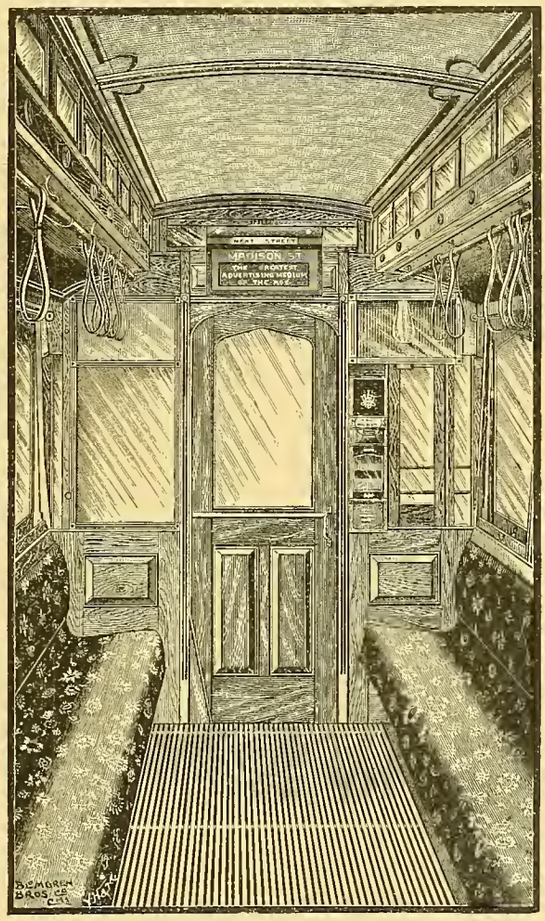
Duluth is to have a line to the apex of the hill on Seventh avenue west. An inclined plane from Michigan to Ninth streets will be built. Next year a cable line will be constructed on Lake avenue, from the Canal to Tenth street.

Track laying has reached the intersection of Granville and Hastings streets, Vancouver, B.C. The directors are considering the substitution of electricity for the contemplated horse power.

An application has been made by the Thomson-Houston Electric Supply company for a franchise to build and operate an electric street car railway at Green Bay, Wis.

Spokane Falls, W. T., has a cable road and an overheard wire electric road. Mr. Ledgerwood, of New York, has bought 600 acres of outlying land and contemplates a second electric road.

The ordinance committee, at the city council



Street Car Indicator.

meeting at Winona, Minn., reported adversely on the ordinance which has been pending for some weeks, and which has attracted general attention, proposing to grant the Winona City Railway company the franchise to put in an electric plant, operate its cars by electricity and furnish electric light and power. The ordinance directly owes its defeat to the active hostility which a minority of the stockholders of the street railway company brought to bear against it.

The Mankato, Minn. *Free Press* suggests an electric motor connecting Lakes Emily and Madison with St. Peter and Mankato.

The Philadelphia syndicate which owns the street car line in the city of Pierre, So. Dak., expects to build five miles more of road before next April. It has to do this to hold its franchise.

The Mankato, Minn., street car company carried 2669 passengers on circus day, 800 more than on any other day.

The first street cars run in St. Paul commenced operations 17 years ago.

Fargo, Dak., and Moorhead, Minn., are agitating for a street car line between the two cities, on opposite banks of the Red River.

Convention Exhibits.

The following have been received in answer to a circular issued by us to manufacturers, asking:

1st. Who, if anyone, will represent you at the Convention?

2d. Do you propose to have an exhibit? If so, what?

Pullman's Palace Car Company, Chicago, Ill.

"We have your favor of August 17, asking if we will have an exhibit at Minneapolis, at the forthcoming Street Car Convention; also, if we will have anyone represent us in this department, at said convention.

"In reply we beg to say that we will make no exhibit, and we will not—as far as we know, at the present time—send a representative."

Chadbourne, Hazelton & Co., Philadelphia.

"A. W. Chadbourne will represent us at the convention."

Martin & Breckinridge, New York.

"Your favor of the 17th of August, in form of circular letter in reference to the forthcoming annual convention of the American Street Railway association, just received.

"We will in all probability be represented at the convention by Mr. D. C. Breckinridge, of this firm, that being our present intention.

"We are in some doubt as to whether or not we will have an exhibit, but that will soon be definitely decided, when we will communicate with Col. Thomas Lowry, as you suggest."

M. M. White & Co., New York.

"We do not propose to have an exhibit at the coming exhibition of the American Street Railway association."

Bemis Car Box Co., Springfield, Mass.

"Your favor of the 17th is at hand and noted. We will be represented at the annual convention at Minneapolis by our agents, C. G. Stearns and F. T. Pullen. Possibly Mr. Bemis and myself may be there, but not positive."

J. D. Smith, New York.

"Owing to the pressure of business we will be unable to arrange an exhibit for the forthcoming convention at Minneapolis."

The Woodward Electrical Co., Detroit, Mich.

"Replying to your esteemed favor of the 17th inst. would state, that it is not our intention to exhibit at the convention named, neither will we be represented there."

Leonard & Izard Company, Chicago, Ill.

"Replying to your favor of August 17, would say that this firm does not contemplate sending any exhibit of street railway cars, material or appliances, to Minneapolis."

J. G. Brill Company, Philadelphia, Pa.

"Your favor of the 14th received, and contents noted. We propose to make a small exhibit at Minneapolis this year."

Dunham Manufacturing Co., Chicago, Ill.

"Dear Sir—Referring to your letter of 17th ult., in regard to the exhibit of street railway cars, material and appliances to be held at Minneapolis, will state that we have no exhibit to make.

"With thanks for the notice received, etc."

The Judson Pneumatic Street Ry. Co. New York.

"We have your favor of August 17, in reference to our exhibit at the Street Railway convention to be held in Minneapolis, on October 17. In reply we beg to say, that we shall exhibit a model built on the scale of one inch to the foot, and showing grades, curves, switches and right angle crossings. This will be in charge of our secretary and treasurer, Mr. H. L. Earle, who will be there to represent us.

"We have applied to Col. Thomas Lowry for adequate space to exhibit the same.

The Street Railway Gazette.

S. L. K. Monroe, - - - - - - Manager.
E. V. Cavell, - - - - - - Editor.
Edward J. Lawless, - - - Associate Editor.
W. L. S. Bayley, - - Mechanical Expert.

GENERAL OFFICES:

CHICAGO:
8 Lakeside Building.
San Francisco, - - - - - - 1222 Bush Street.
Toronto (Canada), - - - - - 53 Magill Street.
Cable Address=Tram, Chicago.

Paris Exposition Headquarters,
Group 11, Class 29, No. 218, W. S. Section.
Geo. M. Bailey, Representative.

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Spain	21ps. 95c.	Ps 1.10.
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Venezuela	12 bolivar.	1½ bol.
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[Entered at the Chicago post-office as second-class matter.]

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Matter for publication should reach the Chicago Office not later than the last day of each month. All communications should be addressed, The Street Railway Gazette, Chicago, Ill.

Important Announcements.

GAZETTE HEADQUARTERS.

The Convention headquarters of the Street Railway Gazette will be in Room 12, on the parlor floor of the West Hotel, where the latch string will be found hanging out as usual.

CONVENTION ISSUE—CLOSING DATE.

The Convention issue of the Gazette will close at this office (8 Lakeside bldg., Chicago) promptly on the morning of October 9th, and we can not guarantee the insertion of any advertisements in that issue, reaching this office later than that date.

Inasmuch as the entire convention number of the Gazette will probably be devoted to giving a full *verbatim* report of the proceedings, transcript of papers read, list of exhibitors, and details of the social features of the gathering, the publisher can not guarantee the insertion of any other matter therein; therefore, whatever reaches the editorial department intended for publication in that issue, may have to stand over until the November number.

The lateness of the present issue is due to an anxiety upon the part of the publisher to be in a position to give members' delegates to the convention, the latest and most official information regarding the arrangements that have been made for their entertainment in Minneapolis, and we feel sure that our readers will fully appreciate our position and avail themselves of the information imparted.

Reduced Rates.

The fact that Secretary Richardson, after years of disappointment, has at last succeeded in making arrangements whereby the members' delegates will be transported to and from the convention at less than tariff rates, must certainly be extremely gratifying to that courteous and indefatigable gentleman, and we trust that he has established a precedent that will be followed for all time, under similar circumstances.

Advice to Exhibitors.

Indications point to the fact that, while there will, undoubtedly, be a considerable number of exhibits at the forthcoming convention in Minneapolis, yet we incline to the opinion that the general display will hardly be equal to what it was last year in Washington. The reason for this may be that the expense of transportating goods to a point so far away is considerable, and that, while Secretary Richardson, always working for the good of the association, has done his best to make known the fact that arrangements have been made by Col. Thos. Lowry for an exhibit, and the Gazette in its August issue made that announcement, yet we have evidence that compels us to believe that a large number of manufacturers are still in doubt as to whether or not an exhibit will be held. We are authorized by Mr. W. J. Richardson to say that "facilities will be afforded all manufacturers, inventors and others desirous of putting their products on exhibition, as heretofore.

"Application should be made at once to Thomas Lowry, pres. Minneapolis St. Ry. Co. for space either inside the hotel or on the street."

Quite a number of manufacturers, etc., have already signified their intention of placing their goods upon exhibition, and it is to be hoped that many more will see the advantage of doing likewise.

In conclusion we would earnestly advise all who send goods to Minneapolis to have them opened and ready for inspection on the morning of October 16th, if not earlier, as the delay in getting their exhibits out on time last year, caused no little disappointment to their owners.

The A. S. R. A.—Its Revilers.

The annual convention of the American Street Railway Association is nigh at hand, and before the October issue of the Street Railway Gazette is sent flying to all parts of the world, carrying within its blue cover a full *verbatim* report of its proceedings, it will be a thing of the past.

Who, looking back to that time when its first meeting was held in Boston–after Mr. H. H. Littell had, with characteristic Kentucky pluck, issued the call, and sounded the slogan through the country, calling the clans together—can help feeling a thrill of pride and admiration run through him, as he looks over the vast assemblage that now gathers in annual conclave to discuss the intricate problems of inter-urban transportation? We have heard it said that these gatherings have now almost lost their distinctive feature —"the acquisition of experimental statistical and scientific knowledge, relating to the construction, equipment and operation of street railways, and the diffusion of this knowledge among the members of the association." And we have likewise heard the downfall of the A. S. R. A. predicted. Can any thoughtful man, who has attended one of its annual meetings, say, fairly and truthfully, that this feature has not been honestly and persistently maintained? "We trow not." We have also heard it said that the annual conventions of the association have degenerated into junketting excursions. Do the facts bear out the assertion? Those who attend the meetings, and sit hour after hour, day after day, listening to the discussion of momentous questions of vital importance to the gigantic interests, and the immense amount of capital they represent, can better answer this most nonsensical and fallacious statement—or, better still, leave it entirely unanswered, as an elephant disdains to notice the gad-fly trying to worry it. If the social features of the conventions are distasteful to these malcontents, these dwellers in the caves of Adullam, let them simply pursue their ordinary avocations, if indeed they have any, and ventilate their pessimistic opinions in another sphere. Their presence can contribute nothing to the success, well-being or enjoyment of these yearly gatherings, they sit like grim death at a banquet, unable to enjoy themselves, and, like curs in their mangers, unwilling that anyone else shall revel in a little of life's sunshine. Yet some of these very men are among the first to "Crook the pregnant hinges of the knee, That thrift may follow fawning,"—their incomes are derived from the very ones whose actions they deride, whose counsels are a butt for their senile revilings. Away with such growlers! the A. S. R. A. has no use for them;—its guests have no use for them,—the supply men, those ubiquitous, courteous gentlemen, indispensable alike to the street railway men and the street railway press—have no use for them,—they are the tares amid the wheat — the chaff from the threshing floor.

As year after year rolls by, and the A. S. R. A. gains in strength, numbers and importance, we watch man after man raised by it to its place of honor, and feel like old Priam sitting at the Scæn gate, watching the embattled hosts of Trojans and Achaians marching before him, and exclaiming "which is Hector, which is Achilles, which is Menelaus?" So, may we ask, "among the delegates to the forthcoming convention, which one will prove the Hector — which the Achilles—who will be the coming man?" The election to the presidency of a body so wise in its counsels, so conservative in its actions and of such paramount importance to the public weal is, indeed, an honor of which its recipient may well be proud. In its choice of officers the A. S. R. A. has always been wise; men have invariably been chosen who had the welfare of the association first and foremost in their hearts. The mantle of the first Elijah has been worn with infinite dignity by his successors. Upon whom now will it descend? Will Minnehaha's laughing waters laugh the merrier if the great Northwest should win the honor? Will the mighty cataract of Niagara roar the louder if he who lives almost within range of its spray, proves himself the choice of his associates?—*Quien sabe!* Be that as it may, the old motto of "Honor to whom honor is due," will undoubtedly obtain, and whether the choice for the presidency falls to the North, the South, the East, or to the West, the American Street Railway Association will still live — croakers, grumblers, malcontents and pessimists to the contrary notwithstanding.

The Triumph of Electricity.

There is no such thing as "Rest" in the history of modern electric railway science. Each day brings forth some improvement, and the leading electrical supply companies are showing creditable zeal in bringing their apparatus and appliances up to the greatest modern standard of excellence. Barely two electric railways in the country can be said to be exactly alike. Hardly a day passes but what patent after patent for electric railway improvement is filed in Washington. Push forward, gentlemen; keep up the march of progress, until your trolleys shall be running over every street in the Union. Bravely, with marvelous pluck, and with indomitable perseverance have you overcome almost insurmountable difficulties, and collectively can you say to the Street Railway world, "veni, vidi, vici."

D. W. Dozier, chief engineer of the Grand Av Cable Ry., Kansas City, Mo., recently favored the Gazette office with a call.

Street Railway Associations.

OFFICERS, DATES OF MEETINGS, ETC.,

AMERICAN ST. RY. ASSOCIATION.

President, George B. Kerper ..... Cincinnati, O.
First Vice-president, Jesse Metcalf ..... Providence, R. I.
Second Vice-president, Henry Hurt ..... Washington, D. C.
Third Vice-president, W. H. Martin, Jr. ..... San Francisco
Secretary and Treasurer, Wm. J. Richardson ..... Brooklyn

EXECUTIVE COMMITTEE.

Geo. B. Kerper ..... Cincinnati, O.
Jesse Metcalf ..... Providence, R. I.
Henry Hurt ..... Washington, D. C.
W. H. Martin, Jr. ..... San Francisco, Cal.
Charles B. Holmes ..... Chicago
John Scullin ..... St. Louis
James H. Johnston ..... Savannah
Henry A. Sage ..... Easton
E. J. Lawless ..... Kansas City

The annual convention of the Association will be held at the West House Minneapolis, Minn., commencing on Wednesday, Oct. 16, 1889.

N. Y. ST. RY. ASSOCIATION.

President, Chauncy C. Woodworth ..... Rochester
Vice Presidents, John N. Partridge ..... Brooklyn
John S. Foster ..... New York
Secretary, William J. Richardson ..... Brooklyn

The annual meeting of the Association will be held in New York on September 17, 1889.

MASS. ST. RY. ASSOCIATION.

President, Chas. H. Odell ..... Salem
Vice-Presidents, H. M. Whitney ..... Boston
Amos F. Breed ..... Lynn
F. O. Stearns ..... Swanson
Secretary, F. H. Monks ..... Brookline
Treasurer, J. H. Eaton ..... Lawrence

Regular meeting day, first Wednesday in each month.

The annual meeting of the Association will be held in Boston, Mass., Sept. 4, 1889.

THE ST. RY. ASSOCIATION OF THE STATE OF NEW JERSEY.

President, John H. Bonn ..... Hoboken
Vice-President, S. S. Battin ..... Newark
Secretary and Treasurer, Charles Y. Bamford ..... Trenton

EXECUTIVE COMMITTEE.

John H. Bonn ..... Hoboken
S. S. Battin ..... Newark
C. Y. Bamford ..... Trenton
C. B. Thurston ..... Jersey City
John Hood ..... Camden
A. Q. Keasbey ..... Elizabeth

OHIO STATE TRAMWAY ASSOCIATION.

President, M. A. Hanna ..... Cleveland
Vice-President, A. G. Clark ..... Cincinnati
Secretary, H. A. Everett ..... Cleveland
Treasurer, J. B. Hanna ..... Cleveland

EXECUTIVE COMMITTEE.

John M. Doherty ..... Cincinnati

The annual convention of the Association will be held in Cleveland, O, on November 20, 1889.

WESTERN ELECTRIC RAILWAY ASSOCIATION.

President ..... T. J. Evans, Council Bluffs, Ia.
Vice-President ..... H. E. Teachout, Des Moines, Ia.
Secretary ..... W. L. Allen, Davenport, Ia.
Treasurer ..... W. R. Moore, Moline, Ill.

Next meeting will be held at Minneapolis, Minn., Oct. 14, 1889. Regular annual convention will be held in Des Moines, Ia., in January, 1889.

Rates to the Convention.

OFFICE OF THE AMERICAN ST. RAILWAY ASSOCIATION,
BROOKLYN, N. Y., AUGUST 21, 1889.

STREET RAILWAY GAZETTE,

Gentlemen—I am in receipt of yours of the 17th instant, relative to reduced fares for delegates and others attending the convention; and in reply thereto, would say, that I have been in correspondence for some time with the several Traffic Associations on this subject, and will very soon know the result, when I will inform you promptly; and which I think will be in time for your next issue. I am in receipt of a letter from Mr. Lowry, in which he says—"We are arranging to make the meeting a *grand success* in Minneapolis, and think you will be pleased with the outcome."

Regarding special rates for accommodation at the West Hotel, would say, that I expect to be able to inform you in reference thereto in time for publication in your next issue.

Sincerely yours,
WM. J. RICHARDSON,
Secretary.

(Since the foregoing was received at this office, we have seen an official circular issued by the Central Traffic Association, authorizing a rate of one and one third fare to Minneapolis and return, on the certificate plan, from all points on lines embraced in the Association.)

The following is a copy of

INSTRUCTIONS TO DELEGATES.

DEAR SIR:—Through the courtesy of the Central Traffic Association, persons attending the American Street Railway Association Annual Convention, to be held at Minneapolis, Minn., commencing October 16, 1889, will be granted a reduction in their return railroad fare only, under the following circumstances and conditions:

FIRST. Each person must purchase (not more than three days prior to the date of the meeting nor later than three days after the commencement of the meeting) a first class ticket (either unlimited or limited) to the place of meeting, for which he will pay the regular tariff fare, and upon request the ticket agent will issue to him a certificate of such purchase (Form 2), properly filled up and signed by said ticket agent.

SECOND. If through tickets cannot be procured at the starting point, the person will purchase to the nearest point where such through tickets can be obtained, and there purchase through to place of meeting, requesting a certificate properly filled out by the agent at the point where purchase is made.

THIRD. Tickets for the return journey will be sold by the ticket agents at the place of meeting at one-third the highest limited fare, only to those holding certificates (Form 2), signed by the ticket agent at point where through ticket to the place of meeting was purchased, and countersigned by the secretary or clerk of the convention, certifying that the holder has been in attendance upon the convention.

FOURTH. It is absolutely necessary that a certificate be procured, as it indicates that full fare has been paid for the going journey, and that the person is therefore entitled to the excursion fare returning. It will also determine the route via which the ticket for return journey should be sold, and *without it no reduction will be made*, as the rule of the association is that "No refund of fare can be expected because of failure of the parties to obtain certificates."

FIFTH. Tickets for return journey will be furnished only on certificates procured not more than *three days* before the meeting assembles nor later than *three days* after the commencement of the meeting, and will be available for continuous passage only; no stop over privileges being allowed on tickets sold at less than full fares. Certificates will not be honored unless presented within *three days* after the date of the adjournment of the convention.

SIXTH. Ticket agents will be instructed that excursion fares will not be available unless the holders of certificates are properly identified, as above described, by the secretary or clerk, on the certificate, which identification includes the statement that fifty or more persons, who have purchased full fare tickets for the going passage, and hold properly receipted certificates, have been in attendance at the meeting.

The certificates are not transferable, and the signature affixed at the starting point, compared with the signature to the receipt, will enable the ticket agent to detect any attempted transfer.

N. B. Please read carefully the above instructions, be particular to have the certificates properly filled and certified by the railroad agent from whom you purchase your going ticket to the place of meeting, as the reduction on return will apply only to the point at which such through ticket was purchased.

Tickets and certificates should be obtained at least thirty minutes before the departure of trains.

A certificate is void if altered, if not presented within prescribed dates, if not signed by the Secretary of the Association, or if blank spaces on the going side are not filled out, signed and stamped by Agent of the line at point from which passenger started.

(ADDENDA.)

Upon the eve of going to press, the following reached the office of the GAZETTE:—

BROOKLYN, N. Y. September 16, 1889.

STREET RAILWAY GAZETTE, Chicago, Ill.

Dear Sirs:—The Eighth Regular (Annual) Meeting of the American Street-Railway Association will be held at the West Hotel, Minneapolis, Minn., the third Wednesday in October (the 16th), 1889, at 10 o'clock A. M.

This meeting has, undoubtedly, been looked forward to with unusual interest by Street-Railway Managers. The following are some of the special reasons, brought to your notice, why you will desire to be present.

FIRST—*Reports of Committees.* Committees will report on the following extensive range of subjects, namely: "A Street-Railway Employees' Mutual Benefit Society;" "How Can Public Sentiment be Best Cultivated so that Corporations may Receive Equitable Treatment?" "Street-Railway Motors Other than Animal, Cable and Electric;" "Street-Railway Mutual Fire Insurance;" "The Conditions Necessary to the Financial Success of Electricity as a Motive Power," and "The Food and Care of Horses."

SECOND—*Street-Railway Exhibition.* A comprehensive exhibit of street railway supplies will be arranged for by inventors, car-builders, and dealers in street-railway supplies generally; the Minneapolis Street Railway company and the West Hotel having generously arranged for every convenience for exhibitors.

THIRD—*Local Entertainment.* The Minneapolis Street Railway company has arranged the following excursions for the entertainment of all who attend the Convention: 1. From Minneapolis by special train to Lake Minnetonka, and tour of the lake on steamer. 2. A special train to Lake Harriet, to Minnehaha Falls, thence in carriages to St. Paul, via Fort Snelling, making tour of St. Paul and return to Minneapolis. 3. A drive around the Park system and Boulevards of the city of Minneapolis.

FOURTH.—*Reduced Rates of Fare.* This year the Trunk Line, Central Traffic, Western States and Southern Passenger Associations have united in extending the courtesy to all who attend the meeting, of the special rate of a fare and one-third for the round trip. These Associations cover nearly all the territory in the United States, except the New England and the Pacific Coast States. This concession applies not only to delegates, but to all other gentlemen attending the Convention, and to members of their families accompanying them. This is the first year that the railroads of the country have united in according reduced rates, and it is very much desired that a large number of certificates may be received by the Traffic Associations in return for their courtesy, that the concession now granted shall thereby be secured to those attending future meetings of the Association. This material reduction in the cost of transportation will, doubtless, have a very appreciable influence upon the attendance.

That there may be no misunderstanding on the part of delegates as to the manner of obtaining the concession granted by the foregoing Associations, the following rules must be strictly compiled with:

(Here follows the "Instructions to Delegates," given in full, in preceding column.)

The Secretary suggests to all who will attend the meeting, and who desire to transact business at any other city *en route*, to arrange to do so on the trip *to* Minneapolis, as the going ticket will, of course, carry with it, in most cases, stop-over privileges; while the return does not.

FIFTH—*Attendance of Ladies.* The attendance of ladies, which was such a delightful feature of the last Annual Meeting at Washington, will likewise be arranged for at the Minneapolis Meeting. Inasmuch as the local companies in the different cities do so much towards the entertainment of delegates, and as the attendance of ladies adds so much to the enjoyment of our Annual Meetings, their participation in the excursions, as well as in the banquet, will be provided for at Minneapolis the same as at Washington.

SIXTH—*The Banquet.* The Annual Dinner will take place on Thursday evening, the 17th inst., at the West Hotel. Each company, a member, is entitled to the admission of two persons to the Banquet, free. Each additional gentleman will be charged ten dollars; ladies' tickets, five dollars. In order to facilitate the Executive Committee, will you please inform the Secretary immediately upon the receipt of this notice of the number that will be present from your company, enclosing the additional amount covering the number in excess of the two to which the company is entitled free, that definite arrangements as to the number that will attend the banquet may be promptly made.

The West Hotel is one of the finest in the country; and the proprietor says that he intends giving those attending this meeting the best available rooms, and will make special efforts to make everybody comfortable. It is advisable that you write to the proprietor at once, engaging such accommodation as you may require for yourself and those who will accompany you, for which purpose an addressed envelope is enclosed. Please find enclosed also a list of the present membership of the Association, numbering in all 158 companies in the United States and Canada.

Will you please acknowledge receipt of this letter at your earliest opportunity, stating whether you expect to be present at the meeting; and on the enclosed delegate's card fill in the names of those who will attend from your company, and return it with your letter of acknowledgment in the accompanying envelope.

Awaiting your prompt reply, I am,

Sincerely yours,
WM. J. RICHARDSON,
Secretary.

Street Railway News.

DOMESTIC.

(See also "New Enterprises," "Extensions," "Elections," "Too Late to Classify," etc.

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a verification of each item received by them in time for each issue.)

CALIFORNIA.

Los Angeles—The cable road to Boyle Heights, east side of the river, is completed and was formally opened Aug. 3. The event was celebrated by a barbecue at the power house. The attendance was very large. Speeches were made by Mayor Hazard and other prominent citizens. Business blocks and private residences were profusely decorated. The length of this branch of the cable system is 24,000 feet and cost $500,000. Col. Robinson is certainly to be congratulated upon his indomitable pluck and energy in so successfully carrying out his gigantic scheme.

COLORADO.

Denver—The County Commissioners are considering the application for a franchise for the Highland Street Railway company.

DAKOTA.

Sioux Falls—The Electric Motor company is letting contracts for the construction of its line.

GEORGIA.

Atlanta—The first electric car ever seen in Georgia was run over the line of the Atlanta and Edgewood line on Aug. 22. The line is equipped with the Thomson-Houston overhead system, and is one of the finest among all the Thomson-Houston company's many installations.

Augusta—The street railroad here is about to adopt electricity as a motive power.

ILLINOIS.

Decatur—The Citizens' Electric Railway company will rapidly push work on the completion of its line.

The Decatur Street Railway company will push the work on the construction of its electric line.

Joliet—The Thomson-Houston Electric company will push work on the construction of the plant for the electric street railway here.

Ottawa—At Ottawa recently the business men and citizens gave a banquet in honor of Mr. T. J. Evans, president of the Ottawa Electric Street Railway company, congratulating him on the unquestioned success of the new enterprise.

Rock Island—The Moline Central Street Railway company has petitioned for franchise for a street railway, W. R. Moore, president.

IOWA.

Des Moines—We understand that all the street car lines here have been consolidated under one management and that electricity will be adopted on all lines in the city.

KANSAS.

Larned—The city council is considering the granting of a franchise for constructing an electric motor system here.

KENTUCKY.

Lexington—The Lexington City Railway company will petition for an amendment of its charter to allow use of electricity as a motive power.

MINNESOTA.

Duluth—It is now positively known that the Douglas County Street Railway company will use electricity for the motive power on its line, which is soon to be constructed on Fifth street, between the East and West Ends and on Tower avenue in West Superior. It has also been learned that a rolling company of Chicago is now manufacturing the rails to be used in the construction of the line, and that the John Stephenson company has been awarded the contract for furnishing the cars, which will be of the latest improved pattern and costly in construction. The contract for constructing the line has not yet been let, but it is understood that bids are being received, and the work of construction will begin in about ten days.

Minneapolis—The Thomson-Houston Electric & Power Co. has introduced an ordinance in the common council asking a franchise to operate lines in this city.

The Street Railway company is receiving estimates for equiping its line with electricity.

In view of the forthcoming convention, the following history of Minneapolis Street Railroad will doubtless prove of considerable interest. The earlier history of the St. Paul City Railway company and its predecessors is shrouded in considerable mystery, and there are really very few citizens of the St Paul of to-day who have an accurate knowledge of the beginning of street car service in the city. The system of to-day, crude as it may be, is the product of an evolution which has been going on almost exactly seventeen years. The first cars on the first line began to move in August, 1872, and there were just four cars, with four drivers and four horses. This with a line of track extending from Seven Corners, down Third to Wabasha, over to Fourth, down Fourth to Jackson, up to Seventh, on Seventh to Locust and out Locust to the corner of Lafayette avenue and Westminster street. The charter under which this road was operated and which is substantially the one under which the company holds its rights to-day was the third granted, nothing having been done under the first two. One was granted by the territorial legislature of 1857 and called for a road operated by steam, to start in St. Paul and run in the direction of St. Anthony Falls. The next was granted in 1868 and this, revised and amended, passed the city council in 1871 and was ratified by the legislature of 1872. Under it, the St. Paul Street Railway company was organized and incorporated in the spring of 1872. There was a good deal of public spirit aroused over the matter. Other rival cities were putting in lines and St. Paul must have one. The original incorporators were Warren H. Dean, Horace Thompson, John Wann, H. L. Carver, W. S. Wright, J. W. Bass, Girard Hewitt, J. C. Burbank, William Dawson, W. R. Marshall, and Lafayette Shaw. The majority of these names are well known in St. Paul to-day, as among those of St. Paul's solid citizens. Their stock was split up among a large number of other citizens. H. L. Carver was the secretory of the company, and work was begun at once, and the cars started in August. Shortly afterward Gov. Marshall and W. H. Dean bought up all the stock, and operated the road until 1874, when Gov. Marshall bought out Mr. Dean's interest, and became sole proprietor. In August he leased it to Shaw & McComb. McComb soon dropped out, and Shaw operated it alone until 1877. In 1874 a second line had been built from Wabasha and Fourth, up Wabasha to College avenue, and along College to Rice street, reaching the then famous Park Place hotel. About this time, too, mortgage bonds to the amount of $55,000 were issued, it being claimed that $110,000 had been put into the road. In April, 1877, interest on these bonds were defaulted. The road was taken possession of by Thomas Cochran jr., as trustee under the mortgage, the holders being all eastern parties, and foreclosure proceedings were begun. Mr. Cochran operated the lines until the completion of the proceedings placed the title in the bondholders, which was in October, 1878. It was during this period that the fare was raised to six cents, and it will be remembered what a commotion this raised. Instead of increasing the reuenues it decreased them. It was not the value of the extra penny that caused the trouble, but copper coins did not circulate then to any extent, and very few people had the change. Those who did not, did not care to be compelled to take four pennies in change. The bondholders did not want the road. They offered it for sale here at a song, almost hawked it through the streets, but not a St. Paul man could be persuaded to touch it. The bondholders organized a company with A. H. Potter as president, W. H. Phillips, vice-president, and W. G. Dommick, secretary. The name was changed to St. Paul City railway, and J. R. Walsh was appointed treasurer and general manager. Mr. Walsh at once took entire charge of the road, but found very little except "two streaks of rust and the right of way." He succeeded, however, in putting it on a paying basis for the first time in its whole history. In 1879 an extension was made from College avenue and Rice street up Summit and Nelson to Western, and on Western to the corner of Ashland avenue with the aid of a citizens' bonus of $2,000. In 1880 the lines were all substantially rebuilt. They were all single tracks with switches and were now made double track. The present Mississippi street line was also built out to the bridge. New equipment was added. The site now occupied by Dickinson's store was purchased for $12,000, and, in spite of the opposition of the chamber of commerce, the central barns and offices were erected. Mr. Walsh ran the road until the spring of 1882, when the stock was above par, and the eastern owners were bought out for $165,000 by H. Greve, A. Oppenheim, F. B. Clarke, W. R. Merriam and T. Lowry, each taking a fifth. After about a year Messrs. Greve and Oppenheim purchased enough of Mr. Clarke's share to give them a controlling interest. In 1884 Mr. Lowry purchased all of Mr. Merriam's interest and the balance of Mr. Clarke's, with enough of Messrs. Greves and Oppenheim's to give him the control, which he has since held, though some eastern capitalists have secured small holdings.

The charter of 1872 gave the company rights on all streets of the city (present or future) and its bridges, with the exceptions that Third street from Wabasha to Sibley and upper Summit avenue were barred. They were also originally forbidden to put a double track on a street sixty feet or less in width. This in a good many cases in the early days compelled the company to build tracks on separate streets. The present company has, however, succeeded in having this sixty feet restriction done away with.

St. Paul—The Thomson-Houston Electric & Power Co. have petitioned the council for a franchise to construct electric street railways here.

Stillwater—The Stillwater Street Railway company has floated mortgage bonds to the extent of $60,000, and, in a trust deed filed by the company with the secretary of state, Allen Curtis, of Boston, Mass., is named as the trustee.

Winona—The proposed ordinance which has been pending for some time granting to the Winona City Railway company the franchise to put in an electric plant, operate its lines by electricity and furnish electricity for lighting and power, recently came up for consideration before the city council:

It appears that some weeks ago a number of St. Paul gentlemen bought up a large amount of stock of the Winona City Railway company from Winona business men. These St. Paul gentlemen, in company with B. H. Langley, a large local stockholder, found themselves at the annual meeting of the street railway company in control of a majority of the shares of stock, enabling them to elect directors and officers. The directors publicly avowed the desire to introduce electricity into the street car system and to put in a power plant here, involving an investment of $50,000 to $100,000. For some weeks the ordinance has been pending before the council and it appeared, from the lively tilt, that there was a minority faction of the street railway company strenuously opposed to the council's granting the franchise asked for.

The right to adopt electricity was rejected by the council.

MISSOURI.

Kansas City, Mo—All the injunctions against the Kansas City Cable Railway company have been been dissolved by Judge Field on the condition that the company pays the Washington street property owuers the damages allowed by the commissioners in their recent report. The attorneys for the company accepted the conditions and the work may now go on.

City Counselor Slavens recently delivered an opinion in regard to the license to be paid on street cars. The opinion is in substance that according to the revised city ordinances the street railway companies must pay a license of $25 a year for every car used at any time during the year.

In 1882 he says an ordinance was passed that each car used in the city should be taxed such a sum as a license. In the years 1886 and 1887, when a number of cable franchises were granted, a clause was embodied in the franchise which virtually repealed the car license ordinance passed in 1882. It was to the effect that license should be paid according to the average number of cars used per day. While this clause acted as a repealing measure on the ordinance of 1882, which, by the way, was aimed at the horse street

railways, it was, as the city counselor claims, only a temporary means for the benefit of the cable companies while in their infancy. In each of these cable franchises, therefore, there is a clause which says that the conditions of the franchise are subject to the changes which might be affected by any general city ordinance. In other words the city did not sign away its rights to make any changes it deemed necessary.

Last year (1888) the revised city ordinances were passed, including a new ordinance which was in effect the same as the one passed in 1882 requiring a license of $25 a year for each car used at any time during the year. This ordinance, the city counselor holds, is now in effect by virtuy of the clause in each franchise which makes such a provision.

"So much" says Judge Slavens, "for the law in the case; the details of adjustment will be met and attended to as questions arise." He thinks, however, that such a thing as transferring a license from one car to another in case of the permanent disuse of the car originally licensed will be allowable. The opinion has been handed to License Inspector Lampe who will proceed to act upon it.

Street railway officials and attorneys are unanimous in their opinion of the whole matter. They say they have paid the licenses according to the law of the city and expect to continue to do so. It is perfectly evident from their attitude that they do not look with a great deal of favor upon the idea of paying the license tax upon every car owned, and state some reasons why they think it unreasonable and opposed to the idea of the framers of the ordinances. Any street railway company, for instance, in order to give good service must have two sets of cars, one for winter and one for summer. No car can be used all winter or all summer without being repaired, consequently there must be extras of both sets. On special occasions it is necessary to put on a great many extra cars, which may be used only on two or three occasions during the year. A company must have more cars than it can use at one time. Beyond this there is a general reticence on the part of street railroad men.

A mortgage for $1,000,000 given by the Metropolitan Street Railway company, of this city, to the New England Trust company, of Boston, and executed August 1, 1889, has been filed in the office of Recorder Hinde. It runs for twenty years, and the interest upon it at the rate of 8 per cent. is payable semi annually. All the Metropolitan company's power houses, street cars, engines, stable mules and franchises in this city, and Kansas City, Kas., are covered by and included in the mortgage, which was given to secure bonds recently issued by the company to pay for intended extensions of its lines.

St. Louis—Pres. W. L. Johnson, of the Southern Railroad Co., has gone East to contract for an electrical equipment for his line

Two street railway companies here have filed articles for increased capital stock. The Mound City Railway company increases its capital stock from $125,000 to $1,000,000, with assets of $300,000 and liabilities $126,000. The Union Depot Railway company increases its capital stock from $400,000 to $1,200,000; assets $811,000 and liabilities $351,000.

Warrensburg—This city is now in a state of considerable exeitement over the matter of granting street railway franchises. The Electric Springs company asked for an exclusive franchise for its car line on certain streets, in the southern part of the city, for a term of fifty years. The council refused to grant an exclusive franchise, and a large mass meeting of the friends of the company was recently held at the court house and the council severely criticised. An attempt will be made to have the matter re-considered.

MONTANA.

Butte City—The car house belonging to the Butte City Street Railway company was burned August 18. The house is located out East Park street, several hundred yards from the closest fire plug, and although the brigade and department responded promptly, nothing could be done by them to stay the flames, and the building was soon a mass of ruins. When the fire broke out there were four cars in the house, but persons close at hand succeeded in getting two of them out of reach of the flames, but the other two were consumed. The loss on the property will be quite heavy. It is not known for a certainty just how the fire started, but the general impression is that flying sparks from from one of the motors did the work. There is a heavy grade just east of the house, and a motor in ascending it throws off numerous large hot coals. The whole structure and everything around it was very dry, and it is thought that some of the sparks flew into the dry timber or a pile of greasy waste, and was soon fanned into a blaze by the heavy wind prevailing at the time. [Another plea for lighting by electricity.—ED.]

NEBRASKA.

Kearney—The Kearney Street Railway company has filed amended articles of incorporation, increasing the capital stock of the company to $50,000.

Omaha—The Omaha Motor Railway company has filed a mortgage for $800,000 in favor of the Mercantile Trust company, of New York city, covering its entire plant in this city. It runs for twenty years with five per cent. interest, interest and principal to be paid in gold, the former semi-annually.

NEW JERSEY.

Newark—There is so much objection to placing a line of poles through the center of the public streets for the purpose of carrying wires designed to furnish motive power for street cars that the street car men have been calling upon their inventive faculty recently to find some other method of running their overhead wires. One of them has struck upon a scheme which may be adopted in place of the pole system for the main streets of the city by the two companies now petitioning for electric franchises, if their requests be acceded to.

He does not believe that the company will ever get the right to run a line of poles up the centre of a street like Broad, Market or Washington street or Central avenue. His scheme is to run cross wires from house to house across the thoroughfares. He believes that one cross wire every 200 feet, properly stretched, will carry the two electric motor wires that will be run longitudinally through a thoroughfare. On streets where there are a few houses, poles can be erected on one or both sides of the street as the necessity may occur. It will be no more difficult to obtain from property-owners the right to sink staples in their walls than it will be to put up poles in front of their doors, in his opinion. In many cases the wires can be stretched from the present telegraph poles.

The petitions of the Rapid Transit and the Essex Passenger Railway Company for the right to adopt the overhead system are still in pigeon holes at the city hall. The Aldermen are waiting the results of the experiments on Bloomfield avenue.

A partial trial of the new electric line on Bloomfield avenue was recently made. Owing to the poor condition of the road the car ran off the rails several times.

NEW YORK.

Binghamton—The Belt Line Railroad company will adopt the electric motor system at once.

Buffalo—The Buffalo Street Railway Company is considering the adoption of the electric motor system on all its lines.

New York City—The Brooklyn Bridge Trustees are considering the construction of elevated railroad tracks across the bridge.

The new horse-car line of the Forty-second Street and Manhattanville Railroad will soon be completed over Tenth avenue to Fort Lee Ferry. On Aug. 8 the first car, No. 300, was run over the new road as far as Eighty sixth street and Riverside Drive amid great excitement. The new car was decorated with flags, the sturdy team of horses wore new harness, the conductor wore a new uniform complete, with cap, and the driver handled a new whip and switch-iron. The car left the depot at 6:15 with President John S. Foster, Supt. Stephen Sisson, Chas. H. Sisson, C. W. Robertson, a GAZETTE representative and others as passengers. As the car proceeded through Forty-second street to Eighth avenue the President ordered the conductor to take any persons who might wish to ride either way, and not to collect any fares. The first two persons to board the car were colored men, which Charlie Sisson held as an omen of good luck.

Great crowds assembled on the corners of the various streets along the route of the new line, waving hats and handkerchiefs and shouting as the car went by. Nothing unusual occurred on the up trip, but in coming back great crowds of children followed the car, some shouting like demons, others throwing all sorts of missiles and some clinging to the back and sides of the car, to get "a ride on the first car," which seemed to be quite a treat to them. The road is now finished as far as Seventy-first street. In a few weeks west siders can ride on the new road to Fort Lee Ferry and High Bridge via Riverside Drive and Tenth avenue, which will boom things greatly on the west side of Harlem. The route is a very pleasant one, especially along the Riverside Drive.

The company obtained the franchise after a hard fight in 1873 and has been making a great deal of progress since that time. It now operates and controls several lines in this city. The company will transfer passengers free of charge to any of their lines going one way, which enables the passengers to reach any desired part of the city at very little expense. It will certainly become a great Sunday road, especially during the summer months. The new cars are being made by the John Stephenson company.

The Broadway Surface Railroad franchise was sold to Col. Lamont, on Aug. 30, for $25,000.00.

(The purchasers of the franchises and grants from property holders to t e Broadway Surface Railroad are simply the capitalists who own, among other properties in this city, the Broadway and Seventh avenue line, the Avenue C line, the Pavonia Ferry line, and large interests in other street car lines. Yesterday's purchase is of value to them inasmuch as, in outside hands, the franchise which they have secured might at any time become troublesome to them in connection with their Broadway and Seventh avenue line, which is the lessee of the Broadway Surface Road. They are now the clear possessors of the property and have what they have long aimed to possess —a trunk line from the Battery to Central Park with connecting and cross town lines. With this trunk line as the basis and their minor lines as a starter in the development of reachers east and west they now have a very good foundation on which to build street car system which will eventually gridiron the city.)

Rochester—It is announced that the contracts for the construction of the proposed South Park and Crosstown lines will be let in about two weeks, and that work will be commenced immediately afterwards. The requisite number of consents of property owners along the proposed routes have now been secured, except on two or three short streets.

A consolidation of the two street railroad companies here is both possible and probable.

Saratoga Springs—Work will be pushed on construction of the street railway here.

Utica—The Belt Line street railroad company is meeting with very gratifying success in its efforts to secure consents for the introduction of electricity as a motive power upon its lines. Already over one-half of the property owners on the different branches have signed the papers. This is a sufficient number to insure the company the privilege it seeks. People seem to be thoroughly agreed that the movement is one in the right direction, and the most cordial words of approval and appreciation of the company's enterprising spirit are heard on every side.

C. A. Nicholson, general manager of the Central New York telephone and telegraph company, fears that if the single wire system is used by the railroad it will interfere somewhat with the telephone service. If, however, two wires are used instead of a grounded or railroad return circuit, the difficulty will be obviated. The Belt Line officials say that no system will be adopted which will conflict with the telephone service or endanger the safety of the public.

The system of electric traction which the Oneida street railway has under consideration, is the Julien, which is now in use on the Fourth avenue line, New York city. The business of the company is increasing, and the prospects for the future of the road are encouraging. The officials believe that by utilizing electricity as a

motive power they will be able to give the public better service, and at the same time effect a considerable saving in the operating expenses of the road, after it is once equipped. The rolling stock will be increased, and it is expected that the electric system will be in running order by next season.

Secretary Wilcox says that the Belt Line company has offered to furnish power for operating the Oneida street railway as soon as it gets its own plant established. The offer may be accepted, as the plan of running the lines of the two companies by the same system will very likely be found too be mutually advantageous.

We understand that in case the Oneida street railway decides not to accept this proposition, it will adopt the Julien storage battery system.

OHIO.

Dayton—The Home Avenue Street Railway company will commence work at once on the construction of its lines.

PENNSYLVANIA.

Erie—Work will be rapidly pushed on the extension of the street railway here.

Johnstown—Though the directors of the street railway have decided to go ahead with the rebuilding and repairing of the road, some of the directors believe that the line will not pay at present. It is understood that a Philadelphia syndicate is willing to take it.

Rochester—The Street Railway company has increased its capital stock to $50,000, which is mostly taken. It is proposed to extend the road 3 7-10 miles, running through Rochester, West Bridgeport, Beaver and Van Port. The road will be operated by electricity.

RHODE ISLAND.

Providence—The Union Railway Co. has petitioned the council for permission to use the electric motor system.

TENNESSEE.

Chattanooga—Work on the construction of the inclined railroad will be commenced at once.

East Nashville—The Main Street and Lischey Avenue Railway Co. will adopt the electric motor system at once.

Knoxville—W. G. McAdoo and associates have bought the Knoxville Street Railway system for $220,0.0. It consists of twelve miles of track. The electric system will be at once substituted for mule power.

The right of way has been granted to the Knoxville Street Railway Co. to erect poles and string wires for operating the railway by electricity.

Memphis—The consolidated Street Railway company has executed a mortgage on all its belongings in Memphis and the state of Tennessee, in favor of the Farmers' Loan and Trust company, of New York, to secure the payment of $2,000,000 of 5 per cent. bonds, to reach maturity in 1919. The object is to take up all present debt and extend and improve the lines.

Nashville—The South Nashville Street Railway company has awarded a contract to the Short Electric Railway company to put in electricity over their lines. The change from horse power to electricity will be made as expeditiously as possible, and will be effected within the next ninety days.

The Main Street & Lischey Avenue Street Railway Co. and the Nashville & Edgefield Street Railway will consolidate.

The City Electric Railway company will probably adopt the electric motor system.

The entire East Nashville system of street railways has passed into the hands of Dr. William Morrow. The sytem will be improved and the lines changed as rapidly as possible to electricity.

TEXAS.

Houston—Work on the proposed electric street railway will shortly be commenced.

San Antonio—The Crosstown Railroad company is petitioning the city council for the right to construct an electric or motor railway here.

Weatherford—The Weatherford City and Suburban Railway company has given a mortgage for $25,000 to T. C. Sattley to build its line.

UTAH.

Salt Lake City—Work is completed on the construction of the electric street railway here, and operations will shortly be commenced.

WASHINGTON TERRITORY.

Seattle—The city council declined to grant the electric street railway franchise to Cyrus Walker and his associates.

The Seattle Electric Railway and Power company has filed a certificate of increase of capital stock in the auditor's office. The stock of the company has been increased from $120,000, divided into 1200 shares of $100 each, to $240,000, divided into 2400 shares of $100 each. The certificate shows that the whole amount of debts and liabilities of the company is $152,430. A dividend of 3 per cent. has been declared for the four months during which the line has been operated. During the month of June 100,000 five-cent fares were turned in by the conductors, which reveals that the road is doing an enormous business.

WISCONSIN.

Fond du Lac—The Fond du Lac Street Railway company has filed in the secretary of state's office a mortgage on its property to the Holland Trust company, of Milwaukee, for the sum of $50.000, the mortgage bearing interest at the rate of 6 per cent.

Green Bay—The Thomson-Houston Electric Supply company has made application for a franchise to construct a street railway here.

Milwaukee—The Milwaukee and Whitefish Bay Railway company will adopt the overhead electric system in the construction of its system.

A project to build an electric motor line to Wauwautosa is being agitated.

John A. Hinsey will adopt the electric motor system for his street railways.

New Enterprises.

ALABAMA.

Decatur—A new street car line is projected here. The Mayor, Mr. Austin, is interested.

Greenville—The Richmond Cedar Works Co. of this place will construct a street railway.

Talladega—A street railway is being talked of in this city. Mayor W. H. Skaggs may be addressed.

ARKANSAS.

Hot Springs—Geo. B. Wells, of Macon, Ga., will build a street railway here.

Pine Bluff—The Pine Bluff & Sulphur Springs Railroad and Land Co, of Pine Bluff, Ark., has been organized with a capital of $100,000, to build a line from this point to Sulphur Springs, a distance of six miles.

CALIFORNIA.

San Diego—The San Diego Cable R. R. Co. has been incorporated with a capital of $500,000 to construct a line here.

COLORADO.

Aspen—The city council has granted a charter and right of way to a street railway company provided they have the road completed in ninety days.

Denver—The Electric Motor company and the Highland St. Ry. company have petitioned for franchises to construct electric motor railways to Edgewater.

Henry Lee and Alfred Townsend are interested in a movement to build a motor line from Highlands to Golden.

DAKOTA.

Sioux Falls—The South Dakota Electric Railway company has been organized with a capital of $100,000 and W. R. Kingsbury, Pres., W. S. Williver, Sec. and C. E. Johnson, Treas., for the immediate construction of an electric street railway here.

GEORGIA.

Atlanta—An electric railroad will be build at the exposition grounds.

Washington—J. M. Smith, of Oglethorpe, will build a dummy line from Washington to Lincolnton.

The Washington Street Railroad Co. will construct a line.

ILLINOIS.

East St. Louis—The East St. Louis and St. Louis Electric Railway company have been incorporated with a capital of $100,000. C. C. Carroll, D. R. Powell and E. C. Lackland, of St. Louis, are interested.

Moline—The Central Street Railway company will commence work at once on the construction of an electric street railway line here.

Streator—A petition will be presented to the Council for the construction of an electric street railway here.

INDIANA.

Crawfordsville—A street railway is contemplated here, Col. I. C. Ellston interested.

Indianapolis—An electric street railway will be built to Irvington by the Indianapolis Street Car Co. Indianapolis.

The Brightwood Electric Street Railway Co. has been granted a franchise to construct an electric street railway here.

Marion—The Marion Electric Street Railway company has been incorporated. The company will invest $8,000 in the enterprise.

Martinsville—Articles of incorporation of the Martinsville Street Railway company have been filed. The directors are John D. Brickert, Anson R. Shireman, Joseph M. Frye, W. W. Culmer and F. S. Montgomery. Mr. Montgomery is President. It is proposed to operate a line of street railway between the artesian wells of E. F. Branch and Eb. Henderson, running via Barnard's well, the I. & V. depot and the Public Square.

Washington—A company is being organized to build a street railway here.

IOWA.

Sioux City—Articles of incorporation of the South Sioux City Electric Motor Railway company have been filed in the office of the secretary of state. The capital stock is placed at $200,000, divided into shares of $100 each, of which $40,000 shall be paid in at the commencement of business. R. M. Bowler, Frank Hunt, J. M. Moon, William Luther, Atlee Hart and E. C. Palmer are the incorporators. Amended articles have also been filed reserving the right to purchase the Covington, South Sioux City and Dakota City Railway company.

KENTUCKY.

Cloverport—The project of building a street railway is being agitated here. The mayor can probably give information.

LOUISIANA.

New Orleans—The Electric Traction & Mnfg. Co. has been organized to operate in this city.

MAINE.

Brunswick—The Brunswick Electric Street Railway Co. has organized with Weston Thompson, pres. and F. H. Wilson, sec'y and treas. The storage battery system will be used, and work will be actively pushed on construction.

VIRGINIA.

Richmond—The South Side Land & Improvement Co. has been granted a franchise for the construction of a street railway in this city.

MICHIGAN.

Lansing—The council has granted the Lansing Street Railway Co. a franchise to construct a street railway.

Saginaw—The Saginaw Union Street Railway Co. has been granted a franchise for a street railway here, and has contracted with the National Electric Traction company, of Detroit, for electrical apparatus and equipment.

MINNESOTA.

Chippewa Falls—A company has been formed for the purpose of giving the city a line of street railway, and the city council is now considering the advisability of granting the company the right of way through the streets. Thad. C. Pound, David E. Miles, E. B. Sanders, of Wausau, D. E. Seymour, A. J. McGilvray, E. De F. Barnett, W. L. Seymour and T. F. Singhiser, of Mitchell, S. D. are interested. The charter of the company gives them the right of way for thirty years from September, 1889, but the exclusive right to the streets shall not extend over seven years. Provisions are made in reference to other lines should they ever be desired. The line will probably not be completed in time for use this fall, but it will be ready for operation in the spring as soon as the season opens.

MINNESOTA.

Minneapolis—The Taxpayer's Union of Eastville Heights is agitating the construction of an electric motor line to connect with this city.

St. Paul—The North St. Paul RR. Co. has been incorporated to build a line from St. Paul to North St. Paul. W. S. Morton, Lane K. Stone and J. W. Jones are the incorporators.

MISSOURI.

Kansas City—The Second St. Ry. Co. and the Kansas Bridge and Terminal Co. will commence work shortly on the construction of their line.

The North East Ry. Co. will construct a large park here and extend its railroad to it.

Sedalia—W. H. Sturtevant may be addressed regarding the projected electric St. Ry. here.

MONTANA.

Helena—J. J. Palmer has petitioned the council for a franchise to construct an electric St. Ry. here. The city council at its last meeting granted a franchise for the construction of a street railway to the Union Depot.

NEBRASKA.

Blair—The Blair Street Railway company has filed articles of incorporation. The authorized capital stock is placed at $100,000, divided into shares of $100 each. Jesse T. Davis, Edgar A. Stewart, Perry Seldon, J. R. Conkling and W. W. Wallace are the incorporators.

NEW YORK.

Buffalo—The Buffalo Terminal Union Ry. Co. has been organized to construct a line here.

Syracuse—Articles of incorporation have been signed for the Eastwood Heights Street Railway company, with a capital stock of $30,000. This road is to connect Syracuse and East Syracuse, running through the "Twelfth ward" tract, recently acquired by the Central City Land company, and an agreement has been entered into whereby the railway company agrees to have a part of the road ready for operation within ninety days, in consideration of the right of way given. Electricity will be the motive power.

The incorporators of the new company are, Nelson R. Williams, Nelson Gere, Gideon N. Caleb, George B. Leonard, George B. Warner, Charles Hudson, William J. Hart, Irving N. Gere, Morey S. Williams, L. A. Williams and four others. N. R. Williams has been elected president, Nelson Gere, vice president, and George B. Leonard, secretary and treasurer.

Gideon N. Caleb, John Dunn jr., and Edward Kanaely are interested in a project to build an electric line from here to East Syracuse.

OHIO.

Akron—The electric franchise, which has had a desperate struggle for life, has at last been granted by the council.

Columbus—The "Metropolitan" Street Railway company will be incorporated here, with a capital stock of $100,000, which will be increased as the work progresses. Articles of incorporation are drawn, and in the hands of Messrs. Powell, Ricketts, Owen & Black, the names appearing being well known: Messrs. A. D. Heffner, county treasurer; Mayor Phillip H. Bruck, R. H. Platt, Colonel N. B. Abbott, Thomas E. and Eugene Powell, H. M. Hubbard, Nicholas Schlee and W. D. Brickell.

It is probable that a cable will be constructed along the main line, and that electricity will be employed on the branches. Chariot or cab lines will be used on streets where the right of way can not be obtained. The new company think that no difficulty will be experienced in getting to all parts of the city, as by the act of 1883, the company will have the right to run over one-eighth of the entire lines of the Consolidated, if necessary. Eastern capitalists are behind the enterprise, and the road is said to be an assured fact.

Findlay—An ordinance is before the council asking a franchise to construct a belt road around the city.

Martin's Ferry—The city council has granted the Electric Street Railway company a franchise to construct a line in this city.

Massillon—The building of an electric tramway is contemplated between this city and Canton Address G. W. Crise, of Beach City, O.

Piqua—The Piqua Street Railway company, Piqua, has been incorporated with a capital stock of $75,000.

Troy—The Troy Electric Railway company has been incorporated, to construct an electric street railway here. Theo Sullivan, P. J. Gates and John C. Barry, are interested.

OREGON.

Ft. Townsend—Work is being pushed on the construction of a street railway. J. N. Layback contemplates the construction of a street railway here.

PENNSYLVANIA.

Allegheny—The following charters have been granted: The Forbes Street and Shady Avenue Street Railway company, of Allegheny; capital, $12,000. The Frankstown Street Railway company, of Allegheny; capital, $30,000. The Homewood Avenue Street Railway company, of Allegheny; capital, $12,000. The Wilkins Avenue Street Railway company, of Allegheny; capital, $12,000. The Forbes Street and Park Avenue Street Railway company, of Allegheny; capital, $12,000. The Bloomfield and Shady Side Street Railway company, of Allegheny; capital, $30,000.

Lebanon—The Lebanon Electric Railway company will build a street railway. Col. A. Frank Siltzer, interested.

Oil City—A franchise has been granted the Oil City Street Railway company to build lines.

The Oil City Electric Railroad and Power company has presented an ordinance to the City Council asking for a franchise for an electric street railway here.

Pittsburgh—The following charters have been granted: The Glenshaw Street Railway company, of Allegheny county; capital, $30,000. Pittsburgh and Birmingham Traction company, of Allegheny county; capital, $1,500,000. Citizen's Street Railway company, of Pittsburgh; capital, $18,000.

The South Side Traction company will build a large portion of its road this year.

Rochester—The Street Railway company is being actively organized and work will shortly be commenced on the construction of an electric line.

Venango—A franchise has been granted for a street railway here.

RHODE ISLAND.

Martha's Vineyard—Work will shortly be commenced on the construction of the electric street railway here.

TENNESSEE.

Chattanooga—F. P. Henderson, W. W. Henderson, J. B. Turnley, W. A. Woolson and Creed F. Gates have organized the Chattanooga and Floral Park Street Railroad company, of this city.

Knoxville—The Council has passed an ordinance granting a franchise to a dummy railroad line.

The Council has granted the Fountain Head Railway company the right to build an electric or horse car line.

TEXAS.

Mineral Wells—The Mineral Wells Street Railroad company has been organized by J. C. Haynes, B. Franklin and others, with a capital of $20,000.

Sherman—The College Park Belt Line Railway company has been granted a franchise to build an electric railway. It must begin work within 30 days.

UTAH TERRITORY.

Ogden—The City Council has granted a franchise for the construction of a street railway here.

WASHINGTON TERRITORY.

Centralia—The Centralia Street Railway company has been organized with a capital stock of $25,000.

Seattle—Article incorporating the North Seattle Cable Railway company have been filed. The capital stock is $300,000, divided in 3,000 shares of $100 each. The object of the incorporation, which is composed exclusively of the stockholders of the Front Street Cable Railway company, is to build, equip and operate street railroads, telegraph and electric light lines; to buy and own real estate, and to sell or mortgage the same, etc. The articles bear the signatures of J. M. Thompson, Bailey Gatzert, Fred E. Sander, J. C. Haines, John P. Hoyt, H. G. Struve, J. Furth, A. B. Stewart, G. H. Heilbron, A. P. Mitten, R. H. Denny and Maurice McMicken.

Although not set forth in the articles of incorporation, the real purpose of the company, which is auxiliary to the Front Street Cable Railway company, is to build a double-tracked cable railway from the power-house to the Front street cable railway, at Second and Depot streets, to Salmon bay. It is proposed to build the road along Poplar street to High, along High to Temperance and out Temperance to its terminus in Denny & Hoyt's addition, near the foot of Lake Union, a distance of two miles from the starting point.

The new line being simply an extension of the Front street line, it will be operated by the same power, though naturally some changes will have to be made in the machinery now in use. The new company proposes to go ahead with the work of construction immediately, though to obtain material and to settle the matter of grades on the streets to be traversed some delay will be occasioned.

An effort will be made to have the road in operation six months after the commencement of work. The estimated cost of the extension is $140,000. It may be further stated that the road will probably be built by the company itself, without letting any contracts.

The North Seattle Cable Railway company has been incorporated with a capital of $300,000 to build a road here. J. M. Thompson, Fred E. Sander and F. H. Denny.

Tacoma—The applications for a street railway franchise made by Horatio C. Clements has been granted.

Walla Walla—A dummy motor line is projected between Milton, Oregon, and this place.

WISCONSIN.

Hurley—S. S. Currey, Dr. McLeod, J. B. Day and C. L. Cushbanks are asking for a franchise to construct a street railway between this city and Ironwood

EXTENSIONS.

Altoona, Pa.—At a recent meeting of the stockholders of the Altoona City Passenger Railway company it was decided to increase the capital stock $35,000 and to extend the present line to Millville on the west and Bellview on the east. This will give the line a length of six miles.

Asheville, N. C.—The Asheville Street Railway Co. (Sprague system) is extending its road.

Athens, Ga.—The Classic City Street Railway company will make several extensions of its line, one by the opera house, another to the fair grounds, and another out Milledge avenue, at once.

Brunswick, Ga.—The Brunswick Street Railway company has applied for the privilege of extending its line about one mile.

Cincinnati, O.—The Sedansville line will probably be extended.

Cleveland, O.—The South Side Street Railway company will extend its line.

The lines of the Broadway and Newburg Street Railway company will be extended.

Danville, Va.—The electric railway company here will improve, and probably extend its road.

Grand Rapids, Ind.—The Fulton street cable line will be extended half a mile east of the city limits this year.

Kansas City, Mo.—The Metropolitan Street Railway company contemplates important extensions and improvements.

Lewiston, Me.—The horse railroad has decided to extend its lines from the terminus on Lisson street down around Broad street bridge and up Main street to Court street again, completing a circuit by an addition of about a mile and a quarter of track, also from the terminus at Pine street as far as the hospital of the Asylum of Our Lady of Lourdes and also to run out Goff street as far as the new culvert on Hampshire street.

Work will be begun as soon as permission can be obtained from the city, and it is thought that when work is once begun it can be completed in about a month.

Madison, Wis.—Street Railway Co. here will expend $20,000 on improvements and extensions.

Nashville, Tenn.—The McGavock & Mt. Vernon St. Ry. Co. (Thomson-Houston system) contemplates important extensions.

Oakland, Cal.—The Oakland Cable Co. will considerably extend its line.

Omaha, Neb.—The Omaha St. Ry. Co. will make important extensions and double track its line.

Philadelphia, Penn.—The West Philadelphia Ry. Co. and the Union Passenger Ry. Co. will extend their lines in this city and adopt the cable system.

San Francisco, Cal—The California St. Cable Road contemplates important extensions and will build a large power house shortly.

Sioux City, Iowa.—The Cable Co. will considerably improve and extend its line.

Tacoma, W. T.—The City Ry. Co. will make extensive improvements and considerably extend its line.

Elections.

Brunswick, Me.—At a meeting of the Brunswick Electric Street Railroad company the following officers were elected:

President—Weston Thompson.

Secretary and Treasurer—F. H. Wilson.

Directors—Weston Thompson, J. P. Winchell, A. F. Gerald, C. B. Story, F. C. Webb, William M. Pennell, F. H. Wilson, Brunswick; capital stock, $25,000.

Cleveland, Ohio—The Short Electric Railway Co. reported on page 145 of our August issue elected the following officers:

Directors—S. H. Short, G. W. Stockly, C. F. Brush, J. J. Tracy, J. Potter, W. W. Leggett and N. B. Abbott.

President and general manager—S. H. Short.

Vice President—J. Potter.

Secretary and Treasurer—W. W. Leggett.

Hamilton, Ohio—The Hamilton and Fridenwald Electric Transit company has elected the following officers:

President—Thomas Millikin.

Vice President—C. Benninghofen.

Treasurer—P. Benninghofen.

Secretary—I. S. Millikin.

Piqua, Ohio—The Piqua Electric Street Railway company has elected the following officers:

President—A. M. Orr.

Vice President—D. Spencer.

Secretary—F. C. Davies.

Treasurer—L. M. Flesh.

Denver, Col.—At the annual meeting of the stockholders of the Park Railway company the following officers were elected for the ensuing year:

President—John Schermerhorn.

Vice President—Z. W. Moore.

Secretary—E. W. Merritt.

Treasurer—J. B. Shepard.

Directors—John Schermerhorn, Z. W. Moore, E. W. Merritt, P. D. Grommon, J. B. Shepard, F. J. Chamberlin, J. W. Strayer.

In the treasury of the company there is now $16,800 in cash, which in connection with the money received for fares will be ample to give good service on the line for the next three years. By that time it is thought the city will have grown so rapidly in that particular direction that no subsidy will be needed.

Seattle, W. T.—The stockholders of the recently-organized North Seattle Cable Railway company recently met and completed its organization by electing the following officers:

President—Dr. A. P. Mitten.

Vice President—H. G. Struve.

Secretary—Maurice McMicken.

Treasurer—John P. Hoyt.

The capital stock of the company is $300,000, divided into 3,000 shares of $100 each.

Too Late to Classify.

Ann Arbor, Mich.—A franchise has been granted to run electric street cars by the overhead system. The company has been reorganized, with John F. Barry, of New York, at its head. Work will be commenced within the next three weeks and will be finished within sixty days thereafter.

Ansonia, Conn.—The Ansonia & Birmingham Horse Railroad has been sold to H. H. Wood, president of the electric road between the two points. He buys only the road bed, track and franchise; the cars, etc., remaining in the hands of the receiver. Mr. Wood bought the road as an individual and not as president of the electric road, but has offered it to that company.

Aspen, Col.—The Aspen Cable Tramway company, with T. H. Edsall, F. G. Buckley, H. R. Woodward, B. Ferris and C. E. Palmer as directors, has filed articles of incorporation to operate a cable tramway in Pitkin county, Col. The capital is $250,000 with 25,000 shares.

Bay City, Mich.—The Bay City Electric Railway company has been organized with Capt. James Davidson as president. Work on the road will be commenced as soon as the Bay City council grants a franchise.

Denver, Col.—The Highland Street Railroad company has been granted the franchise on Ashland avenue.

The American Cable Railway company of New York has filed an injunction suit in the United States Court, this city, against the Denver Tramway company. It is claimed by the plaintiff that they have the original patent granted one Abel Thompson, on October 1, 1872, which they purchased from his widow, Marcia M. Thompson of Brooklyn, on October 4, 1884. The petition claims that the Denver Tramway company is infringing on their cable patents. It is said that a similar suit will be brought against the Denver City Cable company.

Des Moines, Ia.—The consolidation of all the street railways here under one management has been effected; the consolidated interests will be known as the Des Moines Street Railway company. Electricity is to be adopted on all the lines which latter will be considerably extended. The Des Moines Street Railway company has increased its capital stock to $1,250,000, and Chicago parties will place the bonds east, to furnish ready money. Mr. J. S. Polk is the head of the new company.

Dubuque, Ia.—The City Council has granted the Electric Railway company an extension of time to Jan. 1, 1889, in which to build its line.

Hopkinsville, Ky.—The council has granted a franchise to a company represented by S. H. Turner to build a street railway through this city, to be in operation within one year.

Kansas City, Mo.—The stockholders of the Peoples Cable Railway have authorized its transfer by private sale to the Chicago bondholders. The transfer will be made as soon as the necessary legal steps can be complied with. The Chicago bondholders say that as soon as the transfer was completed steps would be taken to extend the road and place it upon a paying basis.

Little Rock, Ark.—A Philadelphia syndicate has obtained control of the dummy line here. The line is about 3 miles long, and the company owned valuable franchises for street railroads over the principal streets in the city. The line will be improved and extended.

Manchester, N. H.—An electric railway will be built by the Massabesic Horse Railway company. The directors of the company are as follows: James F. Briggs, Gust Foster, Luther S. Proctor, Walter Cody, J. C. Moore, M. V. B. Garland and E. M. Topliff.

Nashua, N. H.— The Nashua Street Railway company has declared a dividend of 3 per cent.

New York City, N. Y.—The Broadway Street Railroad company is following out the line pursued by various companies recently, and is seeking for a motive power to take the place of horses. An electric car, run by the storage battery system, is now being tested upon the track from Fiftieth street and Seventh avenue to Central Park, and passengers from the Seventh avenue line often have an opportunity to travel on the car at the upper end of the line. The Broadway road would be about as hard a line to operate with electric cars as could be found, owing to the amount of trucking on the great thoroughfare. Engineers interested in the electric systems argue, however, that the cars could be run about as well by electricity as by horses. The company, however, has made no decision as yet, and is simply experimenting.

Ottumwa, Ia.—The Ottumwa Railway Electric and Steam company has filed articles of incorporation. Capital stock, $200,000. Directors, C. F. Blake, J. W. Garner, W. L. Doud, Geo. P. Daum and W. R. Daum.

Port Jervis, N. Y.—The Port Jervis and Suburban Street Railway company has been organized and incorporated for the construction of a street surface railroad about two and a half miles in length. Capital $25,000. Andrew G. Haynes, T. Floyd Woodworth, Charles D. Haines and Lida Haines, of Kinderhook; Emma A. Haines, of Sandy Hill, and George Kingsley and Judson Kingsley, of Troy, are the incorporators.

Portland, Ore.—The Willamette Heights Railroad company has been incorporated to build and operate street railroads and tramways in the city of Portland; capital stock, $300,000; John Hale, J. C. Mooreland and Geo. W. Bates, incorporators.

Salem, Ore.—Articles of incorporation have been filed by the Capitol City Street Railway company; principal place of business Salem, object, constructing and operating street railway lines in Salem and its suburbs; capital stock $25,000.

Rochester, N. Y.—Permission has been granted to the Crosstown and South Park companies to use electricity.

St. Joseph, Mo.—The Peoples' company has filed for record a mortgage for $250,000, on its railway, cars, franchises, etc., to the Central Trust company of New York.

The South Park Railway company have failed to accept the franchise granted by the common council several weeks ago, within the time specified, and the franchise has accordingly expired by limitation. In order to have the road built the council must extend the time of the old franchise or grant a new one. The line was to have been built by the people in South Park and vicinity, and the Peoples' company was to have opened it.

San Diego, Cal.—A franchise for a cable road has been granted to D. D. Dare, of this city.

Troy, N. Y.—The application of the Troy and Lansingburgh Railroad company to make the change from horse to electric motor power on that part of its road in the village of Waterford, has been granted by the State Board of Railroad Commissioners. The company has commenced to string wires across the Waterford bridge, and it expects to have the work completed in three days.

Business Mention.

The New York office of Richard Vose has been removed to 52 Boreel building, from its old address 13 Barclay street. The Chicago office is now at 426 Rookery building, with Messrs. W. P. and Geo. T. Williams in charge.

Among other improvements recently made by the Walker Manufacturing Co., Cleveland, Ohio, one of great importance has been the building of a very large pit lathe capable of turning work up to 30 feet diameter by 8 feet 6 inches face. This lathe is a combination tool, it being not only a pit lathe, but also a huge planer in which surfaces 30 feet long by 8 feet 6 inches wide can be planed. It also has facing attachments for the proper facing up of the ends of columns and girders. In addition there are gear planer attachments whereby the teeth can be planed in gears of any size up to 30 feet in diameter, and of any proportions desired.

The Sprague Co. has closed a contract with the Jamaica & Brooklyn Street R. R. which it will now thoroughly re-equip under its system and will operate 10 cars. The latest improvements and devices are to be adopted, and it is expected that the road will be in operation upon the new system in a short time.

The Pond Engineering Co. has sold the Fort Scott Electric Light and Power Co., Fort Scott, Kan., a 125 horse-power, Armington and Sims engine. This is the third engine which it has sold the Fort Scott company within a very short time.

It is also furnishing Guthrie, Chase & Co., Milford, Iowa, a 50 horse-power, Schutte Exhaust Steam Condenser complete with all pipe, valves, etc.

The Walker Manufacturing Co. has been awarded the contract for cable winding machinery for the Valley City Street and Cable Railway Co., of Grand Rapids, Mich.

W. A. Dutton, of Dorner & Dutton, is on a business trip East.

Col. Thomas Lowry, of Minneapolis, was recently in Chicago,

Patents.

The following is a list of such patents as relate to Street Railway Interests, issued during the past month, especially prepared for the STREET RAILWAY GAZETTE, by Messrs. Higdon & Higdon, solicitors of patents and trade-marks, room 29 St. Cloud Building, opposite U.S. Patent Office, Washington, D C. A printed copy of any patent here named will be furnished by them for 25 cents (stamps).

Issue of July 30, 1889.

407,835. Aerial Cable Railway, J. B. Perry and J. Mackenzie, Toronto, Ontario, Canada.
407,875. Alternating Current Dynamo, Brush Electric Co., Cleveland, Ohio.
408,043. Automatic Signal for Cable-Railways, A. Pferdner, Chicago, Ill.
407,844. Alternating Current. Electric Motor, E. Thompson, Lynn, Mass.
408,076. Fare-Box Attachment, F. B. Brownell, St. Louis, Mo.

Issue of August 6, 1889.

408,205. Regulator for Dynamo-Electric Machines, H. R. Boissier, New York, N. Y.
408,206. Dynamo Electric Machine, H. R. Boissier, New York, N. Y.
408,590. Electric Motor, United Electric Improvement Co., Gloucester City, N. J.
408,403. Dynamo-Electric Machine, S. Z. De Ferranti, Hampstead, County of Middlesex, England.
408,503. Trolley-Track, J. H. Morley, Florence, Mass.
408,265. Commutator, for Electric Machines, S. H. Short, Columbus, Ohio.
408,544. Electric Railway System, Sprague Electric Railway and Motor Co., New York, N. Y.
408,443. Cable-Railway Turn Table, J. C. H. Stut, San Francisco, Cal.
408,638. Contact-Arm for Electric Railway Motor-Cars, C. J. Van Depoele, Lynn, Mass.
408,639. Under Ground Conduit for Electric Railways, C. J. Van Depoele, Lynn. Mass.
408,640. Multiple-Motor Electric Locomotive, C. J. Van Depoele, Lynn, Mass.

Issue of August 13, 1889.

408,910. Electric-Dynamic Machine, G. F. Card Manufacturing Co., Covington, Ky.
408,692. Grip and Appliance for Cable-Road Cars, A. Campbell, Brooklyn, N. Y.
409,104. Conduit Electric-Railway, B. Jennings, San Jose, Cal.
408,984. Contact-Carrier for Electric Railways, J. C. Love, Philadelphia, Pa.
409,115. Motor for Street-Cars, Patton Motor Co., Pueblo, Colo.
409,116. Motor for Street-Cars, Patton Motor Co., Pueblo, Colo.
408,753. Electric Motor for Street-Cars, W. S. Salisbury, Chicago, Ill.
408,754. Motor for Street-Cars, W. S. Salisbury, Chicago, Ill.
408,855. Electric Railway, W. M. Schlesinger, Philadelphia, Pa.
408,941. Elevated Railway, J. N. Valley, Jersey City, N. J.
409,156. Double Suspended Conductor for Electric Railways, C. J. Van Depoele, Lynn, Mass.

Issue of August 20, 1889.

409,268. Automatic Switch for Horse Railways, D. Binns, and C. Wolff, Brooklyn, N. Y.
409,349. Dynamo-Electric Machine, S. Z De Ferranti, Hampstead, County of Middlesex, England.
409,603. Trolley for Electric Railways, J. G. and R. Dickson, and P. Snyder, Pittsburg, Pennsylvania.
409,192. Safety Guard for Street-Cars, M. J. Goodwin, Sommerville, Mass.
409,463. Armature Core for Dynamos, Higham Patent Right Co., Rockland, Me.
409,646. Brush Holder, for Dynamos, G. H. Finn and J. E. Munson, St. Paul, Minn.
409,237. Electric Railway System, Ries & Henderson, Baltimore, Md.
409,622. Apparatus for Operating Cable-Cars, J. Williams, Jr., Pittsburg, Pa.

Issue of August 27, 1889.

409,219. Car-Wheel, Morgan Rapid Transit Co., 55 Hall Bldg., Kansas City, Mo.
409,901. Pilot or Wheel Guard for Street-Cars, G. H. Bahrs, San Francisco, Cal.
409,769. Pneumatic Railway System, M. Bodefeld, St. Louis, Mo.
409,926. Cable or Electric Street-Railway, L. M. Clement, Oakland, and G. C. Watriss, San Francisco, Cal.
409,775. Electric Railway, S. Z. De Ferranti, Hampstead, County of Middlesex, England.
409,756. Electric Railway Crossing, Ries and Henderson, Baltimore, Md.
409,757. Underground Conduit for Electric Railways, Ries & Henderson, Baltimore, Md.
410,049. Dummy or Motor Engine, J. T. Van Gestel, New York, N. Y.
410,062. Device for Depressing Cables at Street Crossings of Cable Railways, G. H. Wright, San Francisco, Cal.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Mr. Higdon for 25 cents.

Expire During September.

130,360. Railway Car, I. G. Macfarlane.
131,377. Electro Magnetic Motor, A. S. Schreiber.
131,421. Station Indicator, C. M. Bowman.
131,689. Car Starter, W. Keeler.
131,710. Portable Fare Box, J. C. Schooley.

For the Minneapolis Meeting.

The attention of delegates and visitors to the annual meeting of the American Street Railway Association, which will be held in Minneapolis Oct. 16th to 19th, is directed to the Chicago & Northwestern Railway and the facilities that line offer for their transportation.

The Northwestern is the short line between Chicago and Minneapolis and the vestibule limited which leaves Chicago daily at 5.30 p. m. reaches Minneapolis the following morning at 8 03, in time for breakfast. Supper on this train is served in dining car after leaving Chicago.

The Northwestern also has a daily train which leaves Chicago at 10.35 p. m. and reaches Minneapolis the following afternoon at 2.30.

The superiority of equipment and track has accomplished the popularity which the Northwestern has attained with that portion of the traveling public desiring the best of everything, and as tickets are good either going or returning via the direct route through Janesville or Madison or via Milwaukee, Waukesha and Madison; passengers by the Northwestern who desire to go one way and return another are afforded a pleasant variation of route.

Persons who attend the meeting in Minneapolis who purchase their ticket going via the Northwestern will be returned to the starting point at one third of the regular first class fare on the presentation of proper certificate to the agent of the Northwestern line at Minneapolis.

Further information can be obtained and reservations in sleeping cars secured by addressing E. P. Wilson, General Passenger Agent C. & N. W. Ry., Chicago, Ill.

Burlington Route to Minneapolis.

At this date the attendance promises to be large at the annual meeting of the American Street Railway Association, to be held at the West Hotel, Minneapolis, October 16th to 19th, 1889. Consequently transportation arrangements for members of the Association and their families are beginning to be considered, in view of which, please bear in mind that the Burlington route, C. B. & Q. RR., runs solid trains, with unsurpassed dining and sleeping car service, from Chicago to Minneapolis. For the greater part of the distance its tracks skirt the east bank of the Mississippi river, amidst such a wealth of charming scenery that the Burlington's line to St. Paul and Minneapolis has been aptly called the "Picturesque Line."

The Burlington Route has, in addition to its line from Chicago, two lines from St. Louis to Minneapolis and St. Paul, one via the east bank and one via the west bank of the Mississippi river; the east bank line having direct connection from Peoria. If you are contemplating going to the American Street Railway Association Meeting at Minneapolis, and wish further information in regard to the facilities of the Burlington Route to that point please communicate with the nearest of the following gentlemen, who will take pleasure in corresponding with you in regard to the matter. E. J. Swords, General Eastern Agent, 317 Broadway, New York, H. D. Badgley, New England Pass. Agt, 306 Washington St., Boston, Mass., P. S. Eustis, G. P. & T. Agt., Chicago, Ill., Howard Elliott, G. P. & T. Agt. St. L. K. & N. W. RR., LaClede bldg. St. Louis, Mo.

Ho, for Minneapolis.

Delegates and visitors to the annual convention of the Am. St. Ry. Assn. dated to be held in Minneapolis on October 16, will be interested in knowing something about the Chicago, Milwaukee & St. Paul Railway company which now owns and operates over fifty-six hundred miles of thoroughly equipped road in Illinois, Wisconsin, Minnesota, Iowa, Missouri and Dakota. Each recurring year its lines are extended in all directions to meet the necessities of the rapidly populating sections of country west, northwest and southwest of Chicago, and to furnish a market for the products of the greatest agricultural and stock raising districts of the world. In Illinois it operates 317 miles of track; in Wisconsin 1,287 miles; in Iowa 1,566 miles; in Minnesota 1,122 miles; in Dakota 1,213 miles; in Missouri 142 miles, and the end is not yet. It has terminals in such large cities as Chicago, Milwaukee, La Crosse, St. Paul, Minneapolis, Fargo, Sioux City, Council Bluffs, Omaha, Kansas City and St. Joseph Mo, and along its lines are hundreds of large and small thriving cities, towns and villages. Manufacturing interests are cultivated, and all branches of trade find encouragement. The Railway Company has a just appreciation of the value of its patrons, and its magnificent earnings are the result of the good business tact which characterizes the management of its affairs.

The popularity of the line is attested by the fact that notwithstanding the strongest kind of competition of old and new lines, the Chicago, Milwaukee & St. Paul Railway continues to carry the greater proportion of all the business between Chicago, Milwaukee, St. Paul and Minneapolis.

On all its through lines of travel the Chicago, Milwaukee & St. Paul Railway runs the most perfectly equipped trains of Sleeping, Parlor and Dining cars and Coaches. The through trains on all its lines are systematically heated by steam. No effort is spared to furnish the best accommodations for the least money, and, in addition patrons of the road are sure of courteous treatment from its employees

The Baltimore and Ohio Railway is the only line to the West, via Washington, and delegates to the forthcoming convention in Minneapolis, from New York, Philadelphia, Washington, Baltimore, will do well to take the vestibule limited train, leaving New York at mid-night, and reaching Chicago at 10 55 a. m. This train is equipped with Pullman Palace Buffet Sleeping cars, heated by steam direct from the locomotive, and supplied with every convenience and luxury that can add to the comfort of travelers. This magnificent train passes over the Allegheny mountains, and through the historic and beautiful valley of the Potomac by daylight, thus affording the traveler a view of some of the grandest scenery in the world.

Mr. Moam, of the Robinson & Moam Car company is in Nebraska.

Reviews.

PRACTICAL BLACKSMITHING.—A collection of articles contributed at different times by skilled workmen to the columns of "The Blacksmith and Wheelwright," and covering nearly the whole range of blacksmithing, from the simplest to some of the most complex forgings. Compiled and edited by M. T. Richardson, Editor of "The Blacksmith and Wheelwright." Illustrated. Vol. I. Price $1.00. M. T. Richardson, Publisher, New York.

Notwithstanding the fact that every village and hamlet in the civilized world contains a blacksmith, and has ever since mankind learned the various uses of iron and steel, nobody has ever written a book on the art of blacksmithing.

A chapter has now and then appeared in works on mechanics, but these comprise the extent of the world's printed knowledge of an art without which mankind would relapse into barbarism. The present work is a compilation of practical articles which have appeared during the last ten years in the columns of "The Blacksmith and Wheelwright." Ancient blacksmithing and primitive tools are considered briefly, and then plans of shops, chimney building, forges, and descriptions of a great variety of tools are given. The illustrations are numerous, and the book would appear to be of great value to all workers of iron.

Dissolution of Partnership.

The co-partnership heretofore subsisting between M. N. Heckscher and A. Toffler, under the firm name of Heckscher and Toffler, at 211 E. 22nd St., in the city of New York, is this day dissolved by mutual consent. The undersigned will continue the business, and pay all the debts of the late co-partnership.

New York, Aug. 10, 1889. A. TOFFLER.

ELECTRIC STREET RAILWAYS IN NORTH AMERICA.

(IN OPERATION OR UNDER CONTRACT.)

Corrected to September 18, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Adrian Electric Ry	Adrian, Mich	Nat. Elec. Trac. Co.		3
Akron Electric Ry. Co.	Akron, O.	Sprague	12	6.5
" " " " (So. Side Ext.)	Akron, O	Sprague	10	6
Alliance St. Ry. Co.	Alliance, O.	Thomson-Houston	3	2
Americus Street RR. Co.	Americus, Ga.	Thomson-Houston	4	5.5
Appleton Elec. St. Ry. Co	Appleton, Wis.	Van Depoele	6	5.5
Asheville St. Ry. Co	Asheville, N. C.	Sprague	3	4.5
Atlanta & Edgewood St. Ry. Co.	Atlanta, Ga.	Thomsun-Houston	4	4.5
Atlantic City Elec. RR. Extension	Atlantic City,	Sprague	1	1
Attleburo & North Attleboro RR. Co.	Attleboro, Mass	Thomson-Houston	5	8
Auburn Street RR. Co	Auburn, N. Y.	Thomson Houston	3	3
Balt. Union Pass. Ry. Co.	Baltimore, Md.	Daft	4	2
Bangor St. Ry. Co.	Bangor, Me.	Thomson-Houston	4	5
Bay City RR.	Bay City, Mich.	Sprague	3	5
Bay Ridge Elec. RR.	Bay Ridge, Md.	Sprague	2	2
Belt Line	Lynn, Mass	Thomson-Houston	4	4 5
Broadway & Newburgh St. Ry. Co.	Cleveland, O.	Sprague	16	10
Brooklyn St. Ry. Co.	Cleveland, O.	Thomson-Houston	10	10
Buffalo St. Ry. Co	Buffalo, N. Y.	Sprague	4	2.5
Carbondale & Jermyn St. Ry.	Carbondale, Penn.	Sprague	3	1.5
Central Passenger Ry. Co.	Louisville, Ky.	Thomson-Houston	10	10
Central Ry. Co.	Peoria, Ill.	Thomson-Houston	15	10
Chattanooga Electric St. Ry. Co.	Chattanooga, Tenn.	Sprague	6	5
Cincinnati & Inclined Plane Ry.	Cincinnati, O.	Sprague	20	6
Cincinnati St. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	2.7
Citizens Elec St. Ry	Decatur, Ill	Thomson-Houston	4	5
Citizens' St. Ry	Elkhart, Ind.	Nat. Elec. Trac Co.		7
Colerain Ave. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	5
Collamer Line	East Cleveland, O.	Sprague	8	3
Columbus Consolidated St. Ry. Co.	Columbus, O.	Short	2	2
Danville St. Car Co.	Danville, Va.	Thomson-Houston	4	2
Decatur Electric St. Ry.	Decatur, Ill	Nat. Elec. Trac. Co.		3
Derby Horse Ry. Co.	Ansonia, Conn.	Thomson-Houston	1	4
Detroit City Ry., Mack St. Line	Detroit, Mich.	Nat. Elec. Trac. Co.		2
Detroit, Rouge River & Dearborn RR.	Detroit, Mich.	Sprague	1	1
Davenport Cent. St. Ry. Co.	Davenport, Ia.	Sprague	9	3.5
DesMoines Broad Gauge Ry. Co.	DesMoines, Ia.	Thomson-Houston	8	10
Detroit Elec. Ry. Co.	Detroit, Mich.	Nat. Elec. Trac. Co.		
East Cleveland Ry. Co.	Cleveland, O.	Sprague	32	8
East Detroit & Grosse Pointe	Detroit, Mich.	Nat. Elec. Trac. Co.		8
East Harrisburg Pass. Ry. Co.	Harrisburg, Pa.	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa	Thomson-Houston	1	
East Reading RR Co.	Reading, Pa.	Sprague	3	2.5
" " Extension	" "	Sprague	1	1
East Side St. Ry. Co.	Brockton, Mass.	Sprague	4	4
Eau Claire St. Ry. Co.	Eau Claire, Wis.	Sprague	6	5
Erie City Pass. Ry. Co.	Erie, Pa.	Sprague	20	12
Ecklington & Soldiers Home Elec. Ry.	Washington, D. C.	Thomson-Houston	10	3
Essex Co. Pass. Ry. Co.	Newark, N. J.	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa.	Sprague	25	8.5
Fort Worth City Ry. Co.	Fort Worth, Tex.	Nat. Elec. Trac. Co.		10
Fort Worth Land & St. Ry. Co	Fort Worth, Tex.	Nat. Elec. Trac. Co.		15
Fulton County St. RR	Atlanta, Ga	Thomson-Houston	8	9
Georgetown & Tenalleytown St. Ry. Co.	Washington, D. C.	Thomson-Houston	3	6
Gratiot Elec. Ry.	Fort Gratiot, Mich.	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn.	Sprague	4	3
Highland Park Elec. Ry. Co.	Detroit, Mich.	Fisher	4	3 5
Highland Park Ry	Detroit, Mich.	Nat. Elec. Trac. Co.		8.5
Hillside Coal Co.	Scranton, Pa.	Thomson Houston	1	1
Hoosac Valley St. Ry. Co.	N. Adams Mass.	Thomson-Houston	6	5
Huntington Elec. Ry. Co.	Huntington, W. Va.	Short	2	3.5
Ithica Street Ry. Co.	Ithics, N. Y.	Daft	2	1
Jamaica & Brooklyn RR.	Jamaica, N. Y.	Van Depoele	10	9
Joliet St. Ry. Co	Joliet, Ill.	Thomson-Houston	4	3
Key City Elec. Ry. Co.	Dubuque, Ia.	Sprague	4	2
Lafayette St. Ry. Co.	Lafayette, Ind.	Sprague	9	3
Lafayetta Traction Co.	Easton Pa.	Daft	2	1
Laredo City RR. Co.	Laredo, Tex	Sprague	4	4
Lima St. Ry. Power and Motor Co.	Lima, O	Van Depoele	7	6
Lindell Ry. Co.	St. Louis, Mo.	Julien	1	
" Ave. RR. Co.	" "	Sprague	10	5.5
Lng. Island City & Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Los Angeles Elec. Ry. Co.	Los Angeles, Cal.	Daft	4	5
Lynn & Boston Ry. Co —Crescent Beach	Lyna, Mass.	Thomson-Houston	1	1
" " Ry. Co —Nahant Line.	" "	Thomson-Houston	1	5.7
" " RR. Co.—High'nd line	" "	Thomson-Houston	3	2
" " RR. Co—Nathan line	" "	Thomson-Houston	1	.8
" " St. Ry. Co.	Crescent Beach, Mass.	Thomson-Houston	1	1
" " Myrtle St. Line		Thomson-Houston	4	3
Main St. & Lichy Ave. RR	Nashville, Tenn.	Sprague	4	2
Main Street Line Extn., U. P. Ry.	St. Joseph, Mo.	Sprague	4	1
Manchester & Richmond Ry. Co.	Manchester, Va.	Sprague	10	3.5
Mansfield Elec. St. Ry. Co.	Mansfield, O.	Daft	5	4.5
McGavoc & Mt. Vernon St. Ry. Co.	Nashville, Tenn.	Thomson-Houston	6	3
Marlboro St. Ry. Co.	Marlboro, Mass.	Sprague	2	3
Meriden Horse Ry. Co.	Meriden, Conn.	Daft	212	5
Metropolitan RR.	Portland, Ore.	Sprague	4	3
Metropolitan St. Ry. Co.	Kansas City, Mo.	Thomson-Houston	4	4.5

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Minneapolis St. Ry. Co.	Minneapolis, Minn.	Sprague	6	6.5
Mt. Adams & Eden Pk, Incl. Ry. Co.	Cincinnati, O	Daft	3	1
Nanmkeag St. Ry. Co.	Salem, Mass.	Thomson-Houston	6	3
Nayang Cross-Town Ry.	Scranton, Pa	Thomson-Houston	3	1.50
New Horse Ry.	Meriden, Conn.	Daft	12	5
Newburyport & Amesbury H. Ry. Co.	Newburyport, Mass.	Thomson-Houston	2	6
Newport Street Ry, Co.	Newport, R. I.	Thomson-Houston	6	4.5
Newton St. Ry. Co.	Newton, Mass.	Thomson-Houston	10	8
N. Y. & Harlem RR. Co. (4th Ave)	New York, N. Y.	Julien	10	8.5
Observatory Hill Pass. Ry. Co.	Allegheny, Pa.	Bentley-Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg. Co.	Omaha, Neb.	Thomson Houston	14	14
Omaha & Council Bluffs Ry. & B. Co.	Omaha, Neb.	Sprague	2	4
Omaha Horse RR.	Omaha, Neb.	Sprague	20	10
Omaha Motor Ry. Co.	Omaha, Neb.	Thomson-Houston	26	10
Ontario & San Antonio Heights Ry. Co.	Ontario, Cal.	Daft	4	8
Ottawa Electric St. Ry. Co.	Ottawa, Ill.	Thomson-Houston	8	5
Pacific Ave. St. Ry. Co.	Tacoma, Wash. Ter.	Sprague	8	6
Passaic St. Ry. Co.	Passaic, N. J.	Thomson-Houston	3	3
Passenger RR., Extension	East Harrisburg, Pa.	Sprague	4	3
Peoples RR. Co.	St. Joseph, Mo.	Sprague	20	10
Pensylvania RR. Co.	Atlantic City, N. J.	Sprague	6	5.5
Pittsburgh Sub. Rapid Traasit Co.	Pittsburgh, Pa.	Daft	3	
Pittsb., Knoxville & St. Clair St. Ry.	Pittsburgh, Pa.	Daft	4	2.25
Plattsmouth Elec. RR	Plattsmouth, Neb.	Sprague	2	2
Plymouth & Kingston Ry. Co.	Plymouth, Mass.	Thomson-Houston	3	4.5
Port Chester & Rye Beach St. Ry. Co.	Port Chester, N. Y.	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich.	Van Depoele	6	4
Quincy St. Ry. Co.	Quincy, Mass.	Thomson-Houston	4	5
Redbank & Seabright Ry.	Redbank, N. J.	Thomson-Houston	3	5
Revere Beach Ry. Co.	Revere, Mass.	Thomson-Houston	1	1
Revere St. Ry. Co.	Revere, Mass. (Ex.)	Thomson-Houston	4	1.5
Richmoad City Ry. Co.	Richmond, Va.	Sprague	46	13
Richmond St. Ry. Co.	Richmond, Ind.	Thomson-Houston	6	4
Richmond Union Pass. Ry. Co.	Richmond, Va.	Sprague	50	7.5
Riverside & Suburban Ry. Co.	Wichita, Kans.	Thomson-Houston	6	9
Rochester Elec. Ry. Co	Rochester, N. Y.	Thomson-Houston	8	7
Ross Park St. Ry. Co	Spokane Falls, W. T.	Thomson-Houston	6	7.5
Saginaw Union Ry.	Saginaw	Nat. Elec. Trac. Co.		17.4
St. Louis Bridge Co.	St. Louis, Mo.	Thomson-Houston	4	2
St. Louis St. Ry Co.	St. Louis, Mo.	Short	5	3
San Diego St. Ry. Co.	San Diego, Cal.	Henry	9	4
Sandusky Elec. Ry. Co.	Sandusky, O.	Sprague	6	6.75
San Jose & Santa Clara RR. Co.	San Jose, Cal.	Fischer	6	10
St. C., Merriton & Thorold St. Ry. Co.	St. Catharines, Ont.	Van Depoele	10	7
Salt Lake City RR. Co.	Salt Lake, Utah	Sprague	10	6.5
Saratoga Elec. Ry. Co.	Saratoga Springs, N. Y.	Thomson-Houston	4	2
Sault Ste. Marie St. Ry. Co.	Sault Ste Marie, Mich.	Nat. Elec. Trac. Co.	2	3
Scranton Suburban Ry. Co.	Scranton, Pa.	Thomson-Houston	10	5
Scranton Pass. Ry. Co.	Scranton, Pa.	Thomson-Houston	4	2
	Scranton, Pa.	Sprague	20	12
Seashore Elec. Ry. & Power Co.	Asbury Park, N. J.	Daft	20	4
Seattle Elec. Ry. & Power Co.	Seattle, W. T.	Thomson-Houston	5	5
Second Av. Pass. Ry. Co.	Pittsburgh, Pa.	Thomson-Houston	10	10.06
Southington & Plantsville Ry. Co.	Southington, Conn.	Thomson-Houston	2	2
South St. Paul Rapid Transit Co.	S. St. Paul, Minn.	Daft	10	8
Squirrel Hill RR.	Pittsburgh, Pa.	Sprague	5	3.5
Steubenville Elec. Ry. Co.	Steubenville O.	Thomson-Houston	6	2.5
Stillwater Elec. St. Ry.	Stillwater, Minn.	Sprague	6	5
Tacoma Ave. St. Ry. Co.	Tacoma, Wash. Ter.	Sprague	4	2
The North East St. Ry. Co.	Kansas City	Thomson-Houston	10	7
The Peoples St. Ry.	Topeka, Kans.	Sprague	20	12
Third Ward Ry. Co.	Syracuse, N. Y.	Thomson-Houston	8	4
Toledo Elec. Ry. Co.	Toledo, O.	Thomson-Houston	2	2
Topeka Rapid Transit Co.	Topeka, Kas.	Thomson-Houston	30	17
Troy & Lansinburg St. RR.	Syracuse, N. Y.	Sprague	6	5.5
Union Pass. RR.	St. Joseph, Mo.	Sprague	8	5
Union Elec. RR.	Sterling, Ill.	Sprague	7	6
University Pk. Ry. & Electric Co.	Denver, Col.	Thomson-Houston	3	4
Victoria Elec. St. Ry. Co.	Victoria, B. C.	Thomson-Houston		
Vine St. Ry	Kansas City, Mo.	Thomson-Houston	6	3
Washington St. Asylum & Park RR.	Binghampton, N. Y.	Sprague	4	5
Watervliet Turnpike & RR. Co.	Albany, N. Y.	Thomson-Houston	16	15.5
West Dallas St. Ry. Co.	Dallas, Tex	Sprague	2	3
West End St. Ry Co. Brookline Brch.	Boston, Mass.	Sprague	1	10
" " Harvrd. Sq. Brch.	Boston, Mass.	Thomson-Houston	23	12
" " Bylstn & Beach sts	Boston, Mass.	Bentley-Knight	20	14
" " Bylsto & Beach sts	Boston, Mass.	Thomson-Houston	300	230
Wheeling Ry. Co.	Wheeling, W. Va.	Thomson-Houston		
Wichita & Suburban Ry. Co.	Wichita, Kans.	Sprague	7	7.5
Wilkesbarre & Sub. St. Ry. Co.	Wilkesbarre, Pa.	Sprague	7	3
Wilkesbarre & West Side RR.	Wilkesbarre, Pa.	Sprague	3	4
Willamette Bridge RR.	Portland, Ore	Sprague	5	1.5
Wilmington City Ry. Co.	Wilmington, Del.	Sprague	4	3
Windsor Elec. St. Railway Co.	Windsor, Ont.	Van Depoele	2	2
White Line St. RR.	Dayton, O.	Van Depoele	12	9
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo.	Sprague	9	4.5
Wyatt Park Ry. Co.	St. Joseph, Mo.	Sprague	8	5.5

The Street Railway Gazette.

VOL. IV. OCTOBER, 1889. No. 10

Col. Thos. Lowry,

PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION, ELECTED AT MINNEAPOLIS OCT. 17TH. 1889; ALSO PRESIDENT MINNEAPOLIS STREET RAILWAY CO.

Col. Thos. Lowry, eighth president of the American Street Railway Association, was born on February 27, 1843, in Logan county, Ill. His boyhood days were spent in Schuyler county, near Rushville, in the same State, where he studied law, and was admitted to the Illinois bar in May, 1867. In July of the same year he moved to Minneapolis, where he practiced law until he was elected Vice-President of the Minneapolis Street Railway company, in 1875. At that time the Minneapolis Street Railway company was a new enterprise, but Col. Lowry, with admirable foresight, saw at once how the property might be developed, and started in immediately to bring it up to the highest possible standard of excellence. About three years later Col. Lowry bought a controlling interest in the road, was elected its President, and has occupied that important position ever since. He is also the President of the Soo road (steam), and is a majority stockholder in the street railways of the Twin Cities.

Although a heavy capitalist, Col. Lowry, is immensely popular in both cities, in one of which (Minneapolis) he owns a magnificent farm of over 1,000 acres in extent. His princely entertainment of the delegates and their friends at the recent convention in Minneapolis will long be remembered.

The re-election of Mr. Wm. J. Richardson to the Secretaryship of the A. S. R. A. must have been extremely gratifying to that courteous gentleman; for eight years now, Mr. Richardson has been both the Secretary and Treasurer of the association, and the amount of good that he has done it can, probably, never be determined. Be that as it may, one thing is certain, and that is that few men have been more determined to make the A. S. R. A. a power in the land than Mr. Richardson; the affairs of his department have always been conducted with skill and ability, and, upon many occasions he has clearly demonstrated the fact that few men are his superiors in parliamentary usage and executive ability.

Mr. H. H. Windsor, whose name was recommended by the Nominating Committee for the Secretaryship is a young man of great promise, and trained in that magnificent school—the office of the Chicago City Railway company—under Mr. Holmes, to whom he is a most valuable assistant. Beyond all reasonable doubt Mr. Windsor will, one day, make his mark as a street railway man, and the paper he read to the convention (reported in another column of this issue) showed that he was master of his subject.

Chicago can feel justly proud of being able to produce such men as Mr. Windsor.

AMERICAN
Street Railway Association.

Eighth Annual Meeting.

The eighth annual meeting of the American Street Railway Association was held at the West Hotel, Minneapolis, Minn., beginning October 16th, 1889.

The following members' delegates were present:

Thomas Lowry

Augusta, Ga.—Frank E. Pettit, Auditor Augusta & Summerville R.R. Co.

Boston, Mass.—Amos T. Breed, Pres., E. F. Oliver, Sec. Lynn & Boston R.R. Co.; D. H. Sweetser, Treas. East Middlesex R.R. Co; Edward Reardon, Director, F. H. Monks, Gen. Manager, and Louis Pfingst, Master Mechanic West End Street Railway Co

Brooklyn, N. Y.—Wm. Richardson, Pres., Wm. J. Richardson, Sec. and John G. Jenkins, Director Atlantic Avenue R.R. Co. John N. Partridge, Pres. Brooklyn City & Newtown R.R.Co. George W. Van Allen, Pres. and Charles E. Harris, Supt New Williamsburgh & Flatbush R.R. Co. H. M. Thompson, Sec., Wm. N. Morrison, Supt., D. Sullivan, Supt., and Andrew Murphy, Trackmaster Brooklyn City R.R. Co. Walter C. Howey, Supt. Grand Street & Newtown R.R.

Buffalo, N. Y.—Henry M. Watson, Pres. Buffalo Street R.R. Co. and Sec. Buffalo East Side Street Railway Co.

Camden, N. J.—G. George Browning, Treas. Camden Horse R.R. Co.

Chicago, Ill.—Henry H. Windsor, Sec., and Thos. C. Pennington, Treas. Chicago City Railway Co.

Cincinnati, O.—John Harris, Supt. Cincinnati St. Ry. Co George B. Kerper, Pres. Mt. Adams & Eden Park Inclined Ry. Co. H. H. Littell, Pres. and H. M. Littell, Gen. Manager Cincinnati Inclined Plane Railway Co. Henry Martin, Pres. Mt. Auburn Railway Co.

Cleveland, O.—A. Everett, Pres. East Cleveland R.R.Co. J. B. Hanna, Sec. Woodland Avenue & West Side St.R.R. Co. Charles Hathaway, Jr., Supt. St. Clair Street Railway Co.

Covington, Ky.—Geo. Bullock, Gen. Manager South Covington & Cincinnati Street Railway Co.

Dayton, O.—Ezra Rimm, Vice-Pres. Wayne & 5th St. R.R. Co. Charles B. Clegg, Director Dayton St. R.R. Co.

Duluth, Minn.—Samuel Hill, Pres., A. S. Chase, Sec. Duluth Street Railway Co.

Easton, Pa.—Henry A. Sage, Pres. Easton S. E. & W. E. Passenger Railway Co.

Elizabeth, N. J.—T. E. Connelly, Treas., John N. Akerman, Gen. Manager Newark & Elizabeth Horse & R.R. Co.

Findlay, O.—Chas. Smith, Supt. Findlay Street Railway Co.

Galesburgh, Ill.—W. Kellogg, Sec. College City Street Railway Co.

Galveston, Texas.—Wm. H. Sinclair, Pres. Galveston City Railway Co.

Houston, Texas.—Wm. H. Sinclair, Pres. and H. F. MacGregor, Vice-Pres. Houston City Street R.R. Co.

Indianapolis, Ind.—J. C. Shaffer, Pres. Citizens' St. R.R. Co.

LaCrosse, Wis.—B. E. Edwards, Pres., Geo. F. Gund, Vice-Pres., and W. W. Cargil, Director LaCrosse Street Railway Co.

Lafayette, Ind.—George E. C. Johnson, Pres. Lafayette Street Railway Co.

Lincoln, Neb.—C. J. Ernst, Sec. Lincoln Street Railway Co.

Little Rock, Ark.—R. D. Apperson, Supt. Little Rock and Citizens' Railway Company.

Long Island City, N. Y.—Thos. W. Stevens, Director Steinway & Hunter's Point R.R.Co.

Louisville, Ky.—H. H. Littell, Manager, and J. B. Speed, Director Louisville City R.R. Co. J. B. Speed, Director Central Passenger Railway Co.

Manchester, N. H.—Charles Williams, Pres., Geo. H. Knowles, Gen. Manager, and Chas. H. Bartlett, Treas. Manchester Street Railway Co.

Memphis, Tenn.—R. Semmes, Supt. Citizens' Railway Co.

Milwaukee, Wis.—Winfield Smith, Pres., and A. W. Lynn, Supt. Cream City Railway Co. Henry C. Payne, Vice-Pres. Milwaukee City Railway Co.

Minneapolis, Minn.—Thomas Lowry, Pres., C. G. Goodrich, Vice-Pres., E. H. Center, Sec., D. W. Sharpe, Supt. Minneapolis Street Railway Co. F. C. Pillsbury, Pres. Minneapolis, Lindale & Minnetonka R R. Co.

Mobile, Ala.—Robert K. Warren, Pres. Mobile Street Railway Co.

Nashua, N. H.—George H. Knowles, Pres. Nashua Street Railway Co.

New Bedford, Mass.—Samuel C. Hart, Pres. Union Street Railway Co.

Newburyport, Mass.—Chas. Odell, Pres., W. B. Ferguson, Supt., E. P. Shaw, Director, and E. Sumner, Sec. Newburyport & Amesbury Horse R.R. Co.

New York City.—George Green, Pres. Forty-second

Street & Grand Street Ferry R.R. Co. J. N. Partridge, Director Christopher & Tenth Street Railway Co. C. Densmore Wyman, Vice-Pres. C. P., N. & E. R. R.R. Co. Wm. Richardson, Director Dry Dock E. B. & B. R.R. Co.

Niagara Falls, N. Y.—Benjamin Flagler, Pres., Arthur Schoelkopf, Treas., and Frederick Doan, Supt. Niagara Falls & Suspension Bridge Railway Co.

Omaha, Neb.—Thos. J. Evans, Director Omaha & Council Bluffs Railway Co.

Orange, N. J.—Francis M. Eppley, Pres. Orange, Crosstown & B. Railway Co.

Ottawa, Ill.—Thec. P. Bailey, Sec. Ottawa Electric Street Railway Co.

Pawtucket, R. I.—J. R. Bartlett, Vice-Pres. Pawtucket Street Railway Co.

Peoria, Ill.—J. H. Hall, Pres. and J. D. Hall, Director Fort Clark Horse Railway Co

Philadelphia, Pa.—Thos. C. Barr, Pres. People's Passenger Railway, and Lombard & South Street Railway Companies. J. Q Adams, Sec, Citizens' Passenger Railway Co.

Pittsburgh, Pa.—John G. Holmes, Pres. Citizens' Traction Co.

Providence, R. I.—Jesse Metcalf, Pres. and J. R. Bartlett, Gen. Manager Union R.R. Co.

Reading, Pa.—Benj. F. Owen, Pres. and John A. Rigg, Supt. Reading City Passenger Railway Co.

Rochester, N. Y.—C. C Woodworth, Sec. Rochester City & B. R.R. Co.

St. Louis, Mo.—Robert McCullough, Gen. Manager Citizens' and Cass Avenue, and Bellefontaine R.R. Cos. Charles Green, Pres. People's Railway Co. J. S. Minary, Sec. Southern Railway Co.

St. Paul, Minn.—P. F. Barr, Vice Pres. and A. L. Scott, Supt. St. Paul City Railway Co.

Salem, Mass.—Charles Odell, Pres. and R. H. Brown, Director Naumkeag Street Railway Co.

Sioux City, Iowa.—James F. Peavey, Pres. and F. H. Peavey, Vice-Pres. Sioux City Street Railway Co.

Tampa, Fla.—C. E. Purcell, Supt. Tampa Street Railway Co.

Terre Haute, Ind.—Leslie D. Thomas, Sec. Terre Haute Street Railway Co.

Toledo, O.—Norman B. Ream, Pres., A. E. Lang, Vice-Pres. and Wm. E. Hale, Treas. Toledo Consol dated Street Railway Co.

Topeka, Kan.—C. S. Gleed, Pres and E. H. Littlefield, Supt. Topeka City Railway Co.

Trenton, N. J.—Lewis Perrine, Jr., Manager Trenton Horse R.R. Co.

Troy, N. Y.—Chas. Cleminshaw, Pres. Troy & Lansingburgh R.R. Co.

Washington, D. C.—George W. Peason, Pres., A. A. Wilson, Vice-Pres. and Robert Beal, Director Metropolitan R.R Co. H. Hurt, Pres, G. T. Dunlop, Director Washington & Georgetown R.R. Co. Chas. White, Pres., Andrew Glass, Supt. Capitol, N. O. St. & S. W. Ry. Co.

Wilmington, Del.—John Jones Director and Edwin W. Heald, Gen. Manager Wilmington City Railway Co.

Worcester, Mass.—Chas. B. Pratt, Pres and H. S. Seeley, Treas. Worcester Consolidated Street Railway Co.

The following gentlemen were present, and obtained membership on behalf of their respective companies:

William L. Allen, President Davenport Central Railway Co., Davenport, Iowa.

George H. Knowles. President Nashua Street Railway Co, Nashua, N. H.

George H. Knowles, General Manager Manchester Street Railway Co., Manchester, N. H.

George Green, President Forty second Street and Grand Street Ferry Railroad Co.. New York City.

Charles Smith, Superintendent Findlay Street Railway Co., Findlay, O.

F. C. Pillsbury, President Minneapolis, Lyndale and Minnetonka Railroad Co., Minneapolis, Minn

John N. Akerman, General Manager Elizabeth and Newark Horse Railroad Co., Elizabeth, N. J.

R. D. Apperson, Superintendent Little Rock and Citizens' Street Railway, Little Rock, Ark.

PRESIDENT'S ADDRESS.

Gentlemen of the Convention—On behalf of the Association and the representatives of the local companies of St. Paal and Minneapolis, I extend to you a hearty and cordial welcome to this, our Eighth Annual Gathering. The hope has been expressed to me that you will take possession of both cities, the gates of which are thrown wide open, especially that portion lying between the curb lines, the centers of which are bound by bands of steel, and operating thereon the private conveyances of our resident friends dedicated to public use, and on this occasion yours to use and enjoy; and from them to view these beautiful cities and their magnificent surroundings.

The past year has been one of changes in the motive power of street railways. Rapid transit is in demand, and through it great progress has been made in the advancement of street railway traffic, great prosperity to the cities receiving its benefits and to the companies that have adopted it. Electricity and cable power are the systems coming into general use, with the former in the lead. The overhead electric system has thus far been demonstrated to be the most practical; but it is the hope and wish of every street railway manager that the system will be superseded and that the motor of the future, be it electricity, gas, air, steam, or some other power, must and will be a motor independent of a central plant or a wire circuit. The demand for such a motor has enlisted capital and labor of a quantity and quality that is certain to bring about the desired result within a very short period. The horse and mule have been our faithful allies; they have nobly done their share in enabling us to build up cities and towns and to establish therein a service which has added much to the happiness, comfort and prosperity of all classes. In return for their faithful service we propose to emancipate them and return them to the farms from which they came; or, in the language of the negro, who for the first time saw the electric car when he exclaimed:

"White man freed the darkey first,
Now he freed the mule."

The magnitude of the interest we represent, even under the slow movement by horses, when compared with passenger traffic of the steam railroads, is almost beyond conception. The steam railways of the United States during the year 1888 carried 451 millions of passengers, while the street railways of New York state alone carried over 360 millions, and this, with nearly 200 millions carried by the elevated roads of New York city makes the total street railway traffic of New York state 100 millions in excess of all the steam railway passenger traffic of the United States. With the new systems, the carrying capacity, by the increased facilities and the rapid movement of the cars, is more than treb'ed. The travel is increased in the same ratio. Lines are extended to suburban towns and villages many miles distant from the cities that they lie adjacent to. All this has been made possible by rapid transit. It has elevated the standard of our employees, on whom we so much depend to successfully carry out the projects we have in hand. They are realizing that the faithful men have the confidence, esteem and friendship of the railway managers, and this to them is far better than the aid of outside associations, which in the past deprived them of that freedom which is guaranteed to every citizen, namely; the right to employ and be employed and the right and duty to be faithful to those whom we serve.

Now let us all enter heartily into the work we have before us, and let the records of this meeting compare favorably with those of the past, and we will be well repaid for the time and attention we devote to the vast interests we represent.

REPORT OF EXECUTIVE COMMITTEE.

MINNEAPOLIS, MINN., Oct. 16, 1889.

THE AMERICAN STREET RAILWAY ASSOCIATION:

Gentlemen—The Executive Committee respectfully submit the following report:

Membership.

At the opening of the meeting in the city of Washington the membership numbered 157 companies. At that meeting and during the year, the roll of members has been increased by the addition of the fo lowing companies:

Seashore Electric Railway Co., Asbury Park, N. J.
Derby Horse Railway Co., Ansonia, Conn.
Ottawa Electric Street Railway Co., Ottawa, Ill.
Ferries and Cliff House Railway Co., San Francisco, Cal.
Orange, Cross-Town and Bloomfield Railway Co., Orange, N. J.
Wayne and Fifth Street Railroad Co., Dayton, O.
Houston City Street Railway Co., Houston, Tex.
Trenton Horse Railroad Co., Trenton, N. J.
Lafayette Street Railway Co., Lafayette, Ind.
Terre Haute Street Railway Co., Terre Haute, Ind.

The following changes in membership have taken place during the year by lease to, or purchase by, other companies, and by withdrawal:

October 30, 1888, the Bushwick Railroad company was leased by the Brooklyn City Railroad company, and the former company thereupon withdrew.

November 8, 1888, the Lowell Horse Railroad company withdrew, having been purchased the preceding year by new parties.

November 9, 1888, the North Baltimore Passenger Railway company withdrew.

November 16, 1888, notice was received of the abandonment of its business by the Cape May & Schellenger's Landing Railroad company, and the company was therefore recorded withdrawn.

December 4, 1888, the Gloucester Street Railway company withdrew.

June 19, 1889, notice was received of the sale of the Citizen's Railway company, of St. Joseph, Mo., to the People's Railway company of that city, and the former company was entered withdrawn.

September 17, 1889, the Fitchburgh Street Railway company withdrew.

September 19, 1889, notice was received that the Omaha Horse Railway company, formerly a member, and the Omaha Cable Tramway company, not a member, had consolidated under the name of the Omaha Street Railway company, and the last named company became a member instead of the first.

As the result of these changes the membership is now 161 companies.

Committees.

At the outset of the year reports from special committees were arranged for on the following important subjects: "A Street Railway Employee's Mutual Benefit Society," "How can Public Sentiment be Best Cultivated so that Corporations may Receive Equitable Treatment," "Street Railway Mutual Fire Insurance," "Street Railway Motors other than Animal, Cable and Electric," "The Conditions Necessary to the Financial Success of Electricity as a Motive Power," and "The Food and Care of Horses"

The first subject, namely, "A Street Railway Employee's Mutual Benefit Society," is a development of the desire on the part of the management of a railroad company to bring its employees into closer and more harmonious relations with the company than had existed previously. The success of these societies, for there are several in active operation, in bringing about such a state of feeling as was sought, between the employer and the employed, has been even beyond the expectations of their promotors. Perfect community of interest between the employer and employee is greatly to be desired, for there is enough of necessary friction in the conduct of the street railway business without the added annoyance which has so often arisen from the dissatisfaction of the employee with his station in life. This dissatisfaction, natural though it may be, can, nevertheless, be almost wholly offset by the manifestation of a heartfelt sympathy with, and an earnest desire for, the welfare of our employees.

The second subject, "How can Public Sentiment be Best Cultivated so that Corporations may Receive Equitable Treatment," was the outcome of the universal experience of corporations, street railway companies especially. The great mass of people seem to lose sight of the fact that a corporation is, after all, but an aggregation of individuals; and that while the corporation may have no soul, those who compose it surely have. Usually the largest number of the stockholders of a company have but a small interest in the property, and each instead of investing his or her money in one business has placed a small share here and another there to be developed by others. There is no good reason why such property should be treated differently from that owned entirely by one person. That it is so differently considered, with regard to taxation and in the general public esteem, is a fact that is to the discredit of the people.

"Street Railway Mutual Fire Insurance" has been before the Association for several years, and when in the wisdom of the Association the time arrives for its development, the machinery therefor will be found at hand.

The next two subjects: "Street Railway Motors other than Animal, Cable and Electric," and "The Conditions Necessary to the Financial Success of Electricity as a Motive Power," cover important territory relating to the traction and propulsion of street railway cars. During the last few years, each succeeding year has seen electricity progress far more rapidly than any other motive power that has come to our notice; and this has been especially so in the organization and operation of new roads. There is a peculiar fascination about electricity; lying, perhaps, as much in the fact that it is an altogether unknown quantity to most of us, and wholly understood by no one, as in the known fact of its adaptability to so many forms of usefulness; all conducing to the comfort and well-being of the human race. The sight of a car propelled, signalled and lighted by electricity, is most attractive; not only to street railway men, but to every one who has occasion to ride in the car. To no department of our business has so much attention been paid, during the last year especially, as to that of motive power. At best we have come to regard the street railway as a machine by which horses are altogether too rapidly used up; and for reasons of humanity, if for no other, the managers of street railways feel that they should do all in their power to substitute some other motive power for that of animals. If, and when, it is practicable to do this at much less cost, to say nothing of the greater satisfaction in operation, it is manifestly our duty to do so.

The last subject, namely, "The food and care of Horses," is ever on our minds. No street railway will ever be run without more or less horses; and whatever will tend to lengthen the life of the horse, either by the food he eats or the care he receives, is what we all desire to know; for who is there, in the street railway community at least, who does not love and cherish a good horse?

Shall we not then, as we listen to these papers, and in the discussion following, give utterance to our own experiences and ideas in connection with the thoughts and facts presented, have our hearts stirred within us, and go away from Minneapolis far better equipped to continue successfully the prosecution of the business of our life occupation.

Judicial Decisions.

During the year the following judicial opinions and decisions have been issued monthly under the title of "Street Railway Law," being parts of Volumes V. and VI.

1888.

November—The Central Railway company, of Baltimore, against James N. Peacock.

December—The People of the State of New York against John O'Brien, as Receiver of the Broadway Surface Railroad company, and others.

1889.

January—The State of Ohio against the East Cleveland Railroad company.

February—Almira Zilenziger against the Frankford & Southwark Philadelphia City Passenger Railway company.

March—The People, ex. rel The Third Avenue Railroad company, against John Newton, as Commissioner of Public Works.

April—The South Nashville Street Railroad company against H. B. Morrow, County Trustees of Davidson County.

May—Henry Geitz against the Milwaukee City Railway company.

June—Cornelia Ganiard against the Rochester City and Brighton Railroad company.

July—The National Cable Railway company against the Mount Adams and Eden Park Inclined Railway company.

August—B. R. Foreman against The New Orleans and Carrollton Railroad company.

September—Reese A. Hays against The Gainsville Street Railway company.
October—Robert A. Browning against The Cincinnati Street Railway company.

American Street-Railway Decisions.

The work entitled American Street-Railway Decisions may at last be said to be fairly launched. Directly following the last meeting of the association, notices were sent out to all companies, which had before subscribed, being one hundred and twenty-five, requesting that the subscriptions be increased to three copies in each case, whereupon the case of compilation and publication would be at once proceeded with. As a result, subscriptions have been received for two hundred and twenty-four copies of the work.

Your committee has provided for the publication of this work as soon as it can possibly be arranged for; the copy for the first volume being almost ready to be placed in the hands of the printer. We desired very much to have the first volume ready by the time of this meeting; but the work was to extensive for it to be accomplished. It was of the first importance that it should be absolutely correct in every respect; and for that purpose a rigid examination has been made of all digests of cases in all the states and territories, as well as Canada; so that when the work is published it will be absolutely perfect. The first volume will, probably, be in the hands of subscribers by the first of January next; and thereafter the publication will proceed as fast as is consistent with good workmanship throughout. As the edition will be limited to five hundred copies, it is advisable that those companies and individuals that have not already subscribed and desire the work, should do so at once.

United States Mail Lines.

No action has yet been taken by the Post Office Department upon the question of the equipment of street cars with letter boxes. The companies whose lines run between post offices are advised to apply to the department for designation as United States Mail Line, making terms direct with the Government for such consideration. The lines that have obtained this designation have the words "United States Mail Line" conspicuously displayed upon their cars, and find the designation of the greatest possible value in securing free and unobstructed passage for their cars. Trucks and other vehicles are very careful not to hinder the free transit of cars thus designated.

Kindred Associations.

There are now in healthy existence five local state and sectional street-railway associations, namely, Ohio, New York, New Jersey, Massachussetts and the Western Electric; while the Secretary is advised of recent date that the Tramways Institute, of Great Britain and Ireland, is about to be re-organized upon the principle of this association, namely, the membership of companies. We wish it all possible success. The Union Internationale Permanente de Tramways, being the European society of street-railways, organized upon a similar basis to that of this association, is a thriving organization All these associations have our heartiest sympathy and desire for their success. In any way that we can help these kindred associations we shall hold ourselves in readiness to do so.

Trade Papers.

We desire to make special commendation of the several publications that are devoted exclusively to the street railway business, viz: The Street Railway Gazette, The *Street Railway Journal*, and the *National Car Builder Supplement*. While the association has no so-called "official organ," and in fact has recorded itself as opposed to giving any paper such a special recognition, it is nevertheless proper, and due to the publications named, that their work should thus publicly be recognized by the association. They have fully established their right to such recognition by long-continued faithful service to street-railway interests. Any man that desires to keep abreast of the times in all that pertains to this extensive business cannot afford to be without these publications. Both the Gazette and *Journal*, editorially and in their news columns, will compare favorably with the trade papers of any other industry, while the *Car Builder Supplement* is as nearly perfect as possible as a street railway directory; a feature, by the way, of the regular monthly publications.

For the many kind words that have been uttered by these journals from time to time expressive of their deep interest in the welfore of the association, and for their earnest efforts to increase its membership, your committee expresses its grateful appreciation.

Knights of Labor.

The associational year now closed has seen an almost total collapse of the organization known as the Knights of Labor; so far, at least, as that portion is concerned which attempted to dominate street railway companies. Starting in with the manifest determination of making a frightful example of one of the members of this association, The Atlantic Avenue Railroad company of Brooklyn, a "strike" was declared on all of that company's lines. Before its conclusion it was accompanied with riot, bloodshed and even murder. This strike soon extended to the city of New York, taking in every line in that city over which the Knights of Labor had any control; and thence westward took its way until it reached the city in which we now are. The result of these strikes has plainly taught the lesson that foul means will not accomplish what cannot be secured by fair. When men become deceived into thinking it necessary, or even excusable, in a civilized community, to undertake to force their desires, whatever they may be, by the commission of misdemeanors and even felony; extending to the most heinous crime, the taking of inn cent human life; many who engage in such undertakings soon realize that their cause is an unholy one; while all find defeat the inevitable result. The death knell of the organization ot the Knights of Labor has been sounded; because it has shown its unworthiness to live, by reason of the crimes committed in its name under direction of its leaders.

In this free land, freer than any other on the face of the earth, no one can long continue to oppress another without the strong hand of the law intervening. Every man, therefore, can secure his rights through the peaceful channel of the law, and will, as he should, surely fail if he attempts to obtain them by force. Our Government rests upon the principle of the equal rights of all; the poor and rich alike. He who, by industry, careful living, correct habits and a determination to succeed in life, becomes the possessor of more of this world's good than he who, perchance, has been careless, extravagant or without ambition to get on in the world, has the same right to protection of life and property as one who has naught but life to protect. The self respect of the street railway manager has long and often been compromised by the insulting bearing towards him of some of the leaders of this tyrannical organization, with whom he was forced to come in contact. Self respect in its integrity has again become his sacred possession, and must henceforth be inviolate.

The lessons which these strikes have taught have been well learned, and not in this generation, at least, will they be forgotten. We do not rejoice to day simply because in the struggle between capital and labor the former has won, but because therein the right has triumphed. When it becomes a question whether a man shall have the control of that which, by the sweat of his brow, has become his own, or given to another who, forsooth, will have it because he wants it, it is not regarded with popular favor that it be determined by the code of the highwayman. This was the question which the street railway companies were forced to meet this year; and because the right always triumphs the wrong was defeated.

It is our earnest desire that there shall be establisedh in the street railway business such a community of interest between labor and capital, the employer and the employed that perfect harmony shall reign throughout the length and breadth of this great industry.

The Columbus Exposition.

Your committee considers it wise to bring to the notice of the Association the fact that somewhere in the United States a grand World's Fair will be held in 1892; and to suggest that a committee, sufficiently extensive as to territory, shall be appointed to secure for the street railway industry an exhibition commensurate with, and fully illustrative of, the business.

Street Railway Exhibition.

As heretofore, special facilities have been afforded inventors, manufacturers and supply dealers in street railway construction and equipment, to exhibit their wares; and lest there should be an misunderstanding as to exhibition of this character in the future, the committee recommends that facilities be afforded all who desire to exhibit street railway supplies of any character at the annual meetings.

Reduced Rates of Fare.

For the first time reduced rates of fare covering nearly all parts of the United States and Canada have been obtained for delegates and others attending this convention. It is believed that the courtesy shown the Association by the Trunk Line, Central Traffic, Western States and Southern Passenger Associations will have been so thoroughly appreciated that the several Traffic Associations will extend the courtesy for future meetings.

Attendance of Ladies.

The delightful feature of the attendance of ladies at the Washington Meeting, providing for their entertainment with the delegates on the pleasure trips, as well as attendance at the banquet, was so highly approved at that meeting as a decided success, that their attendance at this meeting has been fully provided for.

Local Entertainment.

Your committee desires to express its grateful appreciation of the extensive arrangements that have been made by the Minneapolis Street Railway company for the entertainment of ourselves and accompanying friends.

The Next Annual Meeting.

We bring to the notice of the Association the fact that the companies in the city of Pittsburgh, which last year spontaneously and warmly expressed the desire that the Association meet in that city this year, has, under date of September 20th, through Mr. John C. Holmes, president of the Citizens' Traction Company, again expressed the earnest desire that the Association will m et in Pittsburgh in the year 1890.

Obituary.

On January 2, 1889, Walter A. Jones died at Saranac Lake, N. Y. He had been for many years vice-president of the New Williamsburgh & Flatbush Railroad company, of Brooklyn, N. Y., a constituent member of the Association. Mr. Jones was one of a few men who had most to do with the inception and organization of the American Street-Railway Association. Always of a cheerful, happy disposition, he had a large circle of friends, who esteemed him greatly for his many endearing qualities.

On January 9, 1889, Thomas W. Ackley, the president of the Association for 1886–7, died in the city of Philadelphia, Pa. From the special notice that was sent out at the time, apprising the members of the death of their ex president, we quote the following: "By his death the Association has lost one of its best friends. Mr. Ackley was of a modest, retiring disposition, but of firm and deep convictions as to the right, and what is, perhaps, as important, he had always the courage of his convictions. He was a sincere friend; and those who knew him best will miss him most."

On May 24, 1889, John J Endres died at Hoboken, N. J. He was the chief engineer of the North Hudson County Railroad, which position he had ably filled for many years. He likewise took a deep interest in the welfare of the Association, and was often present at the annual meetings.

On October 5, 1889, Theodore Marsh died at Cincinnati, Ohio. He was a prominent director of the Cincinnati Street-Railway Co., and took a deep interest in its welfare. He had anticipated great pleasure from attending this meeting, to which he had been delegated by the company. Mr. Marsh was a man of many estimable qualities, and was universally beloved by his employees. Wherever placed, he always discharged his duties with marked ability and unimpeachable integrity.

We shall miss the familiar faces and voices of our departed friends.

Respectfully submitted,

G. B. Kerper,
H. A. Sage,
H. Hurt,
J. H. Johnston,
Wm. J. Richardson.

TREASURER'S REPORT.

The following is a summary of the report of the Treasurer:

Receipts:

Balance, Oct. 17, 1888		$2,587 00
138 Annual Dues, at $25	$3,465 00	3,465 00
1 " " at $15	$ 15 00	15 00
11 Admission Fees, at $25		275 00
Tickets to Washington Banquet		140 00
Interest on Loan		42 74
Sale of Annual Reports		10 00
		$6,534 74

Expenses:

Washington Banquet	$2,025 00
Secretary and Treasurer's Salary, 11 months	1,375 00
Seventh Annual Meeting and Report	845 05
Legal Opinions	209 25
Special Committee Reports, 1888	200 00
Eighth Annual Meeting	153 98
Postage	140 00
Miscellaneous Printing	115 19
Insurance, Express, Telegrams and Stationery	13 87
	$5,077 34
Balance, Oct. 10, 1889	$1,457 40
	$6,520 10

STREET RAILWAY MUTUAL FIRE INSURANCE.

BY C. DENSMORE WYMAN.

(Extracts from the report:)

The tendency in all lines of business is towards a division of labor. Specialists in different departments of the same industry or profession are sub-dividing its work with success, and the best results are being obtained by the employment of such specialists. This tendency makes itself felt in our business. Not a few of the companies who are now building their own cars are beginning to question whether it pays or not. Some have already decided the question in the negative and have given up their shops for new construction purposes. Many of us contract our horseshoeing, car cleaning, car painting and track laying, with profit and a lessened responsibility. It is felt that our business is mainly the transportation of passengers and the force of the time honored motto "*Ne sutor ultra crepidam*" is felt and respected. With this tendency and its results in mind, the owners of street railway property when confronted with the question, shall we engage in the insurance business, or hire other responsible and experienced companies and associations to insure us?" hesitate to change from the present system.

* * * * The formation of the New England Insurance Exchange, the Philadelphia Tariff Association, the Frazier System of Inspection, and the systems of Western Mutuals, together with the elaborate papers put forth by Hexamer, of Philadelphia, have grown out of this feeling, viz: that a majority of fires occurred from avoidable causes, and that it was a part of the duty of the underwriters to prevent frauds. A strict compliance with their rules in regard to the use and ownership of fire protective apparatus being observed on the part of the insured has led the old line companies to reduce their rates in many localities to less than one-half the rate charged when first the question of a street railway insurance company was agitated. * *

Many of the Eastern companies and possibly the Western, have, as we have suggested, protected their buildings with sprinklers and other fire apparatus, and secured a great reduction in rates, and thus we may fairly place the average rate paid for the above line at not more than one and one-quarter (1¼) per cent., or a total of $47,500 per year. Now, if this amount be divided among the insurance companies of this country and those of other countries doing business here, and accepting street railway risks, the net receipts to each, after deducting the cost, reserve and liability to loss will be so small that its loss would be, in our opinion, hardly felt by the different insurance companies, and as a lever for the reducing of rates would, in most instances, that is, with the best and strongest companies, be of little use.

It is urged that the profits of the business to be done by a Street Railway Mutual Insurance Company would

be sufficient to make the venture a paying one. We have estimated above that the amount of risks, assuming that the one hundred and eighteen (118) companies counted on placed their entire lines of insurance with the proposed new company, which, of course, is a violent assumption, would be about $12,000,000. The yearly premium paid them at 1¼ per cent. would be $150,000. In the last thirteen years in the cities of New York and Brooklyn seven street car stables and buildings have burned with a loss in each case of $50,000 and upwards. The total loss paid by the insurance companies for these fires was $1,730,247.58. No profit appeared to the insurance companies from street car business during the time named.

The next report was Mr. Hurt's on

A STREET RAILWAY EMPLOYEE'S RELIEF ASSOCIATION.

THE AMERICAN STREET RAILWAY ASSOCIATION.—*Gentlemen:* In undertaking to treat this subject briefly the writer assumes that an organization composed exclusively of the employees of a street railway company, and having no connection with any other, formed for the single purpose of mutual aid in time of sickness, and of aid to the family in time of death, is an association, the proper conduct of which will lead to good results.

If, in addition to this, the future features are added of providing a depository for savings, however small, which shall receive a liberal rate of interest, and of enforcing among its members the gradual saving of a fractional part of their wages, the benefits growing out of such a system will soon become apparent to all connected therewith.

The stability and permanent success of an organization of this sort depends, perhaps, upon the degree of interest manifested in it by the company itself. Referring now to the association composed of the employees of the company with which the writer is connected (and this is done by the way of illustration only, and not as furnishing a model for the guidance of others) the action of the company in respect thereto has been as follows:

After the organization had been instituted and put into practical operation this company presented the committee of management with the sum of five thousand dollars to be held and treated as a surplus fund, the full meaning of which will appear in reading the constitution, article XX.

The Treasurer of the company, in his official capacity, is made the Treasurer of the Association by its constitution, and the other officers of the road are members. The company guarantees the safe custody and proper disposition of all moneys or securities belonging to the Association entrusted to the care of its Treasurer. In general terms the committee of management elected annually by the members and serving without pay exercises special supervision over the relief department, visits the sick, and approves the claims of all beneficiaries before payment. The company collects and disburses the money, makes the investment and guarantees correct accounting in all respects, without expense to the Association.

The leading features of the plan of this Association are:

1st. That membership is not compulsory and may be terminated at will.

2d. That no initiation fee is required.

3d. That nothing is forfeited at the expiration of membership.

All accounts are stated monthly by writing up the pass book of each member and returning it to him. Full reports are issued monthly and posted in the several offices of the company. The dues of one dollar per month, with the assessment of twenty-five or fifty cents added in case of death, receive credit on the account, and the pro rata share of disbursements for the month is charged off against it; the difference remaining as a credit balance to be refunded when membership ceases. This sum represents the compulsory saving of a fractional part of wages received.

Members also have the privilege of borrowing money from the Association by giving security, and of paying the same in easy installments of one dollar and two dollars per month, with interest.

Except a working balance and reserve fund to meet the demands of depositors, the remaining surplus is invested principally in mortgages bearing six per cent. interest. From the amount so received there is set apart, semi-annually, first, the sums due on deposits for interest at same rate per cent. computed for each full calendar month only; and second, the balance is divided equally between the members of six months standing, and the respective accounts credited therewith in January and July.

The forms and blanks used in conducting the affairs of the Association referred to are submitted herewith, as well as a summary of results, in order that if the subject shall prove of sufficient interest to invite your attention you may suggest the changes and alterations which shall seem to you better adapted to subserve the purposes intended.

Very Respectfully, etc.,
HENRY HURT.

The forms and blanks used in connection with the Association are:

1. Application for membership.
2. Pass Book, containing constitution, by-laws, certificate of membership and account.
3. Claim for sick allowance.
4. Warrant on the Treasurer, signed by the President and Secretary for disbursements.
5. Treasurer's check on the bank therefor.
6. Deposit blank.
7. Promissory note.

Books kept in connection with the Association are: By the Board of Managers, Minute book; by the Treasurer, Cash book and Check book; by the Secretary, Journal, Ledger and Book of Warrants; also individual account book, specially ruled.

Results.

Date of organization, August 2, 1886.
Number of members at this date, 236.
Amount paid to the Treasurer, $236.
Disbursements for benefits and deaths during 5 months, to Dec. 31, 1886, $717.
Net individual expense, $2.75.

Disbursements during the year 1887:

For Benefits	$1,081 00
For Deaths	550 00
For Expenses	10 35
Total	$1,641 35
Net individual expense	$3 51.

Disbursements during the year 1888:

For Benefits	$1,305 00
For Deaths	150 00
For Expenses	33 50
Total	$1,488 50
Net individual expense	$3 28.

Number of members January 1, 1889, 257.

Balance standing to the credit of each original member's account on the first day of January, 1889, for dues not expended, $23.90.

Balance Sheet, January 1, 1889.

Dr.		Cr.	
To Bills Receivable,	$15,565 00	By Surplus Fund,	$ 5,000 00
" Cash, -	4,948 02	" Deposits, -	10,263 68
		" Dues, -	4,702 21
		" Interest, -	537 11
		" Profit and Loss,	10 02
	$20,513 02		$20,513 02

Balance Sheet, October 1, 1889.

Dr.		Cr.	
Assessment,	$ 450 00	Surplus Fund, -	$5,000 00
Expense, - -	3 50	Dues, -	3,541 17
Benefit, -	1,236 00	Interest, - -	260 39
Bills Receivable, -	21,961 00	Profit and Loss, -	9 21
Withdrawal, -	1,399 23	Deposits, - -	12,086 33
Cash, - -	842 37		
	$25,897 10		$25,897 10

Mr. Payne, of Milwaukee, inquired what proportion of the employees belonged to the Association.

Mr. Hurt: About three-quarters.

Mr. Barr, of Philadelphia, said that while he could conceive of the advantages of a benefit association in connection with a steam road, he could see some disadvantages connected with it as regards a passenger street railway. He thought that the companies now had as much as they could attend to in getting what was really due the companies; and that the natural tendency where men were employed on roads where benefit assessments were to be paid, was to let the company pay for them. He could see where it would really be a benefit to street railway companies to provide proper accommodations for the employees, in the way of reading and smoking rooms, and similar places for mutual benefit; but as to the plan of establishing mutual benefit societies, he did not think it could be carried out practically to any extent. One man would be in the employ of the company two weeks, and another might be two years; and the advantages of the system would be far exceeded by the disadvantages.

Mr. Richardson, of Brooklyn, inquired whether in the experience of the last speaker he found that the men who saved their money were worse than the men who spent it in drink.

Mr. Barr replied that so far as drinking was concerned, that the company he represented allowed no drinking. The men were discharged if seen entering a tavern, either when on or off duty.

Mr. Payne inquired what the experience of Mr. Hurt had been as to the men who had joined the association, whether they were not the old time employees, and if the men who were constantly changing about joined the association.

Mr. Hurt answered that the employees who failed to join the association, were those who failed to provide for themselves and families; the careless, shiftless class. On the other hand the men who were members of the association were often promoted to better positions, and their deposits were withdrawn when they left the company. The highest expense charged against any one man since the association was formed, with a commencement of two hundred and sixty-seven dollars to a result of twenty-five thousand dollars in three years, was three dollars and twenty-eight cents; and eventually the entire item of expense would be eliminated so far as the members were concerned, because as the fund grew and investments were made, the interest would pay all the expenses and result in a profit instead of a charge to the members.

Mr. Hall, of Peoria, said that the remarks of the last speaker were interesting; but in his sixteen years' experience in the business he had come to learn that confidence begets confidence, and good treatment gets good service in return, and in his opinion everything should be done which would advance the interests of both employee and employer. The meeting in the morning, and the looks and words exchanged, went for much more than many supposed. He was certain on his road the losses by mistakes and change falling out of the pockets of the drivers amounted to more than the loss resulting from absolute dishonesty.

Mr. Barr inquired the size of the road.

Mr. Hall: It is five miles of double track; employing about thirty men.

The President called upon Mr. A. Everett, of Cleveland, to relate the practical workings of the association connected with his road.

Mr. Everett responded that he was not very familiar with the association, as its management was left with the Secretary. He understood, however, that it was working satisfactorily.

Mr. Hurt then said that in twenty-four years' experience in the business he never had a disturbance of any kind on his road; never a stoppage of a single car. His employees did not belong to any labor organization, and did not seem to be in sympathy with them in any way, and seemed to have the same feeling about them that the company had. They think the company is better able to care for their interests than any outside parties. The association was formed at the time when the labor agitations were prominently before the people, but his road escaped all difficulty, and proceeded harmoniously and the men had made a little money besides.

Mr. Richardson said that conferences had taken place between the officers of his company and the employees, looking to the formation of such a society, about four years ago; but just as everything seemed satisfactorily arranged, the men dropped the negotiation, and formed a society of their own independently of the company, and subsequently became a local assembly of the Knights of Labor. The arrangement did not fall through because of a lack of liberality in the offer of the company, but it occurred at that unfortunate juncture when the labor movement was spreading through the country.

Mr. Martin, of Cincinnati, moved a vote of thanks to Mr. Hurt, for his paper, which was carried.

The convention then adjourned until eight o'clock in the evening, in order to accept an invitation from the Minneapolis Street Railway company to take a ride through the city, and out to the Minnehaha Falls.

EVENING SESSION.

The committee on "The Conditions Necessary to the Financial Success of Electricity as a Motive Power" reported as follows:

TO THE PRESIDENT AND MEMBERS OF THE AMERICAN STREET-RAILWAY ASSOCIATION. — *Gentlemen* — Your Committee appointed to report upon "The Conditions Necessary to the Financial Success of Electricity as a Motive Power," begs leave to submit the following:

The subject of "Electricity as a Motive Power" has been the all-absorbing topic before our meetings for the past two years, and only now are we able to give any satisfactory answer. Up to the date of our last meeting, in Washington, October 17, 1888, we had made very little progress in the application of electricity to the propulsion of cars, although a solution of the problem was deemed not far distant. At that time the number of roads equipped and operated by electricity could be counted upon the fingers of your two hands, while to-day they number in the hundreds, a surprising result, all within the short space of twelve months.

This result could only have been brought about by the fact that the experiments heretofore made had proved a success, far beyond even the expectations of those making them, and we have established to-day without a doubt the success of electricity as a motive power. Having ascertained this point, we are next led to the question, What are the Conditions Necessary to the Financial Success of Electricity as a Motive Power? This question, while it can be answered in a general way, must upon the whole rest with us individually.

In the application of electricity we are not met with the *volume of business* or the *engineering and mechanical construction*, as brought to our attention from the report

upon the Conditions Necessary to the Financial Success of the Cable Road, but can simply say that if it is desired to make a change from horse power, electricity will fill the bill to perfection, no matter how long or short the road, or how many passengers are carried. In the investigation of the subject, the most satisfactory results have been shown; it not only increases traffic over the road, but reduces expenses, and will enable us to operate a line, which heretofore entailed a loss, at profit.

We have three methods of operation, as follows: The overhead wire; the conduit; and the storage battery, which will accommodate all conditions.

For the overhead wire, we can only say, that it is all that can be desired, and for suburban roads and small towns, and even in cities, at present can not be equalled. The conduit has found very little favor in the eyes of practical men, by reason of the unsatisfactory result heretofore attained by those who have experimented with it, while the storage battery is gradually, but surely, pushing its way to the front as the most perfect system, and is now only awaiting the development of a battery which will stand the hard knocks and usage which it must necessarily get in the operation of a street car, without destroying its component parts.

The overhead method having been demonstrated to be the cheapest of the three methods, is being universally adopted, and with results that can not but help keep it in the front ranks, as a cheap power to propel cars. We have yet to learn of any person who has seen the operation of a road by this system, and have ridden in the cars, who has not declared it, without reservation, to be just what was wanted. In the large cities we are met with the objection to overhead wires, which necessarily compels us to favor the storage battery, and yet, if the consent of councils could be obtained, there is no doubt that the overhead construction would be placed in operation at once.

If a change is desired in the manner of operating a road, we are not compelled to figure an elaborate cost of construction, which, if of cable, would cost something like seventy to seventy-five thousand dollars per mile, in addition to the cost of a power plant, but are only confronted by the small amount of, say, from two thousand to three thousand dollars per mile, with cars costing from three to five thousand dollars apiece, while for the storage battery we have figures still less, by reason of the wire being dispensed with, so that a comparative statement of the cost of construction of a ten mile road complete, with fifteen cars, would stand probably as follows:

Cost of Cable Construction	$700,000
Cost of Power Plant	125,000
Cost of Car	15,000
	$840,000
Electrical Overhead Wire Construction:	
Cost of Road Bed	$ 70,000
Cost of Wiring	30,000
Cost of Cars	60,000
Cost of Power Plant	30,000
	$190,000
Storage Battery:	
Cost of Road Bed	$ 70,000
Cost of Cars	75,000
Cost of Power Plant	30,000
	$175,000

In the above cases of electrical construction, the motor car would be capable of pulling one or two tow cars if necessary. These figures your committee have no doubt will be found to be calculated within a reasonable limit of cost.

Now to get the most economical service and the best results, it would be well in the judgment of your Committee, to rebuild your road bed, if an old road, and start with a construction that would be as nearly perfect as possible, and that to be a girder rail construction, with ties 2ft 6in. apart, 5 x 10 yellow pine, your rail to weigh from 45 to 60 lbs., the weight to depend upon the traffic that would in all probability be carried upon it.

This is no doubt the most important step after deciding to adopt electricity; by this means you reduce the amount of wear and tear on your cars to a minimum, and prevent, to a certain extent, the damage to your motors, or, if a storage battery, the constant jarring of your batteries. It will also enable you to maintain a more even rate of speed, as also a much faster rate, than could be obtained under any other condition. It is advisable, also, to have your motors examined after each trip, and see that nothing is out of repair. Do not let the motors work at a disadvantage, as a dollar or two expended at the proper time will save you hundreds in the future. Also see that the men running your cars are careful and capable of exercising a little judgment. A careless man will ruin your motor in a short time by forcing the whole current through it, when there is no reasonable excuse for the same; particularly in starting the cars, a little attention in this direction will amply repay you for the time and expense devoted to such inspection.

If you are running a number of cars, it will probably be more economical to put in your own power plant rather than depend on an electric light plant, or it may be absolutely necessary to put it in by reason of having no such source of power. This plant need not necessarily be placed along the line of your road, as the power, being transmitted through a wire, the plant can be placed where the cost of running the generators will be the least, which, if water power is at hand, or if in a coal district, would tend to materially reduce the cost; yet for ordinary purposes power can be leased from any electric light plant at a reasonable cost per car per day.

As to your cars, the majority are now ordinary 16 ft. bodies, placed upon independent trucks, so that old cars can be utilized; but if a new equipment is desired, it would be best that the bodies be placed upon independent trucks, and that both ends be closed, or, in other words, a bow window front and back, with the side entrance clear as in the ordinary car; or, if your road is a double track, with "loops," and your cars run but in one direction, it would be still better to have the front entirely closed, as in the construction of the latest style of cable cars. This construction of the car will protect that portion of the electrical apparatus which is now exposed to the elements, and still make a much neater car; or, if your road carries a large number of passengers, a twenty (20) to twenty-two (22) ft. car upon double trucks, the same pattern, would give even better results.

With the small cars, have at least two motors of fifteen (15) horse power each, and with the large ones it is a question whether or not the motors should be twenty (20) horse power each. Do not stint the power of your motors. There is no doubt in the mind of your committee that considerable of the trouble heretofore experienced has been for the want of sufficient motor power. With this power under your cars and the wire overhead, you may safely climb grades of ten per cent. and more, with perfect ease, but with the storage battery it is hardly safe to climb a grade of more than six per cent.

The question of operating your line during the winter months is also a serious one, but there is still no doubt that if the rail is kept clear, little or no trouble will be experienced. To do this it is desirable, in addition to a plough, to use a large sweeper operated by two fifteen (15) horse power motors, with the brooms working independent of your gear, and propelled by a separate fifteen (15) horse power motor; using at your curves and switches some little salt to keep them clear. This will keep your rail as clear as required under ordinary conditions, and in addition to the above, you should have attached to the cars a small scraper in front of the wheel, to keep the accumulation of snow or ice from the track that may be thrown there by the traffic on the street.

Now to the cost of operating your road. This will rest solely with yourself. It should not under any circumstances exceed ten (10) cents per mile to include the cost of your conductors and drivers. Of course, there are exceptional case where the cost is much greater by reason of conditions which do not exist ordinarily. It was the desire of your committee to be able to furnish you with some exact figures on this particular point, but it was found almost impracticable, as the majority of those from whom the information was sought preferred not to disclose the cost of running their roads.

A few figures showing the gross earnings, as well as the operating expenses for some of the months of the past year on roads operated by electricity, will probably be interesting, although the names of the roads will be withheld.

Operations of a road for the month of August, 1889.

Gross earnings from operation	$3,821 95
Total operating expenses	1,856 67
Showing the net earnings to be	$1,965 28

And in the operating expeuses of this month were included $480, interest charges on floating and bonded debt.

Total mileage for the month, 19,181 miles; average cars operated, 8; average cost per mile per day for operating road, 09 67 cents; deducting amount of interest charges will give 07 12 cents per mile, which is certainly a very satisfactory showing.

For the first 31 days of operation of another road, we have

Receipts	$8,796 40
Expenses	2,164 00
Showing net earnings to be	$6,632 40

With motors making 19,930.5 miles; and of tow cars making 11,610.1 miles. Average motor cars operated daily, 5.93.

This shows a cost per mile of motors of only 10.86 cents, and by adding the additioual mileage of tow cars reduces the cost per mile to a figure of 6.86 cents. In this case it would be well to note that the cost of power was reduced to the average of $1.39 per car per day.

Again we have for another road for the month of July, 1889.

Receipts	$10,605 00
Operating expenses	3,735 00
Showing net gain of	$6,870 00

With the motors making 46,647 miles; showing average expense per mile 08.01 cents.

For another road we have

Receipts from operating 80 days	$5,500 80
Total operating expenses	2,441 27
Showing net earnings for that period	$3,059 53

Another road for 75 days.

Receipts	$6,182 15
Total operating expeuses	2,843 54
Showing net gain for that period	$3,446 42

Last, but not least, we have a report of a road for the month of August, 1889.

Operating receipts	$4,317 46
Total expenses	871 04
Net profit	$3,446 42

The total expense of this road figures at fourteen (14) cents per mile.

The average number of miles that an electric car should make under favorable circumstances is at least 120 miles per day, of eighteen hours, which is 50 per cent. in excess of what we can now get from horses.

It will perhaps interest some of you to listen to a few extracts from a letter written by one operating an electrical road, in which he says: "We find a flattering comparison in favor of the electric motor, and have experienced great difficulty in keeping the people off the roof of the cars, so anxious are they to ride; have carried them on the brake-beams, hanging out of the windows, and on coupling bars. A single car, whose seating capacity is twenty-two, has carried one hundred and two passengers in one load. We have experienced no difficulty whatever in carrying these loads up the steep grades of our city. We can further state that in our six miles of track we have but one block without a grade of from one (1) to eleven (11) per cent. So great has been the increase of travel since we began to use the motors in place of horse cars that we have already found it necesssary to quadruple our equipment.

The instance stated above is only one of many from roads operated by electricity, all of them showing an increase in traffic, and paying large dividends to the holders of the stock.

The most notable instance of the past year has been the resolution of the Board of Directors of the consolidated roads of Boston, to equip their whole system with the overhead wire. A portion of this system has already been equipped, and from the statement of Presieent Whitney we have the fact that on their extension to Arlington of the Cambridge Division there has been at least one hundred and fifty per cent. increase in traffic, with fifty per cent. decrease in the operating expenses, giving us a net gain of two hundred per cent., which is something marvelous.

We have had unfortunately within the past month a report of the breaking down of the overhead system in the city of Richmond, and yet with all the results from reports as to the success of the overhead system, we will have some few who will bring this road up as an example of what the future will be of roads operated by the overhead wire. Why this should have occurred in Richmond is hard to tell, and can best be explained by some one with a knowledge of the cause.

The question of the relative merits of the different systems of electrical construction it has been thought best to leave open to discussion by the members of the Association.

In closing, would say, it has been stated that electricity as a motive power is as far ahead of the cable as the cable was an advance over horses.

THOS. C. BARR,
Committee.

DISCUSSION ON ELECTRICITY.

Mr. John S. Wise: I represent as counsel the Sprague Electric company, which has been slandered so much in connection with the electric railway at Richmond. I desire to make a statement here as to the condition of that road, and the causes of its failure, which I think will be satisfactory to any impartial mind. The Richmond Union Passenger Railway company was chartered by the State of Virginia and the City of Richmond, through the influence of Mr. Maurice B. Flynn, of New York, who came with his companions and obtained that charter, and made a contract with the Sprague company for the equipment of the road. In the first place, it was a scheme to put in a shoe-string and pull out a tan-yard. It was not backed by the proper capital at its beginning. It was a very desirable charter, it was a very desirable enterprise for an electric railway equipment company. The Sprague company, in its anxiety to obtain the largest and longest electrical railway in the world, concluded a contract with Mr. Flynn. The track was laid, I believe with second hand rails; at any rate many of them thirty pounds to the yard, of the lighest and most inferior kind, and to-day the rails all along that road are slivered off, as if they had been hammered. There is not a plumb rail on the road. The curves were twenty-four-foot curves, and they were not bound in any way. The road was not ballasted from one end to the other. That was the character of the work which the owners of the road had put down, and to-day it will take thirteen thousand dollars to put the track in any condition at all; and with that the electric company had nothing to do. The cars were bought from J. C. Brill & Co., and have been there only two years, yet they are in a horrible condition; they are dirty and neglected. They look as if they were twenty years old. For many months they had employed blacksmiths to repair the motors, and had used brushes which were of such inferior material that they would be destroyed in a single trip; and with the foolishness of ignorance they absolutely undertook to manufacture dynamos in their shop. Finally, the inevitable result came. As to the system being abandoned, the statement is without authority. The fact is that the Sprague company saw that its interests were imperilled by the parties who had obtained control of this road. We are in sympathy with the bondholders, and in co-operation with them to-day; and are endeavoring to restore the property to the condition in which it should be. We filed a bill to put it in the hands of a receiver, and take it away from these incompetent people;

and have so far succeeded, that the only reason it has not been done is that every overture has been made to us, and every promise and assurance given, that a radical change will be made in this incompetent management, and the road put in a condition so that this general subject may receive justice, as well as the particular road directly interested. Within the next three months we will show to the people of Richmond some radical changes, and on the road that was the first electrical railway, we will show them the best electrical railway in the world.

Dr. A. Everett, President of the East Cleveland Railroad Co.: I am no talker ; but will say that we are running on our road thirty motor cars to our full satisfaction. We run about fifteen miles of road, and make an average on a motor of fifteen hours a day, about one hundred and twenty-three miles. In connection with the motors, we make eighty miles a day with the tow cars. The road is running to my full satisfaction. It is the Sprague system.

Mr. C. J. Ernst, of Lincoln, Neb.: I am glad to hear from Dr. Everett, and as his road is just about the same length as mine, would like to ask him a question, and that is, the cost per mile of operating his road, including all expenses of management ; in fact expenses of every kind.

Dr. Everett: I cannot answer that question, and for this reason. In my repair shop I am doing new work all the time, equipping new cars as fast as I can get the motors. My men work on new work for an hour or so, and then may be called upon repairs for an hour or so ; and I have not been able to keep a correct account. I have no doubt at all it is a very great saving over horses. In my opinion, the exact saving can not be told until the motors have been used for five or six years. The cost depends very much on the wear and tear of your motors. If the electric motor will last as long as the average life of a horse (my horses last about three and a half years) then the electric motor is cheaper.

Richardson, of Brooklyn: Have you used up any motors since you have been running?

Dr. Everett: We have not used up any, but we burnt out a number when we first commenced running. We have overcome that difficulty wholly, and have not had one burnt out for three months. The most trouble lately is with the commutators ; but no doubt that can all be overcome. We have made improvements since we first started. The heaviest grade is 3½ per cent.

Mr. J. G. Jenkins, of Brooklyn: I would ask the question, how are the passenger receipts as compared with the horses? Are people induced to ride more frequently with electricity?

Dr. Everett: A great many people ride out of curiosity. On an extension of two and three-quarters miles, half of the people who ride in fine weather do not get off the car, but go right back with us.

Mr. Jenkins: I understand, then, your receipts are largely in excess of what they were when you operated by horse power?

Dr. Everett: Comparing August and September this year with the same months last year, the increase is about six thousand dollars; or about fifteen per cent.

Mr. J. H. Hall, of Peoria: What is the power of the central station engine?

Dr. Everett: Three hundred and thirty five horse-power; we had twelve hundred horses.

Mr. Hall: How many cars do you operate daily?

Dr. Everett: We operate about sixty. We have thirty-two motors. Each motor can haul two other cars.

Mr. F. H. Monks, General Manager of the West End Railway, Boston: The West End Railway company has at this time in operation about fifty motor cars, operating some thirty miles of single track. It is giving great satisfaction to the public and to ourselves. It has been stated in a letter which has been read here tonight from President Whitney, that the receipts on the Arlington line are very largely increased, and that the road is giving general satisfaction. We are using the Thomson-Houston system. It is absolutely impossible for me to say what is the cost of operating the system, by reason of the fact that we have a contract with the Thomson-Houston company by which they practically agree to keep the motors in repair and the overhead line in repair; and hence I can not say much as to the cost per mile for operating. That seems to me to be largely a matter depending on locality; the price of coal, the price of labor, the price of real estate, etc. Many factors enter into the matter, so that each locality, and each person in each locality must determine for himself. We are running a line from Park Square in Boston,to Chestnut Hill and Allston and we are taking a large number of passengers who formerly rode on the steam cars, and we are giving great satisfaction. I met a gentleman to-day who said he lived near Allston. He said, "Now I am well suited; when you ran by horses I was not." We are running cars on that line, in trains, on fifteen minute time; we meet with another line at Collidge's corner, so called, and have a seven and a half minute line from that point in. I do not desire to take your time and tax your patience, Mr. Chairman, but would be glad to answer questions that may be asked, and perhaps thereby give you some enlightenment in regard to this matter.

Mr. Wm. Richardson : I hope the gentleman will feel no embarrassment, for we are all anxious to know how the West End company is proceeding in this matter; as to speed, the probability of its permanency, as regards the economy and efficiency of the plant, and generally whether the West End company expects to so perfect this system of electricity that it will embrace all its lines in the city of Boston, or whether it has adopted it for use merely on its suburban roads.

Mr. Monks : It is quite impossible at this juncture to foreshadow what the future will be. I understand the wish of the directors to be, to make very extensive additions to the present electric plant. It is expected where we have fifty electric cars in operation at the present time, to have at least one hundred and thirty in operation by the first of January. The present lines are now entirely equipped with the Thomson-Houston motor; and new lines are to be equipped from the most thickly populated and congested part of the city to Franklin Park, and it will supply a very abundant population. It is not expected that further additions will be made before winter. The operations in the spring will probably include a very large amount of new line to be added. We run at an average speed of twelve miles an hour in some localities, at others a little faster. Between Arlington and Harvard square, stopping at thirteen different places, where the time was previously thirty-five minutes, we make it now in twenty. It is almost four miles. As you will observe, it was a pretty sharp run for horses in thirty-five minutes; and we can now make it in twenty minutes.

Mr. Richardson : If I am correctly informed, the West End Railway company has the right granted to it to run by electric power on every street in the city of Boston.

Mr. Monks: Where they are now at present.

Mr. Richardson: I do not know of the limitation. Can the gentleman tell us whether the success of the matter thus far has been such that the directors of the company feel confident that they can in the future, safely and practically, in all their senses, operate their different lines by electrical power instead of horses; or is it still in the experimental stage?

Mr. Monks : I think I may safely state that the experimental stage has been passed. It is impossible for me to promise to a definite certainty that the whole of the seventy-five hundred horses will be superseded by electricity. The future will show. Suffice it to say that the company is launched upon the enterprise; and I have no question whatever but there will be extensions made during the coming year, in addition to those now contemplated.

Mr. Jenkins: It seems from what the gentleman has said that one of his lines now operated by electricity had been operated by horses. Is there a greater or less expense in operating by electricity than by horses?

Mr. Monks: As I said before, I can not say what the cost of operation is; I do not know the cost to the Thomson-Houston company, under our contract with them.

Mr. Jenkins : That is a matter of secresy between your company and the operating company, what the expense is?

Mr. Monks: I can not be expected to disclose that.

Mr. Flagler, of Niagara Falls: Have the experiments of your company been confined to this one system, or have you used other systems?

Mr. Monks: We have used three systems, sir.

Mr. Richardson: At the same time, or did you experiment with them separately, and then finally settle on one?

Mr. Monks: We used three systems at one time.

Mr. Richardson : What systems?

Mr. Monks: The Sprague system, Bentley-Knight system, and the Thomson-Houston system.

Mr. Jenkins : Now you have but one?

Mr. Monks : Yes, sir.

Mr. Jenkins : We are to draw our own conclusions from that.

Mr. Richardson : I would like to ask whether from the gentleman's experience with the system he speaks of as being operated at fifteen minutes and seven and a-half minutes apart, a road which needed to be operated with cars at intervals of two minutes on a road of four miles in length could, in his judgment, based on his experience and observation, safely adopt this system of electricity, and with such a system could safely depend on being able to operate the road successfully?

Mr. Monks. In answer to the question, let me say that on our Franklin Park division we have two thousand horses. We have a very large business there, our July receipts being one hundred and fourteen thousand dollars. The people ride to the park in large numbers, it being a great public resort. Last summer we ran cars to the park on one minute headway over a very large portion of the day. If the same increase in our traveling takes place next summer with our electric cars that has taken place elsewhere with our electric cars, it is my expectation of being obliged to run cars at least one hundred and twenty in the hour, in order to supply the demand. I have no hesitation, from what I have seen of the system now in use that it is my belief that it will be perfectly practicable for us to do it in that way.

Mr. Lang, of Toledo : Do you use a metallic wire for the return current, or do you use the rails and an additional wire between the tracks?

Mr. Monks : We use the supplemental wire between the tracks, joining it to each rail, making a connection with the rail.

Mr. Lang: Have you experienced any difficulty with the telephone companies?

Mr. Monks : No, sir.

Mr. Lang : And does the city permit the overhead wires of all kinds to be constructed in the city, telephone, telegraph and electric railway wires?

Mr. Monks : There has been a general tendency in Boston, as elsewhere, to have the wires placed under ground. With that in view the conduit was laid in the first place ; but the conduit proved so impracticable and the overhead wire at the same time proved so practical that the citizens of Boston were anxious, even eager, to have us go ahead with the overhead system. In connection with this, it may be proper to state that we are setting up poles on Tremont street, Everyone knows that Tremont street is down in the heart of the city, and that it is crowded all day and late in the evening with foot passengers and teams, and that there are a large number of shops on the street. We are now engaged in putting up our poles in that locality. We use an iron pole in three sections. I confess that when the poles were about to be placed there we had some misgivings concerning the possibility of putting the poles there, and one of our officers went and called in person upon the owners of property on the street. He was received everywhere with great courtesy and kindness and it gives me great pleasure to say that not one man owning property on the street made any objection to having a pole placed in front of his store.

Mr. Lang : I would ask whether this line you speak of was laid with special reference to the use of electricity or whether it was an old line.

Mr. Monks : In that connection let me say

that our box cars weigh about fifty-five hundred pounds and our motor cars about twelve thousand. We have been running with box cars on that line for a number of years; we have a very large amount of stringer flat rail construction which is amply good for the operation of horse cars for a number of years to come; but for the operation of electric cars it is clearly not sufficient and we are now engaged in laying the very best possible construction we can find for the purpose of the proper operation of electric cars.

Mr. Richardson: What construction is it?

Mr. Monks: I would prefer not to advertise any private concern.

Mr. Richardson: I referred rather to the weight of the rail and how it was laid—whether with yellow pine stringers. It is with a view to finding out whether it is necessary for a road now in existence and well constructed to be reconstructed for the use of electricity.

Mr. Monks: I think it is necessary to reconstruct.

Mr. Richardson: Do you design the rail with the joints irregular or regular?

Mr. Monks: We propose to make it with joints meeting. We determined that to be the better way of the two.

Mr. Richardson: What is the weight of the rail?

Mr. Monks: We use a seventy-eight pound Johnson rail on chairs; and we use a sixty-six pound Johnson rail on chairs; we also use some Providence girder rail.

Mr. C. Cleminshaw, of Troy: Can you tell us why you make the joints meet?

Mr. Monks: We think it avoids the possibility of a rolling motion, which I understand from steam railroad engineers has been the effect. If the joints are laid, I will say not opposite, there comes after awhile a sort of rolling, sideways motion, when the car drops on every joint; but when we keep the joints directly opposite the two will fall together, and there will be only a motion up and down in the cars. I looked the thing over very carefully, and that is what we determined.

Mr. Richardson: Is there any reason to suppose that what are called "live" wires will be attended with fatal results when persons come in contact with them?

Mr. Monks: No, sir.

Mr. Richardson: Our difficulty in Brooklyn, in getting the right to put up overhead wires, is the intense fear of their being dangerous to life and limb.

Mr. Monks: I think it is pretty generally understood in Boston that the pressure of current in our wire is not dangerous to life. As you know, in all electric roads we use a five hundred volt current, and in many of the arc lighting systems a three thousand volt current is used. I believe Mr. Edison says that between eight hundred and one thousand volts, a current is dangerous. I have never heard of any serious injury resulting from contact with a wire carrying five hundred volts.

Mr. Lang: Do you protect this wire by other wires strung overhead?

Mr. Monks: You mean guard wires?

Mr. Lang: Yes, sir.

Mr. Monks: That is our intention down town in the central part of the city.

Mr. Petit, of Augusta, Ga.: I would like to ask the gentleman what rate of speed is obtained in the business portion of the city.

Mr. Monks: I can not tell you that, by reason of the fact that our line is not projected in the business portion of the city: but I think we shall not be able to run faster than six miles an hour, on account of the fact that for some time to come we shall be obliged, in the business portion of the city, to run partly by horse power, the horse line occupying the same track.

Mr. Petit: What would be your opinion of using a thirty pound steel T rail?

Mr. Monks: I think it would be unadvisable; I should rather use a fifty-four pound rail.

Mr. Eppley, of Orange, N. J.: I was informed, on very good authority, that an accident occurred within six weeks, in Scranton, Pa., something like this. There was a motor crossing a steam railroad track. It seems the motor got off the track, and the engineer put on the full electrical power; and by some means or other the electrical fluid connected with the steam railway rail. At that moment there was a horse and buggy crossing the track, and the horse stepped on the track and it was thrown head over heels.

Dr. W. L. Allen, of Davenport, Iowa: My experience has only been with a small road, operating five cars. We have run four cars steadily since August 14th a year ago. At that time we were laid up five days on account of the lightning burning out one of the armatures in the station. We have kept an account of all the repairs of all the commutators, gears and all electrical apparatus. Our repairs have been on the five cars for renewals (the ordinary repairs have been included with operating expenses) such as commutators and gears for these five cars, $1,686 in twelve months up to September 1st. Our operating expenses have increased somewhat; that is they were about $10,800 with horse cars, and have been $11,200 with these five electric cars. On that road we have a grade of seven and one-half per cent. Our running time has been increased in this way; we ran fifteen minute cars before, we run twelve minute now, and on busy days run on ten minutes headway. We can make the trip on the road ten minutes out and ten minutes back, being two miles and a quarter. The earnings have increased very largely. It would not make much of a figure compared with these other roads, but the percentage has been nearly fifty per cent. The increase in gross earnings has been $23,000, against $15,000. The operating expenses have somewhat increased; taxes increased, and insurance increased. Our repairs were all included in the operating expenses, but the renewals were $1,680. We have had nothing to pay for armatures. We bought four field magnets, costing about twenty dollars apiece. Most of the wear in our experience has been with the commutators. The brushes rub on this part, and they wear out rapidly. In June last we put on carbon brushes, and they proved very satisfactory, and the wear and loss has almost been done away with. One man attends to the motors, and he works on the commutators, and if some of the wires get loose on the armatures, he has been able to fix them up. The cars make considerable noise as a result, but the people do not seem to mind it. We use the Sprague system.

Mr. Cleminshaw: Could you run ten cars without increasing the expense in proportion.

Dr. Allen: We could run ten cars without increasing much the cost of moving the cars. We would have to put in another dynamo. It depends somewhat on the price of coal. Our coal bill has been four dollars and a half a day. Of course, in these places we get fuel very cheap; we burn sawdust in the summer to a great extent, and that costs very little.

Mr. Flagler: Was the rail changed on the track at Davenport, or do you use the old rail.

Dr. Allen: We use the old rail; it has been down fourteen years.

Mr. T. J. Evans, of Council Bluffs: I have been operating a road between Omaha and Council Bluffs for about a year. We ran during the first four or five months in the winter six motor and six trail cars. When the spring opened we started in with ten motor and ten trail cars. We average one hundred and twenty miles a day to each train, running about fifteen to eighteen hours. We have operated that road at an expense of about four cents per mile, including everything, except the interest and the wear and tear of the machinery. It includes the labor, materials, fuel and renewals. We manufacture most of our renewals in our own shop. The lengrh of the road was about ten miles. During the summer we increased it to about twenty, and put on twenty to twenty-two motor cars. Our expenses will be much less per mile now than before. The greater the number of cars, of course, the proportionate expense is less. We use the Thomson-Houston system. I do not think there is much difference in the cost of operating either system. We have never had an accident. We have had our men take the current, in its full force, time and again. I have taken it without harm. We pay our motor men and conductors two dollars and a half a day. Last winter we did not have much snow, but in place of it something that is worse for electrical railways, and that is sleet. We had a great deal of foggy weather, and the moisture freezes on the rail. It is far more difficult to operate the overhead wire with sleet on the wire than it is with snow on the surface. We never lost a train, however, but kept our schedule time. We apply scrapers in front of the trolley to scrape the sleet off, and sometimes a man would ride on the top of the car and strike the wire and break the sleet. We run about eighteen hours, and the motor car makes about one hundred and twenty miles a day. We have never burned out a motor on the line; we have short circuits, defective wires, and other minor difficulties; but we never had to send a machine away to be repaired. I recently completed a road in Ottawa, Ill. It has been in operation about six weeks. We run single motor cars with one man. That line costs a cent and a quarter per mile per car for fuel. I have only eight motor cars; when they are increased to twelve or fifteen, it can be done for less than a cent a mile. About a week ago, I took the eight motor cars, connected them together, and also four trail cars, making twelve in almost one line, and moved them four and a half miles from a eighty horse power generator, loaded with eight hundred and thirty people, mostly adults, and the train attained a speed of not less than seven and a half to eight miles an hour at any time, and at one time a speed of about fifteen miles.

Mr. Monks: You speak of running these cars in a train, and that you use only one motor man. Did he control the brakes of all the cars, or how did you handle the rear car?

Mr. Evans: We have a conductor, and his place is on the rear car. We have never had any trouble in stopping. We stop with an electrical car, as you are aware, rather easy. Our brakes work well. We use a Pullman car, brakes perfect, with the Bemis truck. We have no difficulty in stopping two cars with one brake. Of course, not so readily as if the conductor was on the rear car applying the brake at the same time.

Mr. Monks: You depend on the brake on the forward car for stopping the train?

Mr. Evans: Yes, sir; but not altogether. When the signal is given to stop, it is given by the conductor.

Mr. Monks: And he winds the brake on the rear platform?

Mr. Evans: Yes, sir. It is frequent that the motor man stops without the conductor's knowledge. He does it with one brake, both cars, without any difficulty. When the motor man takes up a passenger, without the conductor's knowledge, he does it alone.

Mr. A. F. Breed, President Lynn & Boston Railroad Co.: I do not think I say much that will add to the information you have already got from the previous speakers. I think we were one of the first in our vicinity to adopt an electric road, which we commenced about a year ago last July, running about one mile. We operated that road during the summer, and it proved very successful. In the fall we commenced to build a road, just two miles long in a circle, going around, so to speak, the outside of a shell, and encircling a large population through the centrai part of the city. We go up a nine per cent. grade, and go down a thirteen per cent. grade. We go over eleven sharp curves and switches in traveling over the circuit of just two miles; so that I think we get as good a test as is possible. We commeneed operating that road about one year ago, and it has proven very satisfactory in all respects. We run by the overhead system. I think we give electric railways as severe a test on our roads as is possible anywhere.

Mr. Eppley: How long is the thirteen per cent. grade?

Mr. Breed: I should think about 1,500 ft.

Mr. Eppley: Whose system do you use?

Mr. Breed: The Thomson-Houston.

Mr. Eppley: Do you go down on the brakes, or do you use the electricity?

Mr. Breed: We go down on the brakes.

Mr. Eppley: Do you ever ascend the entire thirteen per cent. grade?

Mr. Breed: The other day, when there must have been thirty-five passengers on the car, as a little experiment, I told the driver to stop the car on the steepest part of the grade and reverse his current and go back, which he did. He stopped

(Continued on page 175.)

The Street Railway Gazette.

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Convention Folder.

In order to keep up with the demand for the Gazette's pocket folder, we have had a number of extra copies printed, containing a picture of Col. Thomas Lowry on the front page, and a list of all the officers of the A. S. R. A. since its inception; a partial list of those attending the convention; a copy of the banquet menu, a complete list of the ladies who attended the banquet, etc., on the inside; we will take pleasure in forwarding a copy of the same upon application at this office.

We regret that the first issue, with Col. Geo. B. Kerper's portrait gracing its title page, has been exhausted, the demand for the same having exceeded the supply.

O. S. T. A. Notice of Meeting.

THE OHIO STATE TRAMWAY ASSOCIATION.

Cleveland, O., Oct. 21, 1889.

The Street Railway Gazette, Chicago, Ill.

Dear Sir: The Ninth Annual Meeting of the Ohio State Tramway Association will be held at The Hollenden House, Cleveland, on Wednesday, November 20th, 1889. Meeting called to order at 10 a. m.

The pleasure of your presence is respectfully requested. Yours truly,

H. A. Everett, *Secretary.*

"Watching" Mr. O. T. Crosby.

On Saturday, September 28th, at the office of the Sprague Company in New York City, Mr. O. T. Crosby, late superintendent of the company, who recently resigned that position to look after the interests of the Weems rapid transit, was presented with a magnificent watch and chain, with a diamond-set locket attachment. The presentation was a very informal one, and it was made on behalf of Mr. Crosby's late associates in the office, among whom he was immensely popular.

Needless to say that Mr. Crosby was taken wholly by surprise, but managed to express his appreciation of the kind and generous remembrance.

Farewell Banquet to Mr. H. McL. Harding.

In order to properly "speed the departing guest," a farewell banquet was tendered to Mr. H. McL. Harding, late general agent of the Sprague company, on the first of this month, the occasion being the eve of his departure for Chicago, whither he went to take charge of the Sprague Mining and Motor Department. Mr. Harding has been with the Sprague company since its inception, and to his indomitable pluck, persistance and perseverance is largely due the immense success of the Sprague Electric Railway Department.

The following tempting menu was arranged for at 8 p. m., in the Moorish dining-room of the Hoffman House, the Persian parlor being used as a reception room:

MENU.

HUITRES

Variés Hors d' Œuvres Haut Sauterne Variés

POTAGE
Tortue Verte

POISSON
Sheepshead bouilli, sauce Portugaise
Pommes salsés
Amoutillado

ENTRÉE
Filet de bœuf, piqué sauce poirradé
Tomates farcies, Haricots verts
Pontet Canet
Sorbet au Kirsch
Cigarettes

GIBIER
Pluviers rôtis sur canape Salade Chicoreé avec chapon
Perrier Jouet

GLACE
Bombe aux peches

DESSERT
Gateaux assortis Petit fours Fromage Fruits

CAFÉ
Liqueurs

The banquet was given by the following named gentlemen, a majority of whom were present: E. H. Johnson, A. S. Beves, F. J. Sprague, J. H. Vail, C. A. Benton, G. W. LaRue, E. E. Higgins, H. F. Parshall, E. V. Cavell, A. H. Chadbourne, W. H. Temple, J. S. Wise, A. T. Starkey, E. Whitestone, Theo. Beran, S. Z. Mitchell, O. T. Crosby, T. C. Martin, C. W. Dever, C. W. Price, S. D. Greene, C. W. Jenks, S. S. Wheeler, W. W. Monroe and H. W. Blake.

After the *sorbet* Mr. Frank G. Sprague who occupied the head of the table, rose and set the "toast ball" rolling; the first toast of the evening was naturally "Our Guest," which was most ably responded to by Mr. E. H. Johnson, President of the Sprague company, who testified in glowing terms as to the esteem in which Mr. Harding was held by his company, and the splendid record he had made for the Railway Department of the company, stamping him as the best man he ever knew to secure a contract. "The Electric Motor" was responded to by the chairman, Mr. J. F. Sprague, who spoke of the motor as it was in its infancy, but now indued with the strength of manhood, and with the most flattering prospects ahead of it.

Mr. H. McL. Harding then responded to "The Great West, and Reminiscences," and described in his response his former connection with another electrical company, how he came to connect himself with the Sprague company, the difficulties that he had met with, and how they had been overcome, crediting his associates with having extended to him the most valuable co-operation in his field of labor. He eulogized the Street Railway and Electrical Press, and showed where it had been of marvelous assistance to him in his work.

"Our Absent Wives" were spoken of by Mr. E. V. Cavell, in the language of Eugene Field, "Let's Talk About the Wimmin," introducing therein some original verses appropriate to the occasion. Mr. T. C. Martin made the response to the toast of "Ourselves," while Mr. W. H. Temple replied for "The Press." The formal toasts being exhausted, Mr. O. T. Crosby, who recently resigned his position with the Sprague company to accept another with the Weems company, spoke for "Rapid Transit," while Mr. S. Z. Mitchell had nothing but good words to say for the "Great Northwest." Some very interesting reminiscences were then given by Pres. E. H. Johnson, who cited some striking figures showing how capital had at last reposed confidence in electrical enterprise. "Central Station Engineering" was happily described by Mr. J. H. Vail, who for many years has been the chief engineer of the Edison company, but resigned that position to accept that of assistant to the president of the Sprague company. Dr. Schuyler Wheeler spoke to the toast of "New York City." Mr. Wheeler took the ground that no work in the electrical field should be done unless it was of the best possible quality.

The health of Mr. Frank J. Sprague was then proposed by Mr. Johnson. Mr. Sprague was in a particularly happy humor, and responded admirably to the toast proposed in his honor. Mr. A. H. Chadbourne, one of the Sprague agents in Philadelphia, gave some interesting details as to the work of the company in Pennsylvania.

The company dispersed about 1 a. m. Mr. Harding, who left for Chicago the following morning, taking with him the very best wishes of his friends and associates.

Great credit is due to Mr. H. W. Blake of the Sprague company, who engineered the banquet and brought it to such a successful issue.

Notes.

Buffalo next. Then where? Pittsburg, Cleveland or Louisville?

"The mantle of Elijah has descended."

"Minnehaha's laughing waters laugh the merrier."

"* * * The mighty cataract of Niagara will roar the louder"—next year.

The "dwellers in the caves of Adullum" were conspicuous by their absence.

One of the best known of the supply men, whose place of business is located within a thousand miles of the Quaker city, was accompanied by his "purp," a sharp little English fox-terrier. We understand that when the convention next meets that the said quadruped will be thoroughly trained in the car building business and that the name of the — — — Co. will be painted in conspicuous letters on his back. The manner in which doggy barked his "adieu," as he accompanied his master to the train, was too comical to portray.

The daily press of Minneapolis recognized the difference between capital and labor — the "knights of the punch" element, which was so apparent at the St. Louis convention, having passed in "innocuous desuetude." (See report St. Louis convention.)

"Honor to whom honor is due" is an old maxim, and we know of no better way of applying it than to the West Hotel. The Gazette is under many obligations to the most accommodating and courtly manager, Mr. O'Brien; to his able assistant, Mr. George Heyser, and to all those behind the desk, for many courtesies rendered to its representatives during the convention. It is only fair to state that the management of the hotel left no stone unturned to make every one comfortable, and in one instance, to our certain knowledge, broke over one of its well-established rules in order to accommodate some of those attending the meeting. The hotel was crowded to its fullest capacity, but we have yet yet to hear the first complaint regarding its accommodations. The Gazette truly hopes that Messrs. O'Brien, Heyser & Co. will one day accord it an opportunity to reciprocate the many kindly favors and graceful courtesies received at their hands.

Visitors from Berlin.

Herr Th. Schmidt, Ingenieur der Grossen Berliner Pferde Eisenbahn Act, Gesellschaft of Berlin, and Herr S. Peiser, who holds a similar office in the same company, have been making a tour of some of the principal cities in the U. S., investigating the various street railway systems of this country. They have visited Boston, Philadelphia, Washington, Baltimore, Pittsburgh, St. Louis, Denver, Omaha, Kansas City, Minneapolis, Chicago, etc.

Mr. and Mrs. H. McL. Harding arrived in Chicago on the 3d inst., and took up their abode at the Richelieu, temporarily. They have now taken the house on Elm street formerly occupied by J. Ward Leonard, and Mr. Harding's proverbial hospitality will undoubtedly manifest itself in the near future.

(*Continued from page 173.*)

the car on the steepest part of the grade and moved the car back perhaps a hundred feet.

Mr. Eppley: What speed do you think you could make going up hill?

Mr. Breed: I could not say positively; I think on the nine per cent. grade we could make perhaps six or seven miles an hour.

Mr. Petit: What does it cost per car per mile?

Mr. Breed: I think that is a question no one can answer at present. I do not believe you can tell exactly what it costs. I know we get more riding, and I think we can run the cars cheaper than by horses.

Mr. Eppley: Can you tell what is the percentage of permanent increase in your business?

Mr. Breed: In the case of that particular line the people did not like to run by horses, on account of the steep grades, and the business was very light. I think the increase is large on that part of our system; I should say it was fifteen to twenty-five per cent.

Mr. S. K. Short, of the Short Electric Railway: I want to call attention of the delegates to one or two points in connection with our system of electric railways. We have devised a motor, after a long experience and after very conservative business policy, in which we think we have eliminated most of the difficulties which have been experienced by electrical engineers in electrical street car propulsion. We do not claim to have made a perfect system; we will not have that for some years to come; but we have met and overcome most of the difficulties that have been experienced. We use an armature which is large in diameter, and that gives us, with the rotary feeder, a high speed of the bobbin of the armature. This enables us to run our gears at a very low speed. The pinions on the shaft are large, and we have cars that have been in regular service a year without these gears showing much wear; and we believe it is the slowness of speed which saves them. That has been a very serious difficulty, connecting the motor with the axle of the car wheel. We find that by the slow movement we can gain an advantage in wear. The bobbins on the armature are all separated, so that no excessive heat can be developed in it. We will guarantee that our armatures will not burn out. With these objections removed, these excessive repairs done away with, and these electrical difficulties overcome, it makes the motor a very economical means of moving street cars. Our expenses for operating in Huntington, West Virginia, are about two and a half cents per car mile, including everything but wages. In that city the cost of drivers and conductors is low, about one dollar and a half a day. We make an average of about one hundred and thirty miles a day. We run our cars at a very high rate of speed in the suburbs. We use two systems of overhead construction. We have one system with two wires overhead. This we consider the most reliable and safest system when the constant current is used. We also use the single overhead wire construction, with the rail return. We use carbon brushes on the motors, and also removable segments on the commutators, so that they are not destroyed when they wear down. We simply take off the removable segments and replace them with new ones. These are only some of the main features of our system.

Mr. Richardson: Did your company put a road in operation in St Louis?

Mr. Short: Yes, sir; we put up a construction and equipment of a mile and a half for the St. Louis Railroad company. We are now extending the system three miles, and adding eighteen more cars. It is the intention to run inside of ten days.

Mr. Richardson: Did you take out the first equipment?

Mr. Short: We removed the poles and put up heavier steel poles.

Mr. Richardson: The first equipment was not successful?

Mr. Short: The system was successful, and was operated successfully; but the construction was insufficient for the road. It was on the main portion of the Broadway line, which has a very heavy traffic.

Mr. Richardson: How many volts do you use?

Mr. Short: We use five hundred volts on the potential system.

Mr. Richardson: How much on the double wire

Mr. Short: One hundred and fifty to three hundred.

Mr. Littell, of Louisville, Ky., said he had heard a rumor that the Sprague company had transferred its business to the Thomson-Houston company, and he would like to have a representative of the former company either confirm or deny the report, for the benefit of the Association.

Mr. Johnson, of the Sprague company, replied that he wished to say, in reply to that particular rumor that, while his company could not undertake to reply to all the rumors made concerning the company, and the operation of its system, it was absurd; and he did not think anything more need be said. However, in justice to the Sprague system, and in justice to what had been said about it, he wished to call attention to the fact that when Mr. Sprague designed the apparatus for the Richmond road, he had no predecessors to tell him how to do it. He did it, the road worked, and as a result there are some three hundred electrical roads in operation in the country to-day. This, he considered, was the best evidence that what Mr. Sprague did at Richmond had merit. The fact was that electrical propulsion had become an established industry; and he thought there was enough of business for all; and he deprecated most sincerely that attempt and all attempts of any company to advance their own interests at the expense of other companies. His agents were instructed not to follow that course, and he did not care to address himself further to that branch of the subject.

THURSDAY'S SESSION.

On motion of Mr. Cleminshaw, the following gentlemen were appointed a nominating committee, to nominate officers for the ensuing year and to select a place for the next annual meeting: Messrs. Cleminshaw, of Troy; Hurt, of Washington; Littell, of Louisville; Clegg, of Dayton; and Stevens, of New York.

Mr. H. H. Windsor, secretary of the Chicago City Railway company, the Committee on Motors Other than Electric, Animal or Cable, then read his report, as follows:

STREET RAILWAY MOTORS OTHER THAN ANIMAL, CABLE AND ELECTRIC.

The subject of this report, which at first thought suggests a broad and inviting range, on examination is found to be closely defined. Instead of a fertile field, the past years stretch out more like a vast desert; the wayside thickly strewn with bleaching, or rather rusting, skeletons of frames, cross bars, gears, pipes, levers, springs and empty pocket-books; while beneath the *debris* lie buried fond hopes and rosy expectations of some contrivance which at its birth was to wax great, and, going forth, subdue the land, and, as a lasting monument to its inventor, go thundering down the ages, around curves of small degree, up steep grades on the other side, and never slip a cog or miss a fare.

Motors.

Of these there are two kinds: motors and pro motors; and of the two it is no small question in most cases to determine which is the most impracticable.

Whenever a person invents—or thinks he does—a new motor, the very first place he heads for is a street railway office, where he proceeds to assure the manager that he has now "got it"—of which fact, judging from his wild talk and excited action, the manager has not the slightest doubt. But what has impressed the writer as curious in this connection is that in nearly every instance the originators of these motors, which are at one fell swoop to revolutionize the world, are in nine cases out of ten, men whose only connection with a street railway has been in the capacity of a passenger, while some of them would be more at home on an ox cart than a bob-tail even. Of the nine, possibly one can lay claim to anything like a practical knowledge of mechanics, and the rest will be found among the ranks of store clerks, country tinkers and that class of impecunious gentlemen of leisure who would rather scheme and dream than work. With these people of one idea your objection, though mildly expressed, to glaring defects in their "invention," simply stamps you as narrow minded and your refusal to be made suddenly rich through their efforts causes anguish of heart that is simply intense.

Even after these people have succeeded in building and testing their motor, one must take their statements with a great deal of allowance, for it is the universal custom to figure out theoretical results and greatly in their favor as against operation by animal power. A trial is made under the most favorable circumstances possible, and the sanguine inventor sets out carefully selected results as the average or even minimum effort of what was actually the maximum. He too often overlooks all defects because to him they can all be overcome, and so, perhaps on a trial trip of less than hour, under every advantage of atmosphere, track and skilled assistants, the inventor announces another startling success. If it goes on a bit of track a block long, why not a mile or forty? If for one hour, why not a week or a year? What the skilled engineer so perfectly controls, why cannot the necessarily unskilled labor that must be utilized in our every day work accomplish. In short, a sort of everlasting youth, an almost perpetual motion in its simplicity and economy.

The pro-motor invents unintelligently. He looks only at what actual horse-power can be developed and loses sight entirely of the thousand restrictions and conditions, such as extravagant wear of track, expensive remodeling of rolling stock, unsightliness, danger in operation, inability to control, and, more than all else, absolute certainty of operation. All he looks for is something that will go, forgetting that a bank cashier will do as much under proper conditions. Past failures have also been largely due to the necessarily futile attempt to get something for nothing. It is not in the books and the Lord does not seem to be on the side even of the street railway man who attempts to get something for nothing. The precedent was early set when Adam gave up one good rib for his Eve, and the principle endures. Ten cents' worth of naphtha will not make a dollar's worth of hard coal steam; nor will a dollar's worth of soft coal compress air that shall at will rush out in ten dollars' worth of energy.

So much for pro-motors.

In this report technical terms have been avoided and the following descriptions make no pretense to scientific explanation and are treated in a very matter of fact manner, the aim being to get at the real, intrinsic value of the various methods as they stand related to our wants in the street railway service.

The forms of street car motors under this subject may properly be divided into four classes, and as to practicability in the following order, viz:

1. Steam.
2. Gas.
3. Compressed Air.
4. Chemical.

Steam Motors.

With these you are all perfectly familiar. Letters of inquiry sent to two hundred of the principal companies throughout the country elicited reports from seventy-three companies, fifteen of which are using steam dummies. Of these fifteen, four only operate in cities, located, two in Alabama, one in Washington Ter., one in Montana Ter. and both the latter are now changing to cable. Of the eleven using motors on outside, or semi-suburban business, only two recommend its use in cities; the other nine are most emphatic in their assertion that it is not a practical motive power in the business streets of towns and cities. All agree in the statement that costs for repairs are great. The operating expense, as compared with horses, varies widely, ranging from 40 per cent. less to 300 per cent. more.

Many of the dummies built by the Porters and Baldwins are practical, serviceable machines; for years are still doing good work. But they require a separate motor car, a skilled engineer, a self-cleaning rail, and their repair account, in common with other makes, increases and their general usefulness decreases in proportion as the line grades from a suburban one to the business of a city street. The dust and grit seems to take the life out of any motor with exposed machinery. In one city from which reports were received several new standard steam motors had been entirely used up and one thrown in the scrap heap, all within the past fourteen months. Simply ground to pieces by the peculiar dust and mud incident to that city. On a country line they would have run for years.

Ransom, builder of the Ransom steamer, makes this one of his great claims, viz: that his working parts are all dust and mud protected, the cylinder driving directly on the car axle, and engine and boiler all carried on the passenger car.

But the use of the dummy is every year becoming more and more restricted. For extensions they may answer for a time and for strictly suburban business are sometimes quite popular, but as the territory begins to fill and the roadway becomes a traveled thoroughfare the objections rapidly increase. They scatter ashes, belching smoke if soft coal is used, and gas and fumes if steamed from hard coal, which also is expensive. Petroleum emits more or less odor. The unpopularity of the dummy cannot be better illustrated than by a line three miles long in Chicago, which had been in operation sixteen years, paying expenses only during the last three. This was replaced by a cable line, running at the same speed at which the motor had for years, and the first summer of it operation repeatedly carried as high as 50,000 passengers of a single Sunday afternoon; this, too, with absolutely no more attractions than had existed for years. People would not ride for pleasure behind the "dingle-dongle," as they termed it.

From companies successfully operating steam dummies, the following are selected:

The Metropolitan Street Railway, of Atlanta, Georgia, are using several Porter dummies with satisfactory results, drawing as high as three hundred passengers at 10 miles per hour. The motors weigh 18 tons. Operating expense is 100 per cent. greater than by horses, but the increasing business has overbalanced the extra expense. The exhaust is visible, but not noisy.

W. H. Patterson, secretary of this company, writes: "The lines of this company run into the heart of the city, and we have so far had no great difficulty or serious accident resulting from the use of steam motors. The lines were formerly operated with horses. Since changing to steam, the company has been profitable to its owners; it never was as a horse car line. My

experience is that steam motors are practicable to cities with from 100,000 to 200,000 inhabitants; but where population is greater, the danger would be too great for surface roads."

Another company in the same city, using a lighter steam motor on its suburban lines, estimates their operating expense 20 per cent. greater than horses. Their repairs are heavy, and this company would not consider it desirable for other than suburban lines.

The Highland Avenue and Belt Railway, of Birmingham, Alabama, have used a Baldwin dummy on the business streets for three years. Weight eleven to seventeen tons. Speed fifteen miles per hour. Work well on grades and curves, and draw three 35-foot cars. Repair expenses great; skilled operator required; steam vacuum brake is used, with good results.

The Prosser Motor—you have heard more or less of this motor—of which Malcolm McDowell, in an expert report says: The Prosser Motor consists on one high and one low pressure boiler, three steam cylinders, four for driving the driving wheels of two separate trucks, and two for working the pumps and air blast. The driving cylinders are coupled direct to the driving wheel. The steam pressure on the piston head is the difference between the pressure in the high and low pressure boiler, and this difference is maintained by a surface air condenser, which takes the heat out of the exhaust steam as it leaves the cylinders, and the heat thus taken up in the air is returned to the fire box to maintain combustion, and is so much of the heat originally engendered then returned. The circulation of water between the high and low pressure boiler is maintained by a force pump working under the steam pressure from the high pressure boiler.

The one inspected by your committee was a car about 35 feet long, with a large upright boiler in the centre of the car, which was carried on two swivel trucks. Hard coal fuel was used, being fed to the fire automatically through a central chamber in the centre of the boiler, like a hard coal stove, and which carried several hours' supply. The low pressure boiler was to absorb the exhaust,—steam and noise. The car when fitted was extremely heavy; the mechanism was complicated; some of the rods and pipes cleared the street by only two or three inches. The driver must stand in the centre of his car, where it is almost impossible to watch his track. It is impossible to see wherein this motor affords any relief, and I am informed upon good authority that those who were backing the project financially, have become discouraged and given it up.

A curious freak of mechanics has been testing on one of the Chicago City Railway Co's lines during the past two weeks. The motor consists of an eight foot flat car, a vertical boiler on one end, an engine that looks like a churn laid on its side, and about the size of a churn with the handle sticking out and turning a gear wheel which meshes with a cog on the car wheel axle. There is no noise, the engine reverses in a fraction of a second, and quickly attained a speed of 12 miles per hour on level track. It made a half mile run up a heavy grade in three minutes. This engine is some thing entirely new in mechanics, the patent office recording that nothing like it is of record. It is an economical user of steam, is noiseless, takes no room, has no parts visible, and but few inside, is very cheap, and very powerful. One the size of an ordinary butter churn would develop 15 or 26 h. p. with 60 pounds steam. We have great hopes of it, and it can be steamed from oil fuel, will be less difficult to operate than a team of horses, and can be carried on a passenger car, or in a motor car.

Steam Storage.

The question of steam storage is again being agitated, and a motor of this pattern is about coming out of the Pullman shops, at Chicago. The City Railway Co., of that city, experimented carefully for one whole summer with a steam storage motor, and with results entirely bad. Superheated steam was let into a boiler underneath the car, and a small dead fire placed beneath this tank, to keep up its courage. The fire was allowed to burn until start was made, when it was shut up like a tailor's goose. This fire was, of course, unnecessary; but made assurance doubly sure. The writer has vivid recollections of alighting from this balky horse and plucking pickets from neighboring fences to get up life enough to make for a side track, where the machine expired and had to be towed home with horses. This occurred repeatedly. The car would die on the track at almost every trial. Steam storage can hardly come to our aid, for as long as surface roads are operated they will be always liable to detentions from breakdowns of wagons, fire hose across track, and a thousand and one delays, which would tend to keep the motor out past the bed-time, and it would surely slumber on the street. A motor capable of carrying sufficient steam to make an eight mile circuit would have to be built extremely heavy, the packing would have to be thick—expensive in its first cost, and expensive on the roadway. It would be complicated in construction, and subject to delay at end of line while being charged; which during the rush, morning and night, would work fatal delays. We can hardly pin our hopes to the steam storage.

There is much reason to hope that in the coming gas engine, several of which are now being developed, we may find that which we long have sought, and mourned because we found it not. The Connelly Gas Motor has been tried with success, so the inventor says, at Elizabeth, N. J., and we had hoped to have had one in Chicago in time to make careful experiments and report thereon, but the owners have failed to bring one west, though repeatedly promising to do so

The Patton motor uses a gas engine, and the new one which is being built at Pullman is intended to operate continuously, running a dynamo on the car, which is to charge a storage battery, which is to supply another dynamo underneath the car, which shall gear to the axles and everlastingly make things hum. That is the intention. It does not require very much study on the part of the ordinary railway manager to convince himself that a very few of such motors will suffice to equip his line. The original Patton motor, built at the Pullman shops, and a very handsome piece of work, with its nickel plated hand-rails and Russia iron smoke stack, when tried in DesMoines this summer, failed to pull its train, and in leed could barely move itself—the motor car.

Compressed Air.

Compressed air is at present used quite extensively in Paris for stationary engines, which are supplied from pipes laid in the streets, and drawing their supply from a large reservoir, which is kept constantly filled by immense compressors at a central power station. But what makes a most excellent power for stationary engines proves wholly inadequate as a means of independent locomotion.

High pressure involves great expense at first for plant, and much loss of power by reason of the friction in the compressing machinery. Leakages also, at all points, are great. Low pressure does not admit of a sufficient quantity to be stored and carried on an ordinary car, to last for a greater distance than 500 or 600 feet.

Compressed air was used for three years during the construction of the St. Gothard tunnel. The engine weighed six tons, and the air reservoir was 45 feet long. It contained sufficient air to draw twelve loaded dump cars a distance of 2,000 feet, and return empty, with one charge. Pressure was 130 lbs. at the start, and was reduced to 25 lbs. at the end of one round trip. It was impossible to use fuel in the tunnel, hence the use of air, which but for the work performed would not be considered economical out of doors.

A recent American inventor aims to carry compressed air through a 4-in. main laid between tracks. This air is to be conducted to a reservoir in a moving car through a flexible hose placed at intervals of say three blocks, and suspended over the car by a heavy wire. One end of the hose connects with the pipe line of compressed air between tracks; the other end has a sliding socket into which the pipe attached to the car fits and connects with an air reservoir placed beneath the car floor. The motor is placed on the front platform. A central power station keeps up the pressure in the main. Just how much pressure a car would receive at the end of a three-mile pipe, when 50 or 100 cars between it and the compressing station were also taking their supply, is not stated, and the general idea of a car lifting up its head to receive its sustenance from a suspeuded rubber tube, is so suggestively infaotile in its operation, that the plan, however pretty on paper, can never receive much attention from a practical manager. Even if the scheme could be made to work at all, it would not be as cheap as horses and nothing like as certain.

A very similar system was that so long advocated by Mr. George Pardy, of San Francisco (who died only a few weeks since). He proposed to use a central compressing station, forcing air through a 4-in. main placed between tracks. Every 500 feet this main was tapped by a plug or valve of 2¼ in. diameter opening at which the car driver could refill his tank. It was expected that the actual passing of the air into the car could be accomplished in less than ten seconds after connection had been made. Low pressure, 50 lbs., was used to prevent condensation and freezing, but this necessitated the refilling of the car at every block of 500 feet. It is obvious the inability of any driver on the ever varying condition of track to quickly stop at exactly the spot where the plug is placed. If he runs past he delays in reversing, and the time spent in making the proper connection must be fatal to the system. Then on dark nights the difficulty would be greatly increased, and during rapid snow-fall almost impossible. Different temperatures and weather would affect the force. Any one who has attached an ordinary garden hose knows how much time that requires, and while the plug connections could be made to attach more quickly, still the unions would very quickly wear, and then would come loss from leakage. Mr. Pardy also contemplated a cable system for his air line, to get his air motors over grades. The system is not claimed for suburban work, and certainly is not adapted to the wants of metropolitan cities.

Still another project was that of the Pneumatic Railway company, which is to lay a conduit of cast iron pipe along the track between the rails. A slot extends along the top of the pipe, through which steel bars connect the car with pistons which fill the pipe. This slot is covered from the inside with a flap of leather Rivets, beeswax and tallow are supposed to hold the leather in place and prevent the escape of air. As the car moves along the leather is displaced by the steel bars. As soon as it passes, the leather resumes its position. Comment is unnecessary, although a patent was taken out and a company formed.

Mr. Louis Ransom, who has experimented for many years with compressed air and other motors, is still hopeful for success from the air motor. Under date of Sept. 30th.

"Trouble in compressing the air appears from two causes. First, the great amount of heat resulting from compression, which burns oil and packing from cylinder and piston. Second when pressure becomes high, unless the space between piston and cylinder head, at the end of the stroke, is made a complete zero, the air will not open the valve and pass out, but will cushion and play in the working space. These two difficulties may be mastered by a properly constructed compressor. The next problem is, to hold this air after you have got it down, for it has a mighty trick of never getting tired. Of course, good workmanship comes in here for all it is worth. We want a pressure of at least 600 lbs. to the inch. That is easily enough obtained — but to hold it. No large reservoir will ever do here. It must be small and yet large. Small tubes have a marvelous power of resisting bursting strain. Two-inch boiler tubes are tested at the works to 1,600 lbs. to the inch. Now at the power station I would build a receiver the size of a fair sized room of 4 in. boiler tubes, connected one with another. Into this reservoir air could be forced to 650 lbs. Under the seats of the cars I would have similar magazines of small tubes which should be charged to 600, lbs from the stationary air receiver, by pipe connections, which should be made and unmake in a moment. This should furnish an engine which should use this air with parsimonious economy. But here another bother confronts us. If air gives out heat in compressing, it is equally willing to absorb it in expanding, and it has a knack of picking up any stray particles of water and freezing them into a solid lump of ice. Pass a pipe through a bath of hot water to correct this. One error which I think every experimentor in compressed air has made has been to "wire draw" their force. In other words, if they have in their receiver a force of 600 lbs. let it pass a contracted throttle and let it touch the piston at 150 lbs. If an archer wanted to fling an arrow 300 yards, and drew back the string until he had a pressure of 50 lbs. on the notch, and then should let it up to 10 lbs. before discharging the arrow, we should be apt to say something not very complimentary. What, then, shall we say of the mechanic who spends fuel to obtain 600 lbs of force, throws away 450 lbs. of it, and uses 150 lbs. only. Then wonder at the big percentage of loss. Air should be inducted into the cylinder at full receiver pressure. Enough air at 600 lbs. can be chambered under the seats of a 16-foot car to propel nine miles, while about 60 per cent. of the compressing engines will be expressed in the cars."

Undoubtedly the above can be accomplished, but thus far all attempts have proved more theoretical than practical.

Chemical Motors.

Of this class of motors there have been a number, but thus far all efforts to harness chemical power to street cars have proved miserable failures. It is the old story again, what will work in a closely guarded laboratory is powerless on so ordinary a commonplace as a street car. Little can ever be hoped from this source, as chemically produced motion has always been too expensive for purposes other than curious experiment. We beg, however, to call attention to one or two motors of this class:

Caustic Soda.—The remarkable ability of caustic soda to absorb and retain heat was accidentally discovered in one of the large soap factories in Germany, where the chemical was extensively used. Great iron tanks in which it was kept were one day being washed with hot water. A considerable quantity of the soda adhered to the sides of the tank, when the workmen were unexpectedly called away, leaving the hot water in the tank. Several days afterward it was discovered to retain a very considerable amount of its original heat. This suggested the idea of using a strong solution of caustic soda as a choloric to generate steam for street motor use. In other words, use hot caustic soda under a steam boiler instead of wood or coal, the result aimed at being the fireless locomotive. One of these soda motors, known as the Honingman, was brought to Chicago in 1886, and placed on trial on a three mile track of the Chicago City Railway Co. Track was a standard gauge T rail, and was then operated on with a steam dummy. Everything was favorable to the trial. The test necessitated the construction of a good sized cistern where the soda was stored, and from which it was pumped into a horizontal boiler, where it was heated over a coal fire. It was then drawn into the boiler of the motor, which was a vertical one, steam being made from water, and passing to the cylinders as in the ordinary steam dummy. Instead of the fire flues being filled with flame and smoke, these were filled with the superheated caustic soda. The cylinders exhausted back into the soda tank, to prevent noise and save heat. As high as 60 or 70 lbs. of steam could be reached, but on starting it quickly fell, and at the end of each trip the motor had to be refilled. This could not be done until the soda had first been all drawn off into the cistern This demonstrated the fact that steam could be generated en route sufficient to run, without a spark of fire, ashes, gases or audible exhaust. But while this was possible, it was far from practicable. Against it was the cost of maintaining the heating station, the extravagant use of fuel as compared with the force actually realized in moving the car, the expense of the soda boiler, which must be of best copper and able to withstand the chemical action of the soda. While the motor was built in Germany, the engineer temporarily in charge was not, and the very first day the escaped soda on the floor of the cab was sufficient to eat his leather boo s, which fell to pieces and burned his feet. While this might answer for a few hours for a man who wished to rid himself of corns, it is not a method which will commend itself to the general public. "Fare 5 cents, and a corn removed with every ride" might do to advertise under certain circumstances, but while undoubtedly a drawing card, could not be expected long to please. Not only did the soda kill every spear of grass along the track for three miles, but the reservoir cistern was eaten through and the caustic percolated up through six feet of ground and sought the light in an adjoining lot, and the cherry trees, currant and raspberry bushes and potato vines looked as if they had had the yellow fever, with unusually fatal results. After a settlement had been made with the irate owner of the deceased shrubbery, and a release in full secured, he felt better, but the proceedings taken all in all did not exactly commend themselves to the company. As a matter of fact, the engineer actually had to wear rubber boots all the time while on duty. The motor car was 12

feet long, and carried no passengers. The motor also was extremely hard on track, being very heavy The trial lasted several weeks, under every possible advantage, the inventor or his representative being present. The machine frequently died on the road and had to be towed in. If the pipes or boiler flues were allowed to cool while containing soda, they became filled with a substance as hard as rock, and had to be replaced with new parts.

A chemical motor known as McLaughlin's Chemical Motor was started with great flourish of trumpets last spring at Omaha, but a diligent search and numerous inquiries failed to establish more than the fact that it is enjoying a beautiful state of innocuous desentude.

P. J. McMahon, in the city of New Orleans, in 1886, ran an experimental fireless locomotive, using ammonia gas as the motive power. This gas was produced at a retort centrally located, which supplied each car with sufficient gas to make a round trip, the gas being stored in an iron tank beneath the car or under the seats. It was utilized through ordinary cylinders, same as steam, and exhausted into a tank of water, which absorbed and retained it for further use. Water having the ability to absorb 700 times its bulk of ammonia gas. But the plan was abandoned as impracticable. It was not as cheap as the mule power and no more certain. The gas leaked; the compressing machinery was complicated and its operation expensive, and too much time was required to charge a car.

Time will not permit to mention more of the many freaks of the would-be motors. There was a New Orleans man who firmly believed that he could get a spring big enough, and wind it with a steam engine tight enough to run a car ten miles.

Another freak in the motor line is what we might term the "Bovine Motor," such as was actually seen by a member of this association when in Texas a few months ago. A twelve foot car drawn by a cow, and driven by a twelve year old darkey who sat on the front dash with his feet over in front. This system has several advantages: Company's tickets could be redeemed either in rides or a quart of milk, and thus make the road a money earner night and day. There would be no shoeing account; no anxiety from split hoofs; the lowered horns by day and the big eyes and bellow by night would effectually scare away the small boy who delights to "hitch on." When old age began to creep on apace, instead of charging to depreciation two-thirds of the original cost of the animal, it could be slaughtered and sold over the company's own market, when again car tickets would buy soup bones; and the hide and hair yield their revenue in due season. While the cow line may never be adopted in the slow going cities, it might be made a great factor with proper management which companies contemplating a change in motive power should not overlook.

Then there's the car starter. Some present may have already heard of them. The only practical car starter is the one which will start a car on a three mile track, and keep it started, until it has made six miles, with the necessary stops for passengers.

In Conclusion.

There is no brighter field to-day to the studious inventor than a reasonably cheap motor, which will operate without smoke or noise, at a less expense and better speed than horses, which we can use on outside lines, of large cities, and on the entire system of smaller towns. For a tremendous volume of business there is nothing like a cable for, and electricity is making strong claims for its place, but there are thousands of miles of car track in this country which are waiting for a practical and economical motor. And the really practical man, who invents a really thoroughly practical machine, will be welcomed in a way that will place him beyond the confines of the poor house. Let us then watch and study, and hope, and live in the expectation that ere another year rolls round, and gathers us once more around these topics, the question may be in at least a fair way to solution, and our bondage to animal power and its bondage to our work, be a thing of the past.

Respectfully submitted,
HENRY H. WINDSOR,
Secretary Chicago City Railway Co.

On motion of Mr. Cleminshaw, a vote of thanks was extended to Mr. Windsor for his able paper.

Mr. J. G. Jenkins, of Brooklyn: The company which I represent, the Broadway Railroad of Brooklyn, several years ago, while the hurrah for rapid transit was upon us, decided that it would have rapid transit. We were at that time operating by horses. For one mile of our roadway in Broadway it was densely populated; the other three miles and three-quarters were sparsely populated. We thought we would put on a dummy. We did so. We ran the dummy the three and three-quarters miles, and operated with horses for the other mile. We took our ordinary rolling stock and ran it out to the dummy station with horses, and when we reached the station we hitched the dummy on to two cars, and ran in that way the rest of the distance to East New York. This method was found to be impracticable; entirely so. The cars were too light and would go wriggling all about the track; so that people who desired exercise had only to take our cars in the morning. Then we spent a lot of money for larger and heavier cars, at thirty five hundred dollars apiece; and ran from this point to the ferry with six horses. Notwithstanding the double expense of operating by horse power as well as steam, the road paid; but we could not pick up a paper in the morning but we would see the fear expressed that we might kill some one; in fact, there was not a block in the fifteen or twenty blocks, but that we killed or cut the legs off somebody the whole distance, so that we abandoned the thing as impracticable; not because it did not pay as a financial venture, but because paying for these lives alone and lost members made it impracticable to use that kind of a thing in the city. That was our experience. It cost us two hundred and twenty-five thousand dollars; and we consider it a death-blow to motors of that kind where the population is dense. We then resumed our horse car system, sold the heavy cars, and sold the dummies. We also, during the use of the dummies, instead of having a repair shop, we had to maintain a machine shop, which we found very expensive. We did not have any regular stations, but stuck up red posts at the distance of every two blocks, and these were called the stations; the cars stopped there down and up. The engineers would drive them up to the posts and stop quickly, and everybody would go backward. They ground the wheels off and shook up things so, that in a couple of years the dummy would have to be renewed, and they are expensive. We sold them all, including the cars, and probably came out one hundred and fifty dollars behind on them. Our company resumed its regular street car business, and found it profitable; but since that time they have started right over our heads an elevated system, and the receipts have fallen off very largely. We are looking around for somebody or something that will help us out of this dilemma; some system that will not cost two hundred and fifty thousand dollars and then prove a failure. We want to be very careful; we haven't any more money to throw away. The travel is there, but we do not carry it fast enough by horses. We want rapid transit, and a more economical system than we have got. I would discourage any gentleman connected with any road where there is dense population from using a steam motor of any kind.

Mr. J. H. Hall, of Peoria: I would like to ask one question; what is the difference, as to danger of injuring persons, between an electric motor running eighteen or twenty miles per hour, and a steam motor making the same speed? I can not see the difference In our city they have just put in the Thomson-Houston plant, and I know the cars run fully twenty miles an hour in places, even in the thickest settled portions of the city. I can not see any real difference between a steam and an electric motor as to danger. I have been standing ready for two years to adopt some system of rapid transit; but from the expense and other things in connection with electricity, I still feel disinclined to take it up. If any one can give me a reason why there is any less liability to accident with the electric motor than with the steam motor, I would like to know.

Mr. Jenkins: It took away all our profits paying for these accidents, and made us feel like a lot of murderers. I saw myself several lying with arms and legs cut off. I as a director was disgusted with the whole thing. I do not know any thing about any other system being tried there.

Mr. H. L. Earle, of the Judson Pneumatic company: I am a representative of the Judson Pneumatic company, which has been referred to in the report. I do not wish to take up the time of the Convention; but desire simply to say that if you wish to ask any questions in regard to the system, I shall be glad to answer them.

The Secretary then read the report on the food and care of horses, by Mr. George G. Mulhern, of Cleveland, O., as follows:

THE FOOD AND CARE OF HORSES.

Mr. President and Gentlemen of the American Street Railway Association:

Though the place of that noble animal, the horse, is now being usurped by his powerful rivals, electricity and the cable, still he is yet and probably will be for some time the motive power of many a street railroad.

Managers differ greatly as to the subject of this paper, and after an experience of twenty-seven years, I find that in this, as in all other business, there is still more to learn.

We have yet to arrive at that state of perfection in the feeding and care of horses when each animal shall receive *just* the right amount of food at exactly the right time, and be cared for and groomed with regard to his own peculiar physical condition. If that state of perfection is ever reached, it will indeed be the horses' millenium.

Buying the Stock.

I have always attended to the choosing and buying of the stock personally; but with all possible care in selection, as to the proper weight, build, etc., for our use, I often find that the animal which seems perfectly fitted for the work "goes all to pieces" in a short time, while the one which I hesitated to purchase as seemingly inferior proves an excellent "railroader."

Places differ so materially, in climate, construction of roads, whether level or hilly, etc., that the kind and size of horse suitable for one part of the country would be entirely unsuitable for another. In this connection I will state that I am inclined to the opinion that horses should be bought near the place where they are to be used. I have found that for our use Ohio stock is best. The experiment of bringing in horses from other states has never been successful with us. Whether the same holds true in other states or is the effect of our peculiar raw climate, I have no knowledge.

We buy horses weighing from ten hundred and fifyt to twelve hundred pounds and prefer "blocky" ones.

A new horse should be trained gradually, by driving him one quarter of his work at first, with an old horse, at a time of day when travel is dull. One can soon tell whether he will stand the test or if it is best to sell him as soon as possible. It is a waste of time trying to doctor up a horse whose feet become sore quickly; he will render good service for years on country roads, while on pavements he is useless.

I agree with an able predecessor of mine writing upon this subject, that if it were possible to learn from the owner "the former habits of the animal purchased," it would simplify matters much as to the method of treating him. But as it is a well known fact that in most horse trades the truth is conspicuous by its absence, I fear that reliable information could not be thus obtained.

The comfortless, rattling "bob-tailed" car, drawn by any decrepit old skeleton of a horse that could be bought for a song, and driven by a rusty looking tramp, is a thing of the past; and the plump, well groomed and carefully tended street car horse of to-day has become as much a matter of course as the luxurious car which he pulls or the neatly uniformed and polite conductor, so far advanced are we in these modern days.

Feeding.

Much of this improvement is doubtless due to the system of feeding now universally conceded to be the best, *i. e.*, mixed ground feed in small quantities and at short intervals. No set rule can be given, as no two horses are alike.

The habits of each horse should be thoroughly learned by the feeder, whose position is a very important one. He should have a certain proportion of horses allotted to his care (not too many), should always feed and tend them himself and become perfectly familiar with the peculiar needs of each.

When a team comes in from their trip a handful of loose hay should be thrown down to them. Then when their regular time for feeding comes (which should never be just after or just before a trip), they are fed from six to eight quarts of ground oats and corn mixed with cut hay and dampened. They are watered every half trip, oftener in summer. The sponging out of the mouth and nostrils at the end of the trip is very refreshing in hot weather. On our short lines each team does half its work in the morning and half in the afternoon. On our long lines one round trip of fifteen (15) miles constitutes a day's work, with a lay-over of ten minutes at the end of the line, when, on hot days, the sponging referred to above is very beneficial.

We groom our stock twice a day, and I think we will all agree that too much grooming is hardly possible, as the more a horse is groomed the better he feels and therefore gives better satisfaction.

After the horses have stopped eating, the feeder should see that each feed-box is thoroughly cleaned out, and he can soon judge of the capacity of the different animals by the amount of food left in the boxes. After he has once learned this there is no necessity for under or over-feeding the stock. This cleansing of the boxes is just as essential as the cleanliness of the stable itself, which should be kept thoroughly neat at all times. That it should be well ventilated and lighted we all know. Disinfectants are necessary, especially where there are a large number of horses, when they should be constantly used.

Driving.

If the feeder should devote his whole time and attention to the care of his proportion of the stock, so also should the driver. I cannot lay too much stress upon this point. It is a proven fact in my experience, that when a team is driven promiscuously, first by one man and then by another, they grow thin and broken down in a comparatively short time; when, if driven constantly by one man, they become accustomed to his voice and touch and keep in good condition.

The man also becomes attached to the team he handles and is much more careful of them, to prevent any unnecessary strain at starting, than if he drives every team in the barn. He is more apt to be watchful and report slight bruises or cuts, that, attended to at once, may prevent permanent injury. I would say, right here, that there should be a positive rule, in every barn, that each driver should have his own stock and should report at the end of each trip the slightest slip or bruise, which, for fear of reproof, they seldom do.

In closing, I feel that I have omitted much that I

might wish to say, but have tried to present a few of the more important points of this much debated subject; and though I cannot hope to bring anything new before you, as it has been ably discussed at former conventions, still there is much yet to learn, and in discussing this paper we may receive from your remarks upon it some profitable ideas. Respectfully submitted,

GEO. G. MULHERN.

On motion of Mr. Jenkins, a vote of thanks was tendered to Mr. Mulhern for his able paper.

Mr. William Richardson, of Brooklyn: Mr. President, I think that this paper is of sufficient importance to demand the attention of every man who has the running of a horse railroad. There is not a word in it, I think, that is superfluous, and every word in it conveys useful information and valuable teaching. I feel very thankful to Mr. Mulhern, whom I do not know, for the valuable paper that he has prepared, and which I think should be carefully pondered over by every one of us. What he says about careless driving, the driving by one man, the cleaning out of the feed boxes, the running of teams working on a long distance of fifteen or sixteen miles, so that they may do all their work in one portion of the twenty-four hours and have their entire rest for the other portion, and the manner in which we all find disappointment in the selection of horses. In New York and its vicinity we can not do as he suggests, get horses raised in the state in sufficient supply and at sufficiently low cost to meet our demands. We have to depend on horses from other states. From his state we get some good horses, but we now get very few, because the home demand takes nearly all of them. We could get a first class horse from Vermont; but it is very much more costly generally than we can afford to pay. We find that horses from Michigan are good, in fact from any rolling country state, while the horses from Illinois and Indiana are generally flat-footed, and therefore not good for our city pavements. The horses from Minnesota, Iowa, and other rolling or mountainous states are very much better for our use, both on account of the shape of the foot, and the greater toughness of the horse. The system in New York is perhaps as nearly perfect for our supply as we can get. We make the best selection of horses that we can, and we get ten days' trial of every horse, to see whether he will answer our purpose, with the perfect right of return to the seller, either with a reason or without one. After ten days we are supposed to have a sufficient trial to enable us to judge whether the horse will suit us; but we find just that same difficulty which Mr. Mulhern alludes to, and that is some of the horses which we think will answer best and have years of service in them, would in three months be used up or fit only to be sent on a farm in the country, and others that we expect but little of when we take them,—perhaps taking them on an agreement for a longer trial than ten days—will prove one of the toughest and best horses. I would like to have heard from him as to what he finds the average life of a horse. We find considerable differences on different portions of our road, where we run several lines. On some it will not be over three and a half to four years. I think the average life in Brooklyn is about a year longer than it is in New York city, judging from my experience in both cities. We will average four or five years, taking one with another. Of course we all know that some will run and keep right along, and with but little rest for periods of eight, ten, and even twelve years. It is astonishing, and I think unaccountable, why this difference exists. I do not feel like discussing this, and yet I certainly felt that it was so important in its character that it ought not to be passed without some comment.

Mr. Harris, of Cincinnati: What is the average price in New York?

Mr. Richardson: From one hundred and fifty to one hundred and sixty dollars. We have been able to supply ourselves at that price, and I think we have as good a lot of horses as most city companies, at an average cost of one hundred and fifty dollars.

Mr. Jenkins: I would like to ask if there is any special color that is most desired. I was out a short time ago with a young man who was brought up about stables, and his special color was an iron gray horse and would not select any other if that color could be got. I learn at all the stables that all foremen have one particular kind of color which they think will do better work and last longer. I would like to hear some information on this point.

Mr. C. D. Wyman, of New York: It may be possible that I can give the experience of the Parisian tramway companies in relation to this matter of color, although I have no doubt that any characteristics of the horse that are revealed by the color would possibly vary as to their utility according to the locality in which they were employed. The Parisian tram car companies are especially particular in all their statistics relating to their horses, keeping very accurate statistics as to the height, color and other particulars, to see if there is established thereby any special difference in that respect. They report that the grays are in their experience the longest lived and give them the greatest amount of service and the blacks the least. In our stable in New York our experience has been somewhat similar. After noticing the French system I made for some years memoranda concerning our own stock and find that it corresponded somewhat. We found that grays and roans, other things being equal, seemed to be the best for us; while creams and blacks were, as a rule, soonest used up. Particularly we found it true in hot weather that black horses did not seem to have the staying powers that the other horses did. The bays were an average. There is one other point that I would like to speak of in this connection, and that is in relation to the water that we give our horses. It has been our experience that a microscopical examination of our Croton water revealed at different times different conditions in it of different grades of purity; and it was thought best by the management some four or five months ago to make some experiments in filtering the water. We devised a sort of home-made filter, by placing over the troughs in our stable, of which we have some ten or twelve, a barrel about the size of an ordinary oil barrel, and placing therein charcoal, coarsely ground, with brush and gravel to keep it in position, and we added to that mixture some sulphur. We were led to add this sulphur by reason of the fact that some time ago at Richfield Springs, the sulphur springs, I found that the farmers whenever they had a horse that seemed in poor condition, rather debilitated, brought their horse to drink of the sulphur water. I found that the horses were fond of it; it was necessary to limit the amount of their drink. They would drink until they would almost drown themselves. They were so fond of it. I concluded, from such advice as I could get, that sulphur would be of benefit. We have now been using that filter, with the addition of the sulphur, for about four months. Our cases of colic have decreased seventy-five per cent. In fact, we have hardly had any. Whether it is due to this sulphur and the filtered water I can not say positively; but that is our opinion. The horses enjoy the water very much. One thing we do know, pretty nearly, as we have examined the water under a microscope, and that is that the horses are getting a pure and good water. I do not know whether the water of other localities might not carry in it as many impurities as ours; nevertheless I give you this suggestion, as it is possible that sometimes the origin of these epidemics that seem to strike a stable and for which we cannot satisfactorily account may lie in the water that we are giving the horses to drink.

Mr. Johnston, of Savannah: I would ask the gentleman if the people filter their water?

Mr. Wyman: In a great many places they do; in a great many of the larger restaurants the water is filtered. I can not say to what general extent it is done; but I have seen it done in a great many places.

Mr. Hall: I would like to corroborate Mr. Wyman's statement in regard to the water. I would like to give the convention the benefit of my experience, as a great many will have to continue the use of animal power. I have been managing a road for about sixteen years. For nine years of that time we used the water supply of our city in the barn. My animals got disgusted with it apparently. I went to an expense of a thousand dollars to dig a spring a little distance from the barn to supply them with the water. Before introducing the spring, our medicine bills would run from six to twenty dollars a month for medicine for colic and kindred complaints. Since we have introduced the spring water, I do not remember the passage of a bill by our auditing committee for medicine, except for liniments. Our mules have improved at least fifty per cent. I have not had a case of colic in the barn for two years, and I am there every day when at home. In this connection I would like to speak in regard to feed troughs. I used primarily the wooden trough, when I used to feed oats and corn whole, and uncut hay. I found that my wooden troughs being square, the corners would get foul and sour. I looked about for a metallic trough, and in investigating the matter wherever I found in use the cast iron trough, I found that it would get rusty and objectionable. The result was I procured some twenty gallon enamel kettles, and have used them for several years, and never have a sour or foul trough. The stablemen can take a sponge and in ten minutes can clean the troughs for a hundred animals. I never have an animal leave his food in the trough or refuse to eat it.

Mr. Richardson: In answer to the question my friend Jenkins asked in regard to the color of horses, I want to state as the result of something over twenty years, nearly twenty-five years experience in horse railroading, that I am convinced in my own mind that there is no color that will average equal to the roan, so far as you can get it, from the strawberry roan to the steel roan, in all its different shades and colors. A dark gray is very good; and there is nothing better, so far as you can get them, than a dark dun, with a black stripe down the back, and black legs. There is no tougher horse going than that. The only misfortune is that we can not get enough of them. I agree with Mr. Wyman that the grays, the dark grays, are among the best horses. What is known as the flea bitten gray, little specks all over him, is generally a very tough animal. The bays, as he says, are on the average. I wish to mention one thing especially; if you can avoid it, never get a horse with a white hoof; particularly not the fore hoof. Always endeavor to get a horse with a black hoof. Grays and light colored horses with a black hoof are much stronger, tougher, and wear better; but especially, in selecting your horses, select one with a hollow foot. Avoid all flat-footed horses.

Mr. Harris, of Cincinnati: Mr. Richardson, what kind of shoes do you use in New York?

Mr. Richardson: All kinds, sir; but the Goodenough is good enough for us. It is a very difficult thing to keep the men under you from feeling that some horses are better if they are put on stilts an inch high.

Mr. Harris: You get the privilege of trying a horse ten days; where we are, they do not give us the privilege of trying them one day or one trip.

Mr. Richardson: I think that it is your own fault that you do not get it. I think if you insisted on it you would.

Mr. Harris: I think they would charge us a dollar a day for each horse. I think we can buy them cheaper by inspecting them and buying them at once.

Mr. Richardson: Will the gentleman tell me what he pays?

Mr. Harris: The horses average about one hundred and fifteen dollars; they run from ninety to one hundred and thirty dollars.

Mr. Richardson: With us, for a horse suitable for our use, weighing about eleven hundred pounds, a good, chumpy, well built horse, fifteen and a half to sixteen hands high, active and light on his feet, free from tricks and defects, we are willing to pay one hundred and fifty dollars, if we get ten days' trial. We want first to see if he is a kicker, biter or balker, or has any other bad traits.

Mr. Harris: I will state that the agents of horse dealers in New York City buy horses in our market in the vicinity of Cincinnati, and pay about one hundred and twenty-five dollars for each horse that goes east; and when these agents are not there and buying the horses in my own market, I can get them for a little less money.

Mr. Richardson: It costs ten to fifteen dollars to get them to New York.

Mr. Harris: Fully.

Mr. George W. Pearson, of Washington: Mr.

President, for the purpose of carrying out the recommendation of the Executive Committee, in relation to the Exposition of 1892, I would move that a committee of nine be appointed by the president to carry out the recommendations of the Committee. The motion was carried. The president appointed the following gentlemen: George W. Pearson, Washington, D. C.; G. Hilton Scribner, New York City; Charles B. Holmes, Chicago, Ill.; E. B. Edwards, Philadelphia, Pa.; Henry M. Whitney, Boston, Mass.; Thomas Lowry, Minneapolis, Minn.; Charles Green, St. Louis, Mo.; Edward Lusher, Montreal, Canada; William H. Martin, San Francisco, Cal.

Subsequently, on motion, the president, George B. Kerper, Cincinnati, O., and the secretary, Wm. J. Richardson, Brooklyn, N. Y., were added to the Committee.

A vote of thanks was then passed, in appreciation of the courtesies extended to the Association in the matter of reduced rates by the several traffic associations

The report of Hon. G. Hilton Scribner, of New York, the Committee on "How Can Corporations best Cultivate Public Sentiment so as to secure equitable treatment," was then read as follows:

HOW CAN PUBLIC SENTIMENT BE BEST CULTIVATED SO THAT CORPORATIONS SHALL RECEIVE EQUITABLE TREATMENT.

It is a theory that goes apparently unchallenged that when a corporation of any kind is formed, the public, under whose laws it is organized, surrenders something of value to itself or makes some sacrifice to the corporation. And that, therefore, it is not unjust for the state to place such burdens, restrictions and reclamations upon the corporation, from time to time, as shall in the opinion of the public keep the balance even between what the corporation has received from the public and is yielding to it. That this theory is false, in fact unjust in morals, and pernicious in practice, is capable, I think, of demonstration. In the first place, under no conceivable circumstances is the state justified in surrendering or permitting to one man, or any organization of men, anything, which surrendered or permitted, does not make for the good of the public, or I may add does not make for the greatest good of the public, when so surrendered or permitted. This proposition is so evident to my mind, that it is difficult to argue it. It is not only true in the abstract, but universally true in the concrete. Remembering that the state is only the public organized for action, that it is not only supreme but is of necessity as supremely selfish as the individuals of which it is composed, and it follows that its strongest motive will always be, and must be to do what it *conceives* to be for its own greatest good. It seems rational then to suppose that when the organized public or state authorizes a number of its citizens to carry on an industry under certain specified restrictions and conditions, it is moved to do so because it is believed to be for the greatest good of the public that this particular industry should be carried on in that way. At any rate it must be plain to the most untutored mind that if such is not the motive and purpose, then the thing ought not to be done in that way at all. No sooner, however, is a corporation formed than it is stigmatized; first, as a monopoly, notwithstanding it may have been organized under a general law which leaves the field of industry it is about to enter as free to all new comers who choose to organize and enter it in the same way as the grocery or dry goods business is open to the individual. Such, for instance, is the character under present laws of nearly all railroad companies, and without exception of all other companies.

In the second place, the corporation so formed no sooner enters business than its stockholders, directors and officers are made to feel in many ways—through the agency of the press too frequently and always by first contact with public officials—that it lives by sufferance; that its birth and being, though reluctantly permitted, are not approved by the public nor by the state; that its methods and purposes are in some way inimical to the public, and that the rights of every other citizen making up the great public have been and are being infringed in just the proportion that the corporation is prosperous; and lastly, that a very profitable business on the part of the corporation is a downright robbery of others, and especially of those who are not engaged in the same line of business at all. Now exactly what part of the entire industries of the country are performed under such misguided and demoralizing notions I have not the data at hand to determine, but as the steam railroads constitute about one-eighth of all the property in the United States, it is probable, that including monied corporations, at least one-quarter of all that is done in this country rests under the unjust ban of being done by these grasping and soulless agencies which, according to public opinion, have in some way wrung from the other three-quarters a right and franchise to injure and rob them, and that no opportunity is ever lost by the corporation in exercising such power to the fullest possible extent. Those who hold such views (and few are to be found who do not) never seem to consider whether it would not be possibly a wiser and better policy on the part of the injured public, who not only authorized but is still authorizing the formation of corporations, to call a halt and take measures to undo its past work by utterly destroying all corporations at once. Instead, however, of adopting such a course, which is certainly the only logical one, if corporations do live and thrive at the expense of others, the state breaks its covenants with the corporations by placing upon them additional restrictions and burdens, supervising them and prying into their affairs, and if their business is found to be profitable, asking them with authority and force to divide their profits with the state, in some instances compelling them to pay the entire expenses of the state, as in Pennsylvania, and in all cases taxing them excessively and on a different basis from individual taxation. More than all this, in visiting them and dealing with them, the state is sure to trample ruthlessly upon all those safeguards and proprieties which hedge about the individual and his affairs under the organic law. Of course, courts and juries are animated with the same feelings growing out of these prejudices and preconceived opinions. It has at last come to be the rule that in any case against a corporation for injury to the person or property, if the judge allows the case to go to the jury, a verdict for the plaintiff is assured. It is curious and almost amusing to note how, in some cases, where, if any recovery were justified, it should be, say, five thousand dollars, the jury finding the corporation entirely blameless, will come in with a little verdict for perhaps a hundred dollars to comfort the plaintiff, and as a consolation for his having had such a groundless and miserable case. And yet the treatment of corporations by courts and juries is almost *divine* when compared with their treatment at the hands of legislators. The dealings of legislatures throughout the country with the corporations which have been created under their sanction is in most instances characterized by anything but justice, honor or honesty.

But this brings us back again to the source and origin of all the trouble. Individual legislators come together fresh from a vigorous canvass for their election before the public and therefore from an intimate association with the people who, in most cases, quite sincerely believe that there is no danger that any authority will ever be able to abuse or oppress any corporation as much as it deserves. Is it to be wondered at that the legislature under such circumstances forthwith introduces and passes, if possible, every conceivable measure it can contrive, which shall punish the corporation without hurting the public? All that limits this persecution practically is that in most matters the public and corporate interests are so nearly identical, that a severe injury to the one is no little detriment and loss to the other. The long lash intended only to lacerate some corporate interest not infrequently winds itself about and stings a whole community of individuals.

But aside from these oppressions visited upon them by authority, the corporations are not fairly dealt with by the press. Still I cannot very much blame the newspapers for the positions they take nor the influence they exert If those who control three fourths of the industries of the country are determined that the impersonal agencies which control the other fourth, have no rights which they are bound to respect, and so are resolved to place upon them all the taxes and burdens of society, and go free themselves, we can hardly expect the newspapers, which prosper only as they accord with the public opinion, to take up the unpopular cause of the corporations for no more substantial reason than it is just. Besides, it has always been the complaint of the press, put forth no doubt in good faith, that many corporations enjoy valuable grants received from the public, and which the same public has been greatly inconvenienced by granting, such, for instance, as railroad franchises and privileges in public streets As before stated this never is the case. If it were true that a street railroad lessened the utility of a public street, for any purpose for which the street itself was opened and dedicated, then this position would not only be tenable but the railroad ought not to be allowed there at all. But if the railroad on the other hand enables more persons to traverse the street than otherwise could do so, and to get about at less expense of time and money than they could in any other way, then the public has surrendered nothing which it would not be injured by revoking and taking back. Then why should a street railroad, which carries people through the streets, rest under the opprobium of being in some sense a public nuisance, and be subjected to half a dozen separate and excessive, if not punitive, taxes per annum in consequence? Why should it be constantly taunted and abused for simply existing, any more than individuals who transport passengers for a living over land or even upon the high seas? The only remedy for all these evils under our form of government is a change in public opinion, and this must come with enlightenment and education as to the real facts of the case, if it comes at all.

It is, I know, extremely difficult to convince one class of society which has become accustumed to deal unfairly with another class, that it is wrong to do so; even more difficult still, when that is *accomplished*, to change the practice. Consider for a moment how deep-seated this anti corporation prejudice is. There is no provision in the constitution of the state of New York that taxes shall be uniform and equal. Such provision would allow corporations to escape punishment. The organic law of the great state of New York would not prevent the legislature from compelling the corporations to actually support the state, provide for all its paupers and criminals, maintain the public schools and provide for all the wants of society. Now all this is simply outrageous; it must be changed or corporations must in the end go out of existence. The first step to be taken is to demand for corporate property the same rights and immunities extended to all other properties. Every legislative body should be respectfully petitioned to establish equality between all proprietary interests whether they be corporate or individual. This would open a full discussion of the question. If there is any good and just reason why twenty men lawfully associated together in any industry should be treated more harshly than two men associated together for the same purpose, some one will doubtless be found bright enough to discover and state it. Certain catch words are constantly applied to corporations which do them great injustice and create false impressions. They are called monopolies, but as a rule they are not in any sense monopolies. If the New York Central or Lake Shore Railroad Company had enjoyed a monopoly, would the West Shore or the Nickel Plate ever have been built? And what is there to hinder under existing laws another railroad parallel to them both? The catch phrase of "rich corporations" is false and misleading in most cases. It is the large aggregated capital contributed in small sums by thousands for an undertaking proportionately large, which the unthinking call riches, without remembering the corresponding liabilities, and the prejudiced and unprincipled call it by the same name to excuse depredations upon it. The fact is that corporations in this country are not, as a rule, rich, and they would not dare, even if they were able, in many instances, to become so any more than the taxable individual would among the Oriental nations. The profits which corporations earn for distribution in this country are far below those made in private business when an average is struck.

It is exceedingly fashionable to speak of "soulless corporations," while every one knows that they are no more soulless than Smith, Jones & Co. Smith may have a soul and so may Jones, and each of the junior partners, but the firm is as soulless as any corporation, and indeed the firm is practically a fictitious person and quite as likely to be deserving of persecution and ill treatment as any corporation. This impersonal character of the corporation is, however, the cause of most of its troubles, and the excuse for its oppression. Under our modes of feeling if not of thinking, it is not considered as cruel and unjust to rob one thousand unknown men of a dollar each as it would be to rob one known man of one thousand dollars, while in fact the former constitutes one thousand crimes, while the latter is but one.

In all these matters, and many others, those whose earnings are invested in corporate undertakings should see to it that they are not misrepresented. Capital is said to be timid and it should be so in its investment, but not in its protection.

It is my firm belief that but few, even well informed business men, know to what extent the capital invested through corporations is unjustly dealt with by the state. It is the business of corporations to see to it that those who sin against them shall at least sin against light. From the leading editorial column of to-day's New York *Tribune* (October 4, 1889), in an article upon another subject, I find this sentence: "It is not equal taxation to tax all the property of a company twice: once upon the entire value of the securities representing it, and again upon the real and personal property which the securities represent." Is it to be supposed that the writer of that sentence knew that it was applicable to nearly all the corporations of the state? That under the unjust application of this oppressive system the corporation which the writer represents pays taxes upon more than a million of dollars of absolutely fictitious valuation, with no visible property whatever to represent it. And the corporation in question is neither more nor less fortunate in this respect than most others. To cure these evils corporations must enlighten the public, petition legislatures for relief, and stand for what is right and just, never attempting to correct any evil by any indirection, but demanding what is just and equitable, and as a last resort fighting for it in the courts and before every legislative body. The press and the public will only be with the corporations in their just demands when the corporations themselves show sufficient courage in defending themselves by all the proper means at their command.

On motion of Mr. Jenkins, it was ordered that the foregoing report be printed in pamphlet form and be distributed among the members of the Association. He considered it an exceedingly valuable paper, and that it should be in the hands of every gentleman connected with the Association.

THURSDAY AFTERNOON.

Mr. Cleminshaw, on behalf of the Nominating Committee, reported as follows:

For President—Thomas Lowry, President Minneapolis St. Ry. Co., Minneapolis, Minn.

Vice-President—C. Densmore Wyman, Vice-President Central Park N.& E.R.RR. Co., New York City.

2d Vice-President—J. C. Shaffer, President Citizens' Street RR. Co., Indianapolis, Ind.

3d Vice President—Albert McCulloch, General Manager Citizen's, St. Louis, Cass av. and F. G. and Bellefontaine Railways, St. Louis, Mo.

Secretary and Treasurer, Henry H. Windsor, Secretary Chicago City Ry. Co., Chicago, Ill.

Executive Committee—George B. Kerper, President Mt. Adams & Eden Park Inclined Railway Co., Cincinnati, O.; George W. Kiely, Managing Director Toronto Street Railway Co., Toronto, Canada; R Semmes, Superintendent Citizen's Street Railroad, Memphis, Tennessee; F. H. Monks, General Manager West End Street Railroad Co, Boston, Mass.; Francis M. Eppley, President Orange Cross-Town and Bloomfield Railway Co., Orange, N. J,

The Committee also recommended Buffalo, N. Y., as the next place of meeting.

Mr. Jenkins: Mr. President and Gentlemen, I coincide with nearly all of the recommendatiations of the Executive Committee. No doubt they have given the subject great and careful consideration; but in my business experience, I never yet saw an instance where it was advisable to discharge a good and faithful servant. In all corporations with which I have been connected, there has always been a pack horse that is ready to work night and day. Such a pack horse in this Association has been Mr. Wm. J. Richardson. A good and faithful servant should not be laid aside now. He has been our Secretary and Treasurer, as I understand, since the organization of this body, and we have yet to hear a complaint against him. In our corporation, the Broadway Railroad company, of Brooklyn, we get many communications interesting to us from him; and I would oppose with all my might and main his removal at this time.

Mr. Barr, of Philadelphia: I move that the name of Mr. Wm. J. Richardson be added to the list.

Mr. Sage, of Easton, Pa.: Before the vote is put I would say that I am of the same opinion as the gentleman from Brooklyn. During my membership with this Association there is no one I have met with who, in my opinion, has been capable of taking the office and doing the work that Mr. Richardson has done; and I think we would be making a very great mistake at this time, when we wish to keep this Association in a flourishing condition, to attempt to make a change; and I hope the convention will re-elect Mr. Richardson.

On motion, the question was put as to the substitution of the name of Wm. J. Richardson in place of that of H. H. Windsor, in the list of officers as reported by the Committee. This motion was carried.

Messrs. Richardson of Brooklyn, and Henry Martin, of Cincinnati, were appointed tellers.

The convention then proceeded to ballot for officers, the president being authorized to cast the ballot, which resulted in the election of the following gentlemen:

President: Thomas Lowry.
1st Vice-President: C. Densmore Wyman.
2d Vice-President: J. C. Schaffer.
3d Vice-President: Robert McCulloch.
Secretary and Treasurer—Wm. J. Richardson.
Executive Committee: George B. Kerper, George W. Kiely, Raphael Semmes, Frank H. Monks, Francis M. Eppley.

On motion, of Mr. Richardson, the election of the foregoing officers was made unanimous.

A motion was then made that the recommendation of the Committee to hold the next meeting in Buffalo, N. Y. be adopted. The Convention was then reminded that Mr. John G. Holmes, of Pittsburgh, had invited the Association last year to meet in Pittsburgh, Pa., in 1890.

Mr. Woodworth, of Rochester: I would like to say on behalf of Mr. Watson, who was called away, that he wished to extend the courtesies of the city of Buffalo to the Association. He would very much like to have you come to Buffalo next year.

Mr. Holmes: I would like to say for Pittsburgh that we would be very much pleased to have the Association come to our city next year. We urged our claims in Washington last year, but yielded in behalf of Minneapolis. I would like very much to press the claims of Pittsburgh as strongly as possible. We think we have a good deal there of interest to the railroad people. We expect next year to have electric roads, cable roads, and horse roads, all in operation in our city; and we will be very glad to do our best to entertain you.

Mr. Cleminshaw: I wish to say in connection with what the gentleman from Pittsburgh said, that Buffalo extended the invitation the first year and has pressed it ever since; and this time, in my opinion, it was proper that the Nominating Committee should recommend Buffalo.

A motion was then put and carried that Buffalo be the next place of meeting.

Messrs. Odell, of Salem, and Eppley, of New Jersey, were appointed a committee to escort the newly-elected president to the chair.

President Lowry: Mr. President and gentlemen of the convention: I sincerely thank you for the distinguished honor you have conferred upon me. I only regret that some more active and prominent member of the association was not chosen; and I am sorry that the association has so poor a presiding officer as you will find me to be. A few years ago in Minneapolis at one of our banks, a little discussion arose among the stockholders in regard to a president. They did not all agree, and an old gentleman from the southern part of the state, who happened to be the largest stockholder, turned to me and said, "I do not see what you need with a president. We have a bank down in our town and get along first rate and we haven't got a president." I asked, "Does it devolve on the vice-president or anyone else?" "No, not exactly, we haven't got any president at present; at least nobody but me." Gentlemen, I hope you are all satisfied with your visit here, and in case I am on this side of the water, I shall be glad to render what assistance I can, and preside to the best of my ability at the meeting; and I hope to meet you all at the next convention.

On motion a vote of thanks was passed to the Minneapolis Street Railway company for the cordial manner in which the delegates had been entertained.

A vote of thanks was also passed to the retiring president, Mr. George B. Kerper.

Secretary Richardson: Mr. Chairman and gentlemen of the convention: To say that I thank you for your election of me as the Secretary and Treasurer of the association for the ensuing year, but feebly expresses the feelings of my heart. A year ago, you will remember, after the service of six years of the more or less faithful performance of duty, you very kindly indorsed my record of those previous years; and you have done it again to-day. I have always stood for a principle in my office; the salary has nothing whatever to do with the matter. I have regarded the office as the highest honor conferred upon me in my life, to be the Secretary and Treasurer of the American Street Railway Association. I have esteemed it a high honor, as I believe any gentleman well might. I thank you again, gentlemen, for this indorsement of my record for integrity, not to say ability, by your unanimous vote this day.

The Convention then adjourned.

THE BANQUET.

The banquet took place in the evening of the 17th at the West Hotel, and the following was the tempting

MENU.

(Amontillado) Blue Points on the Half Shell.
Clear Green Turtle in cups, a la Victoria.
Cotelettes of Lobster, a la Rothschild.
Table Celery. Sliced Tomatoes.
(Haut Sauterne) Filet of Minnetonka Bass, a la Matelote Normande.
Potatoes Hollandaise.
Saddle of Lamb, a la Macedoine.
String Beans. Green Peas.
(Pontet Canet) Sweet Bread in Cases, Secret.
Cardinal Punch.
(Pommery Sec.) Minnesota Prairie Chicken, larded, with Currant Jelly.
Point d'Asperge.
Roquefort and Stilton Cheese.
Terrine de Foie Gras de Strasburg.
DESSERT.
Glace Neapolitaine. Petit fours, assortis.
Fruit. Cafe Noir.
Liqueurs. Cognac. Cigars.

The following ladies were present: Mrs. Kerper, Cincinnati; Mrs. Henry Hurt, Washington; Mrs. David Jenkins, Brooklyn; Mrs. T. C. Pennington, Chicago; Mrs. H. A. Everett, Cleveland; Mrs. Henry Martin, Cincinnati; Mrs. L. McFarland, Chicago; Mrs. Jas. Raymond, Minneapolis; Miss Olive Speed, Louisville; Mrs J. R. McLaughlin, Detroit; Mrs. Julia Walsh, St. Louis; Mrs. H. A. Sage, Easton, Pa.; Mrs. Sinclair, Galveston, Tex; Mrs. Wm. J Richardson, Miss Laura Richardson, Brooklyn; Mrs. John G. Jenkins, Miss Jenkins, Brooklyn; Mrs. Henry H. Windsor, Chicago; Mrs. A. E. Laing, Toledo; Mrs. B. F. Starr, Minneapolis; Mrs. John Harris, Cincinnati; Mrs. George W. Pearson, Mrs. Charles Edmonton, Washington, D. C.

A letter from Calvin A. Richards, of Boston, was read by Secretary Richardson. He said that the letter had kindly messages to each of the two presidents, and that for that reason they desired him to read the letter for them.

The letter was a humorous epistle, full of drives at President Kerper and Thomas Lowry. One instruction to the former was, "Don't try to tell a bigger lie than Lowry; no man living can do it." Another was: "Be careful of my dress coat and return it by express."

President Kerper followed this with a brief address, in which he told how Col. "Tom" Lowry had come into possession of the Minneapolis roads by taking them as an attorney fee from the original owners.

The first toast of the evening, "Our Guests"—Minneapolis—the metropolis of the West, after eight long years of waiting, extends to all, and especially the ladies, a hearty and joyous welcome. She is ready for the census of 1890; ready to absorb the suburban village of St. Paul, and take in the counties of Hennepin, Ramsey, and Dakota, as well as the strangers within her gates," was responded to by the Right Rev. Bishop Ireland, who said:

Mr. President, Ladies and Gentlemen:—This, I am told, is the eighth annual convention of the American Street Railway Association. You have held your conventions in many renowned cities of the United States, and I think I am correct in saying that never before have you been addressed by an bishop or an archbishop. We have many things to show you and tell you about in Minneapolis, things which we will not object that you should remember and imitate at home. The fact of the case is that the Minneapolis and St. Paul street railway companies are quite pious institutions. The President, Mr. Lowry, does not go to battle without his chaplin; at least that was the case in his last passage at arms with the city council of St. Paul, and finding at one time that he could not obtain a franchise for himself, his chaplin stepped in and obtained one. There is now on the statute books of the city such a thing as the Ireland-Corrigan franchise, and the line which is to be built under this franchise will be the first electric railway line completed and fully equipped in the two cities. It is certainly a good omen for electrical motors that the first line thus completed in the cities should be so closely connected with the church. I only hope that Mr. Lowry will now continue the chaplaincy in times of peace, and that if I should be asked to participate in other projects of his that the chaplain will be let in on the ground floor.

The subject, surely at first reading, it seems to me, should be most gracious and pleasing to me, but the most placid streams at times hide dangerous rocks, and a very dangerous one appears here to interrupt my plain sailing. It is all very well to speak of Minneapolis, the metropolis of the west, but read down a little further and you will see these words, "ready to absorb the suburban village of St. Paul." Now my electric road unrolls its rails over the streets and avenues of St. Paul, and some amendments may be needed for the franchise. The patriarch of our city of St. Paul, Mr. Murray, is present, and if I speak to the toast, "Minneapolis ready to absorb the suburban village," how will I dare go back to the twin sister. I need, I assure you, the advice of experts that I may be able to pass over the curve I must describe to avoid wreckage. Our two cities are two loving sisters, and one calls the other by the fond name of "little one." There is human nature there, of course, and it may be that, especially at the approach of the census year, one thinks she is the bigger; but at any rate it is tit for tat, and Minneapolis speaks of her little sister, and St. Paul speaks of hers. As loving friends they are marching towards lasting union, and as I am preparing myself for that union I will remember only the wedding, and will not look back over the days of courtship to know which one will have taken in the other. It is agreeable, perhaps, to our horse and electrical railroad presidents and officials here present to know that this grand union of St. Paul and Minneapolis, which is to give us the Joined City of the West is to be accomplished mainly through our city railways. They are starting out from the heart of St. Paul and making rapidly across midway, only waiting for Minneapolis to build more bridges across the Mississippi, and they will reach right into the heart of Minneapolis. I speak, ladies and gentlemen, for this great city of Minnesota now called St. Paul and Minneapolis, to be called in the future I will not say by which name, but I speak in the name of that great city of 425,000 souls, which yesterday was a little village, which to day is spreading out north and south, east and west, absorbing, as the toast says, Hennepin county and Ramsey county, and ready to pounce upon Dakota, and the Lord only knows how far ont we will extend our stakes, for we intend to be surpassed by no other city. We heard the other day that Chicago tried to take in the whole state of Illinois, and of course we may try to do as well and take in the larger portion of Minnesota. It may be that some gentlemen came from the great eastern cities to see our nascent villages; came to see our small buildings, our little industries; for it is well known that outside of Minnesota, whatever be the reason, I do not say whether it is fear or jealousy, they scarcely do us credit. We are very modest here, but modesty is truth and honor. To be modest it is necessary for me to say that very few years will go by and we will have our million, and our banking interests will step up side by side with those of your most pretentious cities. Providence has favored us most highly. North and west, south and east plains, most

fertile, watered by grand rivers and extensive lakes; have we not our railroads running down into Nebraska and Iowa, taking away the substance upon which Chicago has been heretofore fed. Lake Superior is our inland sea. We are rearing and maintaining our factories and industries; we have the men of enterprise, the men of energy to do it. We have only to tell you to look around and see our great cities and remember that in 1880 Minneapolis had only 45,000 and St. Paul, I believe, then had 42,000. Now Minneapolis has her 210,000 and the two cities together their 430,000 (laughter and applause); but I believe my reckoning is wrong. We are ready for the census, the toast says. I assure you we are ready, but I am not to give away Minneapolis on that subject. But we are prepared to hear the roll called in 1890.

Ladies and gentlemen, now, in the name of that great city, be it mine to extend a welcome to our distinguished guests from all parts of the country. We are honored, gentlemen, by your presence here; we know that your experience and your intelligence, made manifest in the various deliberations of your convention, will have given new impetus to our own enterprises. We are sure that going back to your own homes you will remember this great city, this favored state; and let me ask you that you tell your friends that you had no blizzard, no cyclone; that there were no storms such as deluged New York a year ago; no rain storms and floods such as devastated the whole country east of the Alleghenies. Here you have God's own temperature; where have you seen such magnificent days as this October weather in Minnesota; and let me tell you we have here grand hotels and magnificent lakes, and we will be very glad to have you come and spend your summers with us; and by the time you return next year we will have the electric railroads running in all directions; and I know, as well as I know Mr. Lowry, that the electric railroads of St. Paul and Minneapolis will bear the inspection of any railroad officials in the most pretentious cities in the Union. For my part, I feel especially interested in city railways, not financially only, but a great moral interest. I have always taught that railways leading out into the suburbs, permitting the scattering of population, is one of the best remedies of the moral ills of large cities. Vice, dissatisfaction, so called communism and anarchy are diffused where the people are crowded together in tenement houses, cellars and attics. This was heretofore a necessity; but give us numerous railroads, city railways, permitting the workman for five cents to ride out to his home in the suburbs, where there is fresh air, and health for himself and his children, and you will lift up the whole people morally and intellectually. You are a great refining, civilizing power, gentlemen.

Now I look again at my toast, and it reads a welcome to all, especially to the ladies. Well, now, there is another rock against which I have to run. A cynical friend of mine told me I was chosen to respond to this toast because I knew so little of the ladies. But there is no truth whatsoever in it. I know that womankind is the guardian of virtue and religion. I know that men can build railroads and mills, and lay out great cities, but were it not for the refining and the religious influence of woman, man would soon lapse into a state of primitive barbarism. I know that womankind rule the nation, because woman forms and nutures the thoughts and affections of the men who rule the nations. The greatest moral power in society is the mother caring for her little ones, and inspiring that little one with holy and grand and refining sentiments. Be it mine also to welcome to our great cities the ladies, and be it mine to hope that they will return to their homes and will not forget their visit. The lady sitting near me, Mrs Kerper, told me that formerly the railroad magnates did not admit ladies to their banquets. They would let them come in and see how beautiful the rooms were decorated, and what was served up on the tables, and then they would withdraw to the parlors. Well, the world is advancing, and the railroad men are becoming more civilized. And now another word of explanation as to myself.

In St Paul a few days ago I addressed the railroad-brakemen, the laboring class, and I talked to them of their rights and their duties, and now I stand in the midst of capital, in the midst of the employers. Is there inconsistency here in me? Not at all. Labor and capital are both necessary; and without capital what would labor do, and without the concentration of capital where would be our great enterprises, and without capital would our country have developed so rapidly in a few score of years, that the star spangled banner floats today over a nation the peer of any nation on God's earth. I will always defend capital and defend its rights; but I will also say to capital, as I said to labor, that rights are never so sacred as when they are linked with duties. I stand here with peculiar pleasure because I know that the employers here and the companies represented here, have at heart the good of their employees; that they remember that their employees are rational creatures, God's creatures and our own equals in so far as human nature goes. I feel that these rights are recognized on the part of labor, and that capital then can with full security appeal to the country to sustain its own rights. Occasionally it is dark and threatening, and it looks at times as if storms were brewing in the distance, as if clouds were hovering over the horizon; and I believe that the best remedy to prevent the evil lies precisely in the prudence, the wisdom and the sense of justice of the higher classes of the employers. One thing which makes me love my country so dearly is this fact: That the employees, the laboring classes in America, prosper and succeed, and are treated as the laboring classes in no other country. Harmony between all classes of society, recognition on one part and on the other, fulfilment of duties by ourselves that duties on the part of others may be fulfilled, this is what will maintain peace and harmony, and give to us a great and glorious country. Ladies and gentlemen, I thank you for having listened to me.

"Our Patrons. May they never grow less, unless it be that numerous one who is ever ready to remind the conductor that he is the first man that ever charged fare for that child," was responded to by Mr. Francis M. Eppley, who spoke well and to the point, and his speech elicited considerable applause.

Hon. Wm. P. Murray, of St. Paul, then replied to the toast: "Our Cities; what would they do without us, and what could we do without them." The response was characteristic and contained happy allusions to Thos. Lowry, Mayor Babb, A. J. Blethen, Dr. A. A. Ames, P. H. Kelly and J. J. Hill. The gentleman also paid a handsome compliment to the ladies.

The next toast on the list: "The Courts; may the judges enter a final decree, ruling us out of their jurisdiction, until our patrons are taught discretion sufficiently to get off and on the cars at a standstill, especially after attending banquets," was responded to by Judge Koon. He said: "I can hardly see why the street railway association should toast the courts, when the courts persistently roast them. I admit that the lawyer's clothes are usually made of the lawsuits of the street railways. Yet there is a similarity between the street railways and the courts. Many of the courts are broad gauge, with palace cars, while others are little bob-tailed, one-horse affairs. Courts are the oldest affairs in existence. The oldest case on record is that described in the book of Genesis, in which Adam and Eve are the defendants. They had a fair trial and were duly convicted and judgment passed against them. I have often wondered what would have been the result had a modern lawyer been there to plead their cause. If judgment had been delayed, we might perhaps have been able to wear good clothes every day instead of once a year when the street railway association meets here. The lawyers generally are your friends, and if there's anything your association should do, it is to sit down on those fellows who go around hunting up suits against you to plead on contingent fees."

Chas. B. Pratt, who was unable to be present, sent a written reply to the toast, "The railroad manager, the employer and the motive power; any one alone is incomplete, but when all work together harmoniously they exert a mighty influence in the development of a community." Secretary Richardson read the letter, which was brief, witty, and well received.

A. J. Blethen's response to the sentiment, "The press; the railroad manager is blessed with its good will, but cursed is he who has its ill," was a happy effort, bringing out clearly the idea that the press is the great developing and directing power of modern times. Without it our state and city would still be in their infancy. It is the friend of the street railway and other large business interests, and those employed in making up a real daily newspaper are a class of able, conscientious and hard working men.

The toast of "Counsel and Council—neither desired, but both required," was responded to by Rev. M. D. Shutter, of Minneapolis.

Mr. Chairman, Ladies and Gentlemen—I had supposed that this toast was assigned to one of my profession, in the absence of the original appointee, not from the fact that we are prone to give advice, but that we receive so much. I think we receive enough good advice in the course of a week to set up this whole Association for a month. I want to say, however, that if this does refer to the constant advice that is given to railroad managers by everybody, for everybody thinks himself qualified to advise a man in public station—the editor the minister, and the street railway manager, and all men in public life—if the community which to exercise this privilege, the community ought to be educated and it ought to know something about what it is saying when it presumes to advise those who occupy these positions and administer these affairs. It is an old saying, you know, that two heads are better than one. I do not think it is always true; it depends on who owns the other head. I want to say this to you, gentlemen, and say it in all earnestness, I think you will admit that what I say is a fact, that the education of the community on the subjects which are represented by this body is largely in the hands of demagogues. They presume to teach on these subjects, when they have never learned their own lessons. We often find that to be the case. I know plenty of men who understand exactly how to manage the finances of a great country, but their wives have to take in washing.

The toast, "Our Bonds," was proposed, and Col. E. M. Wilson called on to respond. He alluded especially to the bond of friendship, and, though he admitted that Mr. Thomas Lowry was the ablest street railway manager in the world, but it was as a redeemer of the bonds of friendship that he was even more famous. Mr. Wilson said so many pleasant things of Mr. Lowry that the latter was constrained to rise and explain himself. Mr. Lowry expressed his pleasure at the friendly words for himself that had been uttered by Archbishop Ireland and others.

The toast "Our Absent Friends—only the departed ones, we hope, for good cause, and they, though lost to sight, are held to memory dear; while those who could have come we wish were here," was responded to by Mr. C. Densmore Wyman, of New York, as follows:

Mr. President, Ladies and Gentlemen—As you see by the programme of the toasts, the gentleman to whom had been assigned the honor of responding to this, the last toast of the evening—a gentleman who is possessed of an ability, an eloquence commensurate with the sentiment which this toast expresses—was at the last moment unable to be present. As I hear it, Mr. Smith, the cream of the Cream City railroad, has been all day engaged in court arguing before a cruel judge, and they are all cruel, into the ears of a prejudiced jury, and they are all prejudiced, for the rights of his poor railroad, and we are all poor. He therefore found it impossible to be present and at the eleventh hour, and with the characteristic kindness which is an integral part of your president, he has substituted poor me. I am a substitute, therefore, you see; and during the war the term substitute was used oftentimes as a polite appellation for a bounty-jumper; one who got all he could and then skipped. I felt if I could, with a single bit of honor left, after having been so amply repaid with this feast of good things for the appetite and this delicious repast of delicacies for the mind which we have set for us this evening, escaped this duty, I would gladly have done so. But you know that all of the street railroad profession are all truly honorable men; and we have to face the music a great many times, whether the strain is set in pleasant tones or whether it is unpleasant and harsh and disagreeable It is our business to run as I heard a superintendent of a street railroad once say, on "skedoole time," and when the schedule is made out and we are put upon it, even if one is an extra, we lose our car if we do not answer "here" and go on.

And yet, gentlemen of the Association, I am sure the very reading of this toast will suggest to each one of you what should be its proper respone Our Absent Friends. How that very phrase brings up a procession of well remembered ones across the path of our memory's vision. It does not require any violent stretch of our imagination to seat around these tables with us those who have in past times delighted us all with their presence and greet them again to-night. I remember one, as you all do, from whom we have heard to-night, who has been present at nearly all our street railroad conventions and who has done so much for us on occasions of this sort, with his genial humor, his sparkling wit, his enlivening presence, and who has been so dear to all of us, Mr. Calvin A. Richards, of Boston. It is sometimes said that the Bostonians are insular in their prejudices. You remember the story that is told of a lady of that city who was fully possessed of this characteristic, which, as I have suggested, sometimes crops out among the residents of the place. She was walking along one of the roads leading to Boston and she noticed a milestone by the way on which was inscribed "1 m from Boston." She stopped and said: "How touching; some unknown wayfarer lies here beneath this stone; and I see, with all the modesty of the people who live in this important city, she cares not to have inscribed her name or her age, or any other encomium upon her whateve; no greater honor than is to be found in the words 'I'm from Boston.'" But Mr. Richards is not insular; he is a citizen of the United States, with sympathies as broad and far reaching as this, our country.

I need not attempt to voice the sentiments which I know you every one feel of regret that we do not have with us here to-night our friend from Chicago, who has so many times responded so eloquently to the toast of the ladies. We love him and we miss him; but we send from here across the miles of stretch of country between that city and this our greetings to Mr. Holmes.

We have another one, whom I recollect used to sit with us at the festive board and in the council chamber, who spells his first name with three letters, and I have often wondered why he did so. But as I remember him, so full of faith and enthusiasm, I suspect that he adopted the appellation of Tom, in order that he might disavow any possible connection with the original doubting Thomas. I refer to Mr. Tom L. Johnson, of Cleveland.

And why need I mention in anything like detail the many others whom we recollect. There are so many who could be mentioned that are absent to-night. Our hearts go out to them, and I know that they are with us in spirit, if not here in body. But I will not detain you longer; mine is but the end of the volume; the little short addenda upon this evening's pleasure; but there are others who during the year have gone from us never to meet with us again. Their work is done and o'er on earth; but they live in our memories forever. You remember the last words of Daniel Webster, when he lay dying, and his friends in agony drew near to catch, if possible, the last utterances of that great and magnificent mind, and suddenly from a state of almost unconsciousness for one instant the titanic son of the

ast rose almost from his couch, and with the air of defiance at death, expired with the words, "I still live." And so those who have gone out from us never to sit again with us, live perhaps more truly to-day than they did when they were here on the earth, in our memories forever.

After "Auld Lang Syne" had been sung, three cheers and a tiger for the Minneapolis Street Railway company were then proposed by Mr. H. H Littell, which were given with vigor, and the banquetters then dispersed.

Exhibits and Personals.

Mr. Jos. Leidenger looked after the interests of the Dayton Manufacturing company.

The Brownell & Wight Car Co., of St. Louis, were represented as usual by Mr. Fred W. Brownell, who is probably as well known to street railway men in general as anyone in the business.

The Pullman company was represented by Mr. W. S. Louttit.

Mr. S. H. Short, of the Short Electric Railway company, explained the workings of his series system. It was the intention of Mr. J. Parker, Vice President of the company, to be present, but at the last moment he found it impossible to get away.

The Meaker Mfg. company, of Chicago, was represented by Col. H. L. Norton.

The Electrical Press was well represented by Messrs. Fred Deland, Dean, Palmer and others.

Maj. A. G. Wellington looked after the interests of the Griffin Wheel & Foundry Co.

The Thomson-Houston company was ably represented by Mr. Theo. P. Bailey, F. C. Todd and Norman McCurdy.

A model of the Volks Cable Crossing and Grip Brake device, of Kansas City, was exhibited.

The Robinson & Moan Car company, of Minneapolis, was represented by both Mr. Robinson and Mr. Moan; this company, as previously reported in the GAZETTE, has erected a magnificent building which, when completed next month, will give the company the largest street car producing capacity in the world.

The exhibit of whiffletrees made of hollow channel bars was made by B. F. Avery & Sons company, of Louisville, Ky., and attracted considerable attention.

The Walker Mfg. Co. exhibited model of a cable railway with the Walker drum.

The Vogel & Whelen Cable company had a full sized model on exhibition.

Mr. H. L. Earle, Sec'y and Treas. of the Judson Pneumatic Street Railway company, was kept busy during the entire convention explaining the workings of his model. It may fairly be said that his exhibit attracted more attention than any other, on the account of the novelty and ingenuity of its workings.

The Bemis Car Box company was represented by Mr. J. G. Stearns.

Mr. H. A. Sage, of Easton, Pa., was taken quite sick with rheumatism, but a visit from Dr. Dan'l Coolidge brought him out all right; we understand that Mr. Sage now says that there was only one man at the convention and that man was Dr. D. C.

The Daft Electric Light company, of New York, was well represented by Mr. C. W. Price; Mr. Price has been in the electrical business for a number of years, and is more than popular with railway men, from the Golden Gate to Gotham.

The LaClede Car company was represented as usual by Mr. Wm. Sutton, regarding whom, none but good words were ever spoken.

Mr. Chas. Hathaway, Jr., attended the convention as a delegate for the St. Claire Street Railway company, of Cleveland, O., of which company he is treasurer and general manager; few men have more personal friends than Mr. Hathaway. We understand that he will push the interests of Hathaway and Robinson on the road in the near future.

Mr. Chas. Odell, of Salem, Mass., attended the convention; Mr. Odell is probably one of the most popular men in the whole convention, his genial manner having won for him friends without number.

Richard Vose, of New York, was represented by Mr. W. S. Silver and Mr. A. W. Slee, both of whom are well known to the street railway fraternity.

Messrs. C. A. Hitchcock and Fred B. Jones looked after the interest of the Adams & Westlake company.

Mr. R. Semms, Gen. Mgr. of the Citizens' Street Railway company, of Memphis, Tenn., favored the GAZETTE headquarters with a call.

Mr. R. D. Apperson, Supt. of the Citizens' & Little Rock Street Railway, of Little Rock, Ark., attended the convention as a delegate, and also in the interests of a new car wheel, of which he is the inventor, a full description of which will shortly appear in the GAZETTE.

The Northwestern Electric Supply & Construction company, of Seattle, Wash. Terr., was represented by Mr. S. Z. Mitchell, of that city.

Mr. Henry C. Payne, of the Milwaukee City Railway, favored the GAZETTE headquarters with a call.

Wm. Wharton, Jr. & company, of Philadelphia, exhibited specimens of their rails.

Johnston company, of Johnstown, Pa., exhibited sections of their various kinds of rails, etc.

The St. Charles Car Co. was the only company exhibiting a car. The car was 16 feet long, and the interior was finished in mahogany. It was lighted by the Frost Dry-Carburretted System. We noticed that the car was equipped with the steel steps recently placed upon the market by the Standwood Mfg. Co.

Mr. Chas. Clemenshaw, President of the Troy & Lansingburgh Railroad, was present, and was listened to with the closest attention whenever he spoke. Mr. Clemenshaw was one of the originators of the A. S. R. A. and we believe, has never yet missed a convention. Little surprise would be felt if at any time he was elected to the presidency of the Association.

The Hon. E. P. Shaw, Pres. of the Newburyport Car Mfg. Co., a member of the Massachusetts Legislature, and one of the best known men in the East, was present. Mr. Shaw is the inceptor of more than one street railway enterprise, full details of which have from time to time appeared in these columns.

The J. G. Brill company, of Philadelphia, was ably represented by Vice-Pres. John A. Brill, and its General Western Selling Agent, Mr. Bernard H. Schmidt; the Brill display consisted of a very handsome model of Brill's Patent Independent Rigid Truck, and a car gate made on the lazy tongs pattern, both of which attracted considerable attention. We noticed that Mr. Schmidt managed to form a considerable number of acquaintances, and he is probably as well known now in the West and Northwest as in his old field of labor,—the Southwest.

The interests of Post and Company were well looked after by Mr. H. E. Keeler, who, by the way, mourned considerably regarding "the exhibit that never came."

Mr. Jos. W. Mason, Jr., in company with Mr. Louis E. Robert, looked after the interests of the Louis & Fowler Mfg. Co.; both these gentlemen are well known to the majority of Street railway men, and were greatly interested in the convention.

John A. Roebling's Sons' Co. was well represented by Mr. Geo. C. Bailey, Manager of its Western Branch; everybody knows Mr. Bailey, and we have yet to find one who has not a good word to say for him.

Mr. T. C. White, of St Louis, represented the Fulton Foundry, of Cleveland, and did his best to look after the interests he represented; he had a heavy contract to swing, but feels well satisfied with the results he attained. We missed our old friend Mr. Langdon, who was unfortunately prevented from attending the convention on account of other important business.

The interests of the Hale & Kilburn Mfg. Co. were well looked after by Mr. Geo. F. Small, one of the best salesmen in the business; Mr. Small has been with his company for a number of years, and is immensely popular with the street railway fraternity.

Valentine Co. were represented by Drum Major Nat. P. Lane, who, it will be remembered, took an active part in the "Marshall Hall" entertainment at Washington last year. Maj. Lane is an indefatigable worker and as good a salesman as one would find in a year's tramp.

(Parenthetically it may be well to remark that Mr. S. F. Miller is probably not far behind Major Lane in this respect.)

It is almost needless to say that Mr. Edward Beadle attended to the interests of the Railway Register Mfg. Co., and the Eureka Folding Mat, of which latter he is the sole manufacturer. Among the supply men few stand higher in the respect, friendship and confidence of the street railway fraternity than Mr. Beadle.

The Johnson company sent three of its best men to the convention: Dan Coolidge, Maj. H. C. Evans and Elmer Evans; big-hearted Harry Evans always has a kindly word for everyone, while that prince of entertainers, Col. Coolidge, saw that the wants of the "inner man" were properly cared for. Elmer Evans tells us that he has about made up his mind to return to his old love—New York City—Porkopolis hardly affording him scope for his soaring ambition.

One of the coming men in the street railway business is undoubtedly Mr. H. M. Littell, Gen. Mgr. of the Cincinnati Inclined Plane Railway company; Mr. Littell took hold of the road when it was sinking a pile of money every day, and under his able management the property has now attained an excellent standard. He was unfortunately called away from the convention by reason of the sad accident that happened on his line. While he had made arrangements for matters to proceed as usual during his absence, he felt that the interests of his company demanded his immediate return to Cincinnati; his enforced absence was keenly felt by his many friends and associates.

The St. Louis Car company was well represented by its manager, Mr. P. M. Kling; we believe that the convention last year was the first one that Mr. Kling attended, but judging by the number of his friends in Minneapolis, one would think that he had been known to the street railway fraternity ever since the inception of the A. S. R. A.

Dorner & Dutton, of Cleveland, were represented by Mr. W. A. Dutton, who, being himself an ex-railway man, was well known to most all the delegates.

Mr. Francis M. Eppley, of the Orange Crosstown Railway, Orange, N. J., whose speech at the banquet is reported to in another column, was one of the most interested members of the whole convention.

The Peckham Street Car Wheel and Axle Co., was represented by Mr. Edgar W. Emmins, who, we understand, is about to locate in the city where the World's Fair of 1892 will be held—Chicago.

Mr. Jas. Selwin Tait, of New York, favored GAZETTE headquarters with a call. We much regret our personal absence at the time.

To Wm. Hazelton 3rd, of Chadbourne, Hazelton & Co., Philadelphia, may be ascribed the credit of being one of the most hard working, successful, and popular men in that enterprising company, together with being a model entertainer. We understand that on or about the 17th of January, 1890, Mr. Hazelton will follow the example of his partner, Mr. Stadelman, and get married. (Next!)

Mr. Fred. B. Jones, of the railroad department of Adams & Westlake company, of this city, left Minneapolis in a particularly good humor having captured an order for trimmings for fifteen cars. Mr. Jones is one of the most valuable men connected with his company, and is very favorably known among street railway men.

Mr. Edwin P. Sears, who represented Pratt & Letchworth, of Buffalo, was kept pretty busy with his splendid exhibit of Buffalo hames, and took a number of orders for his reliable house.

Mr. John S. Pugh was on hand, as usual, looking after the interests of the Baltimore Car Wheel company, for which he did some valuable work. Mr. Pugh's face and burly figure are known to about every street railway man in this great and glorious country of ours.

T. F. Manning attended to the business of Murphy & Co.

Captain Eugene Griffin, of the Thomson-Houston Company, of Boston, was met in New York City early in the month.

Aug. Day, of Detroit, paid a flying visit to Chicago on the 10th.

Mrs. R. Dudley Frayser, of Memphis, accompanied by her two charming daughters, has been spending several weeks at the Hotel Bartholdi in New York. Their presence was much missed at the convention.

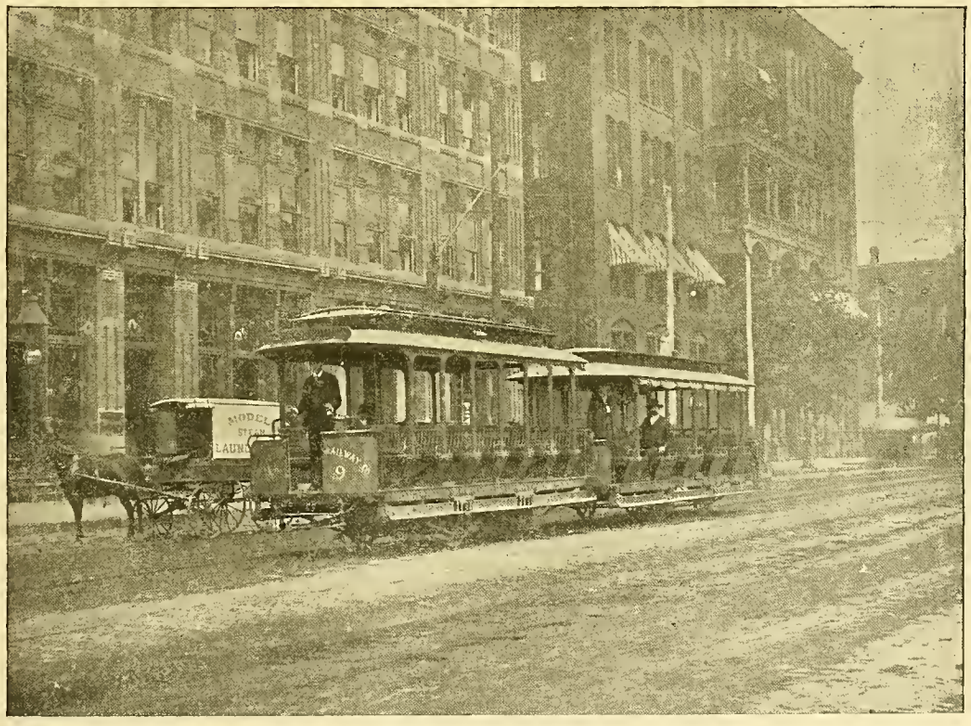
The Street Railway Gazette.

VOL. IV. NOVEMBER, 1889. No. 11

ELECTRIC RAILWAYS.

Omaha Motor Railway.

The Omaha Motor Railway, at Omaha, Neb., on the line of which a car in operation is shown in the accompanying cut, is one of the largest and most important electric railways in the West. Seven miles and a half of track was the original electrical equipment, but the satisfactory operation of the cars resulted in its extension being made very soon after the first car was put in operation. In constructing the overhead line the cross suspension method was used, the conductor being supported from cross wires attached to poles placed at the curb line a distance of 120 feet apart. The track is laid with Johnson girder rail with some exceptions in the outlying districts where the streets are as yet not paved; in these places T rail is employed. All the rails are reinforced at the joints by copper wires, insuring a perfect path for the return current. The line combines many grades and curves, the former ranging from three to nine per cent., and the latter being from 60 to 75 foot radius.



OMAHA MOTOR RAILWAY.

The power station is a two story brick building, with a small car house attached. The upper story is used for offices, store rooms, and repair shop, and the lower story contains the steam and electrical apparatus. The building is lighted by seventy 16 candle power lamps, the current being supplied from the same generator that furnishes current for the cars. The electrical plant consists of eight 80 h. p. Thomson-Houston generators, connected to a switch-board provided with all the most improved appliances necessary for the manipulation of the current.

The steam plant consists of two Corliss engines of 200 and 400 h. p. respectively, connected to a line of shafting provided with friction clutch pulleys, which renders each generator independent of the others. The boiler room contains six 100 h. p. boilers, steam pumps, heater, and other necessary appliances.

The cars which were built by the Pullman company, are 26 in number, and are each equipped with two 15 h. p. motors. The average car run is eighteen hours per day, and the average number of tow car trains per day is 23. There are three car houses capable of holding 100 cars, located at convenient places along the line. Each is provided with suitable pits between the tracks so that the cars can be cleaned and all necessary repairs readily made, while to facilitate shifting, a trolley wire is placed over each track.

The Omaha Motor Railway system comprises 40 miles of track, about 26 of which is equipped electrically. The traffic since the electric cars were used has been very heavy indeed and the performance of the apparatus under severe tests with heavy loads has been all that could be asked.

The electrical equipment will be extended as rapidly as possible until the entire system can be operated without the use of horses.

Operation of Electric Railways.

A week or so ago the Gazette received from one of its subscribers a number of questions, evidently clipped from an exchange, regarding the operation of electric railways; they were forwarded by us to the president of an electric railway, in order to get the benefit of his personal experience with that system of street car propulsion; in reply thereto he sends us the following:—

NOVEMBER 12, 1889.

STREET RAILWAY GAZETTE, Chicago, Ill.

Dear Editor—The questions regarding electric railways have been received and we will attempt to answer them as best we can from an experience of over one year. Will take them up in their order.

1st. Do they give trouble in rainy weather and when snow and ice are on the track?

In rainy weather, if anything, they run better than at other times. With snow, we had no trouble last winter unless snow exceeded a fall of 5 inches, our little scraper and broom on the car keeping tracks sufficiently clean. We could run over small drifts at street corners, averaging a foot in depth without trouble, but when the snow fall exceeded 5 or 6 inches we sent out our plow car which could be pushed ahead of the motor car and clear the track of 18 inches of snow. As to ice on the track, we had very little trouble from this cause as we have two motors on each car and the forward wheels would break the ice sufficiently so that the rear wheels would grip the track and propel the car.

2nd. Is any of the electric machinery often burned out or injured by lightning?

No. We have lightning arresters on the cars and in the station.

3rd. Are passengers in danger of being injured by lightning during thunder storms?

No. Passengers were afraid to ride in the cars during a thunder storm. We had at one time a very severe lightning and thunder storm in which 5 cars were struck but the lightning arresters carried off the current and the passengers did not know that the line had been struck. The same storm killed horses in the streets and did much damage to our city. We immediately had a thorough inspection made by an electrical expert whose report was published in the daily papers, and now the public feel that the safest place during a lightning and thunder storm is in one of our cars.

4th. Are conductors necessary on electric roads?

We do not use conductors except when running trailers to move a large crowd, otherwise the operator collects the fare by the use of fare

box, the same as he did when driving the horse car.

5th. About what is the average permanent increase in earnings caused by the use of electricity?

It is hard to get an average from one road. Our line has increased over 50 per cent, others that we know of have made much larger increase, but judge that 50 per cent can be put down as a minimum rather then an average increase.

6th. About what is the average cost (the year round) per mile run of operating cars with electricity?

The average costs will vary with different localities. We say that 10 cents per car mile will cover all expenses including repairs, insurance, taxes and 6 per cent interest on our entire investment. This will be considerably reduced the coming year.

7th. What items go to make up the expense of electricity as a motive power?

As we understand this question, you want the items which go to make up the cost of motive power, which would be all expenses for wages at the power station, fuel, water, oil, waste, repairs and incidentals.

8th. Can an ordinary horse car be used with an electric motor?

Most all of our cars were run as horse cars and changed to electric motor cars. If we were going to do it again, we would buy new motor cars, and have all our horse cars to use as trailers, for we can say that that would have been true economy.

9th. What is the average life of an electric motor?

The electric motor has not been in use long enough to judge of its "average life." Many of its parts so to speak are indestructible, others are repaired from time to time, and the expense therefor, cost of repairing account and included in the total cost per car mile, hence to day our motors are almost as good as the day in which they were put on the cars. Our judgment is that this can continue indefinitely.

West End St. Ry. Co. Equipment.

The West End Street Railway company of Boston is making rapid progress in the equipment of its line with the Thomson-Houston system, and work is being pushed on the lines on which it is intended to use the electric cars this winter.

The wiring has been completed on Charles street, and from Egleston Square through Washington street, to Dudley, while that on Shawmut ave. and Tremont street will soon be ready. The temporary power plant at the Hinckley Locomotive Works is nearing completion. This plant consists of five McIntosh & Seymour (Auburn, N. Y.) high speed compound engines of 300 h.p. each, and four Babcock & Wilcox boilers. The electrical plant consists of fifteen Thomson-Houston railway generators, of 60,000 watts each, and will supply the energy necessary for 150 cars.

The permanent power plant will be a model of its kind, and when completed the largest and best equipped in the world.

The steam plant will comprise thirteen triple expansion condensing engines of the Reynolds-Corliss (Reliance Works, Milwaukee) type of 1,000 h. p. capacity each. Babcock & Wilcox boilers will be used for supplying steam to these engines.

The generators, 52 in number, which are being made by the Thomson-Houston Electric company, are of special design, and will be of 200,000 watts capacity each. The plant will furnish the necessary energy for 1,300 motor cars.

Although the work is progressing rapidly it can not be definitely stated when the various lines will be in operation. Horse cars will soon be taken off the Cambridge division, and residents in Cambridge will be given the full benefit of rapid transit, and before long the electric car will be a familiar sight in the heart of the city.

Troy and Lansingburgh Electric Railway.

One of the best installations of electric railways in the country is that of the Troy & Lansingburgh line, of which Mr. Charles Cleminshaw is president, which was made by Woodbridge & Turner, of New York. The Sprague overhead system is used.

Since the opening of the road regular trips have been made, and the road is now in superb working condition. Eight cars have been equipped and some six miles of track. The power is furnished by two 80,000 watt Edison dynamos, each driven by a 150 h.p. engine through a line of countershaft. It is so arranged that either engine can drive either dynamo, one machine alone being sufficient to generate power for the whole complement of cars. It is intended to extend the line at once through Waterford and Cohoes, and an order for additional cars has already been given.

This gives evidence of the satisfaction with which the new system is regarded; and at an early date it is expected to extend the line through Troy.

New Electric Railway in Buda-Pesth.

According to an exchange, the second great line of the network of electric tramways belonging to the municipality, and designed by the firm of Siemens & Halske, was formally tested as to its admissability, both from a technical point of view and from that of public safety on September 5th.

At present there are five electric locomotives tastefully equipped ready for use, to which other cars can be coupled as the traffic may require.

The system of this electric line is that of Siemens & Halske, with underground leads for the current, as in the line formerly constructed in Station street, and as in that about to be completed along the Great Ring Road.

The line was traversed three times by the Commission, all the details of the installation, the means of inter-communication, and the manner of working, being carefully tested in all their combinations. No objection was found and the Commission declared unanimously that the concession for commencing regular traffic should be granted.

The speed of traveling in the interior of the town is 13 and in the suburbs 20 kilometres per hour (respectively 8 and 12½ miles).—*Exchange.*

Awards at the Paris Exposition.

We find in "L'Ingenieur Conseil" of the 12th ult., the following information in relation to the granting of prizes at the Universal Exposition at Paris for the different types of accumulators or storage batteries.

"Accumulators at the Paris Exposition."

The official list of prizes distributed to exhibitors has just been published.

We give herewith, the Award of Merit which the Jury has assigned to the different manufacturers of accumulators :—

"Grand Prize" M. Gaston Planté (deceased)

"Gold Medal" The Société L'Elèctrique of Brussels, which manufactures the Julien accumulators.

"Silver Medal" The Electric Power Storage company (E P S. of London) which exploits the Faure-Sellon-Volckmar accumulators.

"Silver Medal" to the French Societe of Accumulators (Phillipirt Bros.) which exploit in France, the Faure-Sellon-Volckmar accumulators.

Silver medals were also awarded to M. Gadot, who also exploits the Faure-Sellon-Volckmar accumulators in France and to M. Emile Regnier, who exploits accumulators of his own system.

The other manufacturers of accumulators obtained either bronze medals or honorable mention.

When we consider that the Grand Prize was given to M. Planté purely as an honor to the memory of a savant who in 1859 invented the secondary pile, the highest distinction was in reality granted to L'Electrique (or Julien) in this important branch of electricity."

According to an exchange, "One of the most interesting achievements in modern engineering is the electric mountain railway recently opened to the public at Burgenstock, near Lucerne, Switzerland. The rails describe one grand curve formed upon an angle of 112 degrees, and the system is such that the journey is made as steadily and smoothly as upon any of the straight funicular lines. The Burgenstock is almost perpendicular; from the shore of Lake Lucerne it is 1,330 ft., and is 2,800 ft. above the level of the sea. The total length of the line is 938 metres, and it commences with a gradient of 32 per cent., which is increased to 58 per cent. after the first 400 metres, this being maintained for the rest of the journey. A single pair of rails is used throughout, and the motive power, electricity, is generated by two dynamos, each of 25 h.p., which are worked by a water-wheel of nominally 125 h p., erected upon the river Aar, at its mouth at Buochs, three miles away, the electric current being conducted by means of insulated copper wires. The loss in transmission is estimated at 25 per cent."

The Julien Company May Use Powder but not Paste.

Judge Lacombe, of the United States District Court, has just rendered a decision in the case of the Electrical Accumulator company against the Julien Electric Traction company and the New York and Harlem Railroad company upon a motion for a preliminary injunction to restrain the defendants from the use of a certain make of storage batteries in the electric cars now being run on Fourth and Madison avenues in this city.

It will be remembered that some months ago, in a suit brought by the Electrical Accumulator company against the Julien Electric company, Judge Coxe of the United States Circuit Court decided that the Faure Storage Battery Patent should be limited to the application of the active matter in the form of a paste; thereupon, the Julien company began experiments for the application of the active matter in the form of a powder. As, however, the batteries in use on the electric cars have been made with the active matter applied in the form of a paste, Judge Lacombe has decided that the complainants are entitled to an injunction, but at the same time, decides that the method employed by the defendants of applying the active matter in the form of a powder before the plate is immersed in the electrolyte is not an infringement and that that method may be employed by the defendants. The Julien company now employs that method.

Thomson-Houston Co.'s Record.

During the past few weeks the Thomson-Houston Electric company of Boston has completed the electrical equipment of a number of street railways, on which the electric cars are now in daily operation. Among them are the following :

	Cars.	Miles.
Central Railway, Peoria, Ill.	15	10
Citizens Elec. St. Ry., Decatur, Ill.	4	5
Metropolitan St. Ry., Kansas City, Mo.	4	5.40
Omaha Motor Ry., Omaha, Neb.	26	10
Ottumwa St. Ry., Ottumwa, Ill.	4	5
Quincy St. Ry., Quincy, Mass.	4	5
Richmond St. Ry., Richmond, Ind.	6	4

The company has also closed the following important contracts :

Albany City Ry., Albany, N. Y.	32	14
City Elec. St. Ry., Nashville, Tenn.	6	3.61
Kearney St. Ry. Co., Kearney, Neb.	2	8
Macon City & Suburban Ry. Co., Macon, Ga.,	4	4
Metropolitan St. Ry. Co. Toronto, Ont.	2	3
St. Paul City Ry., St. Paul, Minn.	20	51
St. Paul & Minneapolis Ry., St. Paul, Minn.	20	20
Union Depot Ry., St. Louis, Mo.	30	10

A contract has recently been closed for an electric railway at San Jose, Cal., which is the first Thomson Houston road in the state. As an electric railway has already failed in this city, the selection of another was not made without careful investigation, which resulted in making the contract with the Thomson-Houston Electric Co. Ornamental double bracket iron poles will be used, and nothing will be left undone in making the road a model one in every respect.

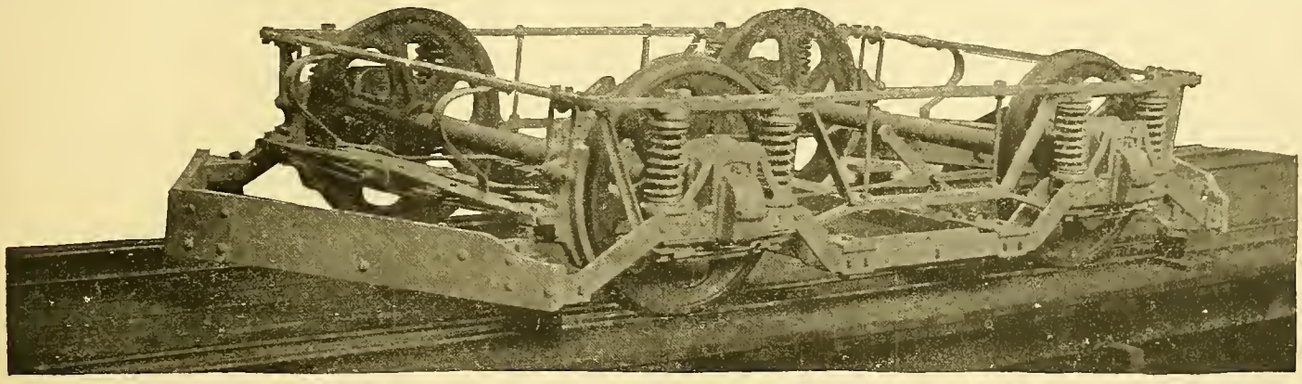
Important Contract.

A Portland, Ore., dispatch says the Multnomah Street Railway company has signed a contract with the agents of the Sprague Electric Motor company to furnish plant, cars, etc., and to change their lines on Washington and B streets, from First street to City Park, to an electric motor line. The change is to be completed by December 25th. Ten cars have been ordered, the motors attached to which will have sufficient power to draw a second car. The new cars, when crowded, will carry 90 people each.

Brill's Independent Rigid Truck.

Among the exhibits at the recent Street Railway Convention in Minneapolis, was that of Brill's patent independent rigid truck, a cut of which we now show.

In this style of truck the motor-carrying frame is attached to an independent or loose pedestal, which is swung over the journal boxes on rubber cushions. The spring posts pass freely through these pedestals and are connected at bottom with stays and braces. The bottom of pedestals are held together with malleable-iron braces. To take out the wheels and axles from this truck, it is only necessary to remove these braces when the car and truck can be jacked up and the wheels dropped out. This is a great advantage and the leading feature in this truck.



BRILL'S INDEPENDENT RIGID TRUCK.

The truck is fitted with Brill's dust and oil-tight journal boxes, and has life guards and track brooms; it is also equipped with extra heavy brakes of the Brill's equalizing patterns and double brake beams. Is made heavy and strong and arranged for the use of pipe bracings for open cars.

This system of truck is intended for the carrying of the propelling and operating machinery, brakes, life guards, track brooms, snow scrapers, etc., so that in case of accident to car body or truck another can be substituted in its place, and where open and closed cars are used, at the end of the season the trucks can be taken out of one set of cars and placed on the other, effecting a large economy.

By the means of the upper chord in the truck the pedestals or spring posts are held squarely in position, and the bottom frame of the car body is prevented from spreading, and where the truck is applied to old cars the upper chord of the truck dispenses with the necessity of re-squaring the bottom frame if out of true.

According to an exchange, the longest horse car line in the world is at Buenos Ayres, and connects with the outlying towns.

When completed it will extend over 200 miles. The rolling stock consists of five sleeping cars, 18 feet long, made by the J. G. Brill company, each having six berths, which in the day time are rolled back and used for seats; four double decked cars; two platform cars, six ice wagons, four cattle trucks and 200 goods vans. (We will be interested to know how many horses it takes to pull this kind of a Barnum's circus.)

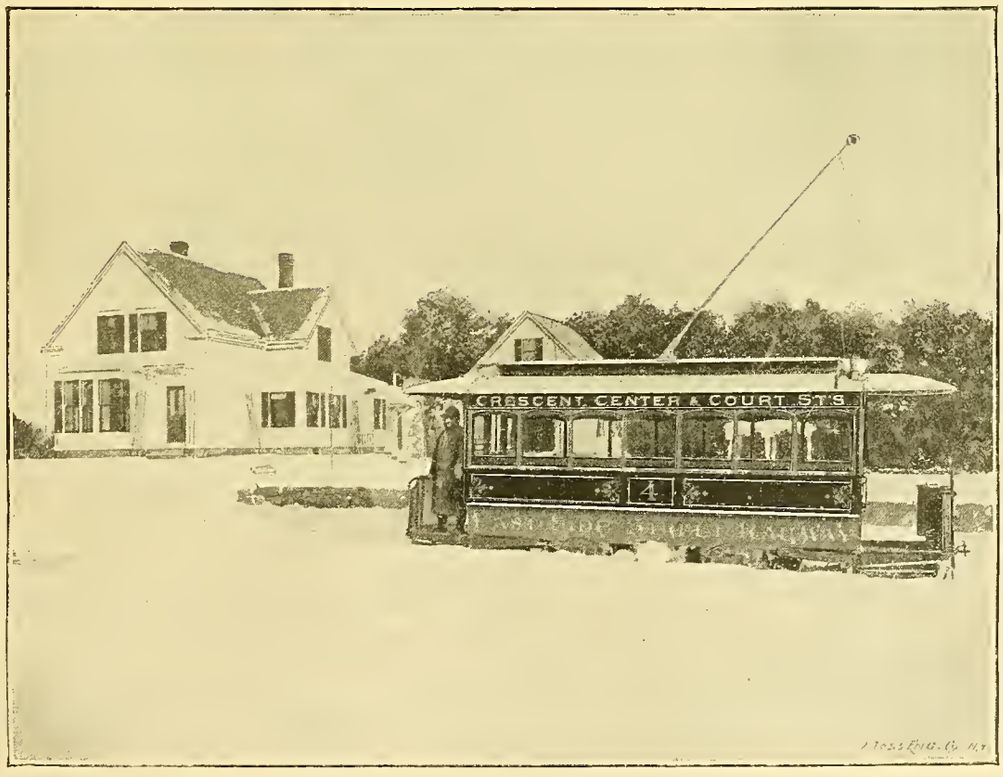
Electric Cars and Snow.

The record made by electric cars during the snow storms of the winter of 1888 and 1889 was, as our readers will remember, satisfactory in every degree. Although last winter was on the whole a mild one, yet there were enough snow storms and sleet storms to test severely the electric roads in the north and their ability to keep the tracks cleared of snow, and cars running.

The accompanying engraving shows some of the drifts encountered last winter upon the East Side St. Ry. of Brockton, Mass. This road is equipped with the overhead electric system, and it is claimed by the Sprague Co., which equipped the road that, owing to its feeder distribution of electric current, power can be applied at the end of the line for clearing the track of snow more certainly, and with less loss, than by any other system.

There were a number of roads operating under this system last winter, on which heavy snow drifts were frequently encountered, and even then the electric system was found to work successfully. Mr. W. L. Allen, the well known president of the Davenport Central Railway of Davenport, Ia., who is operating this system on his line, wrote, last winter, after a severe snow storm, that his cars made the usual time in spite of the deep snow, which latter necessitated horses keeping only at a walk all day, and stating that the management was jubilant over the success of the electric system.

We understand that the Sprague company has recently perfected an electric snow plough, of which we will publish a description shortly. This plough is the result of careful study upon the part of its engineers and the plough promises to play an important part this coming winter in the service of street railway companies.



EAST SIDE STREET RAILWAY, BROCKTON, MASS.

Chicago "Hustlers."

The Sprague Electric Equipment Co. is a Chicago institution, and, as such, it gave us great pleasure to note the hearty reception its representatives received at the hands of the street railway men in Minneapolis, whose lines had been equipped by them. Evidently the work done by this concern proves to be eminently satisfactory.

The company is composed of active, energetic men, well up in each department of their business. That they are Chicago "hustlers," is evidenced by their equipping a road, including the furnishing of the Sprague apparatus and new cars, bodies, and trucks, and starting the electric cars for business in just 55 days from the signing of the contract. The growth of their business has been such that their present quarters in The Rookery are so small, that often there is "standing room only." They have leased and are fitting up large handsome offices on the ground floor of the Rialto building into which they expect to move during the present month. Their storeroom in the basement will be a model in its arrangements for the dispatch of that branch of their business, they being large manufacturers of special devices for electric equipment of electric railways.

Unique Electric Railway.

An electric railway is now running in England, on the southern coast, in which the supply system is quite different from any electric railroad in the U. S. About a foot and a half from the car, on the side of the track, a flat rail runs, being raised on posts a foot high, the current traveling on this rail being connected with the car mechanism by a rod containing a wire. A peculiar part of the system is in the crossing of streets, the rail ceasing abruptly on one side of the road, and the car, propelled by its momentum plying across the road, where the connecting-rod catches on to the rail once more. A wire passes under the road from one end of the raised rail to the other side of the road and joins the current. These cars often travel at the rate of twenty miles an hour. The electricity used is generated by water power.

—*Electric Review, London.*

The Peckham Motor Truck.

The Peckham Street Car Wheel and Axle Co. of New York, send us the following description of its new Electric Motor Truck, regarding which we have heard only good words spoken as to its practicability, economy and ease of motion:

"It has been the custom to suspend the motor by means of bearings around the axle at one end and at the other by a flexible bearing supported at the bottom of the truck on crossway angle irons, the reason for this being to allow the motor itself to follow curves and grades without undue strain on the gearing. In the new truck shown in the cut a very important improvement has been made in suspending the motor from overhead, it thus being absolutely free to move in accordance with the relative motions of the truck. The motors, either one or two, as the case may be, are hung from the crossway angle bars by flexible joints, enabling the suspended motor to adjust itself perfectly to any position, and prevent altogether the jars and shocks which it might receive when rigidly secured to the bottom of the truck in the usual manner. To provide the truck with the necessary strength to support one half the weight of the two motors, the side frames are supported by a regular bridge truss, this construction giving the greatest possible strength with the least weight of metal—another radical improvement over the older forms, in which simple bolts were used. By reason of this bridge truss construction it possesses, it is claimed, greater strength than any other motor truck, and is, at the same time, so designed that the armatures can be readily removed when desired, without disturbing car body or truck. Also, by the removal of a single nut the motor can be suspended from the axle, if necessary, for repairs.

Although the truck is designed for suspending motors from overhead by flexible joints if desired, the motor may be suspended from the bottom plate of the truss, since this plate is in turn supported from overhead by the truss. When supported from underneath, the difficulties encountered in older forms, are overcome in the following ingenious manner. The cross bars, which support the motors, are provided at each end with round ends, that fit loosely in sockets attached to the underside of the supporting bars. Being supported by these loose or adjustable bearings, the motor supporting bars can yield with the motor in stopping and starting cars.

The manner in which the motor is secured to the suspended eye bar, from the overhead frame of the truck, and the method of securing the truss frame to the pedestal of the car boxes, is such that each motor, and the axle and wheel to which it is attached, can be removed from under the car by the removal of only three nuts.

This truck is equipped with the interchangeable elastic motor wheels and fibrous steel motor axles, which are manufactured solely by our company. The advantages of these elastic wheels are that they relieve the motors from shocks and crystallization, and prevent noise. The interchangeable webs can be renewed at any car stable by any ordinary workman, without removing motors from axles, and the fibrous steel axles are stronger and more durable than any other."

Lightning.

The following doggerel, slightly changed by our "poetry editor," appeared in the Dubuque, Ia. *Herald* of Oct. 25, and will be highly appreciated by those familiar with the *raison d'etre*.

'Twas near the close of an autumn day,
When city fathers, old and gray,
On the "Milwaukee" sped away
As guests of J. A. Rhomberg.

They rode along and drank their wine
And joked about the old mule line;
But Joe was scheming all the time
To beat Doc. Allen's lightning.

And as he rode he reasoned thus:
"'Twould never do to make a fuss
If I beat Allen. Won't he cuss;
If I don't—the mules go kiting.

For now our people are alive,
For better service they will strive.
An old mule line will never thrive
Till cars are pulled by lightning.

I spent five hundred;—what is that,
I'll get my charter, good and fat,
And carry the council in my hat
If they only keep on fighting.

I never thought when I fought Bliss
That things would ever come to this.
It's very plain I made a miss
When I opposed the lightning.

The Dubuque "*Telegraph*" the preceding day says that—

The shades of night were falling fast,
As through our Hawkeye state there past
A gang of "statesmen" grave and nice,
Whose banner bore this strange device,
Dubuque "Lightning."

For Omaha they all were bound,
To cast their glances 'round and 'round,
And learn from facts, not visions vague
If Thomson-Houston or the Sprague
Are better than Dubuque "Lightning."

Edison Company—Annual Meeting.

At the recent annual meeting of the Edison Electric Light company, Henry Villard was elected a director *vice* A. J. Thomas, and Samuel Insull *vice* F. R. Upton. The board now consists of Thomas C. Buck, C. H. Coster, Noah Davis, John W. Doane, Thomas A. Edison, J. H. Herrick, E. H. Johnson, Morris H. Smith, F. S. Smithers, Henry Villard, Spencer Trask, Samuel Insull and J. Hood Wright.

The Sprague Company, always on the alert for the right man in the right place, has placed Mr. J. H. Vail, late assistant to the president of its company, in the responsible position of its chief engineer. He, in addition to having general charge of the conduct of the home offices, will now have authority over all operating branches of the company. We trust that Mr. Vail will accept the congratulations of the GAZETTE upon his justly merited appointment.

Cable Railways in Denver.

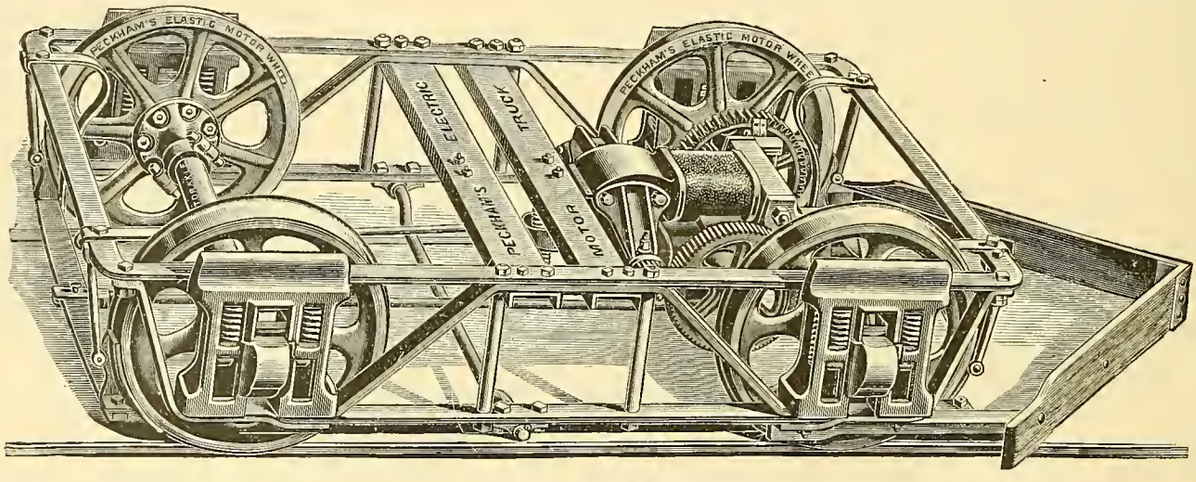
The new cable railway system in Denver, according to the newspapers there, is not only the most complete, says "*Industries*," but the most extensive in the world. We allude to the new plant about to be started, and certainly for present Denver it is a wonderful evidence of public spirit and confidence in the city's growth.

The new power house is nearly done. The engines and main gearing were in place at the time of our visit in September. The arrangement is for 1,200 horse power, to be generated by water tube boilers and a Wright engine, the latter made at Newburg, New York. The whole system is spur geared. The first mover has a face forty-two inches wide, and weighs thirty-six tons. The main shaft is steel, eighteen inches in diameter, weighing twenty-five tons. The flywheel weighs sixty two tons, and all other details are massive in proportion. There are six sets of traction drums, each being operated by a clutch. The arrangement of the plant varies a good deal from any here, and is much more crowded than in the San Francisco power houses.

The aggregate length of the lines to be ultimately operated from this centre is nearly thirty miles. The Welton street branch, about seven miles long, will be the first in operation, but the whole is to be completed this year, and no doubt will be, as there is a force of 400 to 500 men on the work.

The cable system crosses the railways on an iron viaduct, now nearly done. A local newspaper says the investment will be $2,000,000, but assuming the quantities before given to be correct, and the work to be first class, we think this amount can be doubled.

The City Line, a different system now working, seems a much cheaper one than our lines here, in so far as permanent way and equipment. There is an air of cheapness that can not well be described, but is nevertheless quite apparent to anyone familiar with cable roads.



THE PECKHAM MOTOR TRUCK.

Brake Inventors—Attention!

The following is self explanatory:

IMPERIAL AND ROYAL
AUSTRO-HUNGARIAN CONSULATE GENERAL,
NEW YORK,
OCTOBER 31st, 1889.

To the Editor of the "STREET RAILWAY GAZETTE," Chicago.

GENTLEMEN: I am ordered by my home authorities, who endeavor to insure the general public in the best way possible against any harm arising from street railroads, to obtain descriptions and designs of new and reliable safety appliances and improved brakes used on horse, cable and electric cars in large cities of this country.

If you can possibly favor me with some of such designs and descriptions you will greatly oblige, Yours most respectfully,

BALITUHEL,
Consul of Austria-Hungary.

The cable on the Spokane Falls line is 33,500 feet long, second in length only to a cable used in St. Louis, and made by Broderick & Bascome, of that city.

The Shallow Conduit.

What is the best motive power for conveying passengers in cities? This is a question which interests not only thousands of investors, but every passenger who wishes to spend as little time as possible in going from one part of the city to another part. It would doubtless be answered in a dozen different ways by a dozen different people, according to their interest in the various motive powers now in use.

Notwithstanding the great number of experiments which have been tried with more or less success in the past year or two, it seems to be a fact conceded by thoroughly posted men, that nothing has been developed or tried which can meet certain very important requirements, so fully as the cable system. We have yet to hear of a case where a thoroughly built and well managed cable road has not performed all that was expected or desired. For a line with steep hills there is nothing equal to the cable system. This is generally admitted. For handling large crowds expeditiously it has no superior. For a heavy continuous travel it is probably superior to any other.

At all events this would seem to be the conclusion reached by the Third Avenue company, in New York City. After two or three years of very satisfactory experience with its own cable road, in 125th Street, and after thoroughly investigating all the new methods of propulson, it has come to the conclusion that the cable system is the best one with which to handle satisfactorily its immense traffic on Third avenue. After a long contest, it has succeeded in getting permission of the state authorities to substitute cable traction for that of animals.

The only valid objection to a cable system has been its great cost. Only those roads doing a very heavy business could afford the outlay. The efforts to cheapen the cable road have been largely in the line of cheaper and lighter material in the conduit, and this has resulted in a collapse of the conduit in a short time. More recent efforts to cheapen the cable system have been in the line of furnishing a grip which would work in a smaller and shallower conduit, thereby effecting a saving in primary cost, without lessening the stability of the conduit.

Friends of the Terry Patent Grip claim that this has been accomplished, and also that several other very desirable results have been reached by that device.

So far as cost is concerned, it is stated that the 125th Street line of New York City cost $157,000 per mile. A line of equal efficiency, using the Terry Grip and Shallow Conduit, it is claimed, can be built for less than one half that amount. Admitting this statement to be correct, it will bring this cable system within the reach of many of the best roads in all our principal cities. As to the comparative cost of operating, experience has shown that the cable system makes a saving over animal power of from 50 to 75 per cent. As to the cost, compared with that of electricity, we are sorry to say, we have been unable to obtain sufficient data of a reliable kind to justify a comparison.

The Terry Conduit is but twelve inches deep, and nine and three-quarters inches wide; the cable four inches above the bottom of the conduit. The old pattern of grip, known as the vise-grip, has one jaw running underneath the cable and the other upon the top. This arrangement requires the deep conduit. The Terry Grip works on a different plan, and takes hold of the cable on the sides, instead of the bottom and the top. You can illustrate the principle on which it works as follows:

Lay your pencil on your desk, and open a book in the centre about half an inch, then turn it down over the pencil with the back of the book upwards, and, as your hands pass down over the cover of the book, you compress it together and hold the pencil. This is the way the Terry Grip takes hold of the cable. Two strong jaws are pressed together by a saddle working outside of them, so controlled by the gripman that he can take a firm hold of the cable, or slight hold, as he pleases, or release it entirely, by less than half a turn of a wheel in his hands, like a brake wheel. The inner faces of the grip-jaws carry rollers which take hold of the sides of the cable, and the only contact between the grip and the cable is through rollers. For this reason the car can move at a snail pace without any abrasion of the cable or injury to the grip.

It is claimed by its advocates that this is the only grip that permits a slow motion in a crowded street, or at crossings, or going around curves, without injury either to the grip or the cable. The gripping rollers project on each side of their supporting frames, so that when the pressure is applied, the rollers move forward and come in contact with the depressions, or double inclines formed in the inner side walls of the gripping jaws, thus holding the cable tighter as the pull becomes stronger. Both the grip jaws and operating saddles are hinged to the main carrying plate, within the conduit, thereby giving a free horizontal motion to the jaws in going around curves. The weight of the gripping apparatus rests on a spiral spring, giving a free perpendicular motion, sufficient to take the cable either on top of the pulleys, or at the lowest part of the slack between the pulleys.

It is also claimed that this system is much safer than any other, especially those using the grip car. The gripman in this case is at the dashboard of the front platform, where he can see and realize any danger of collision much better than when located back in the center of a grip car. Two slight motions of his wheel let go of the cable and also set the brakes. This fact, and ability to slow up at will, without danger to cable or grip, will save most of the accidents which have been so frequent in San Francisco and Chicago. The grip car, the long, awkward lever grip, and the inability to go slowly around curves and at crossings without danger to the cable or the grip, are the causes of fully three-fourths of all accidents on cable roads.

A new line using this system has recently been opened in Kansas City, and its operation will be watched with great interest by many who are seeking for information on the subject of motive power for street railways.

Los Angeles Cable Road.

This magnificent system of cable lines has now been completed, and Col. J. C. Robinson, to whose indefatigability and enterprise its splendid success is largely due, is certainly to be congratulated upon the result of his labors.

Speaking of the construction of the road, Mr. Aug. W. Wright, constructing engineer, says that it presents very many features that make it an exceptional piece of work in its way. All the engineering problems that have met every cable road builder in the world—and many that had never before been successfully solved—had to be solved. There were four great lines of cable with double tracks and two lesser lines, and upon this system there was every conceivable sort of curve and cable crossing to be overcome. All the lines were doubled tracked. The cable road that was to be met and crossed had a prior franchise, and it followed that the new road had to carry its cables under that one in making the crossing.

Going down First street there were four lines of steam railway to be crossed, one of which, at Alameda street, must necessarily be crossed on the level, and then the tracks had to be carried over the Santa Fe rails at First street. The river being met at this point, it was deemed wiser to go over the tracks and the bed of the stream by one immense viaduct, 578 feet in length. The building of that viaduct was of itself a great undertaking, although it had been dwarfed by subsequent efforts in the same line, as you know, but it was successfully concluded, and admirably answers the purpose of its construction.

Another difficulty that was met in the construction of the system consisted in the fact that the space allowed for the passage of the grip was so small, and this was particularly true upon the curves. It was a problem, under the circumstances, to acquire a strong enough hold upon the rope to meet the resistance as the car swung around, but this also was met and overcome, and not a grip has been broken in the time that the line has been operated. A steel grip is used, the result being that there are fewer breakages and that the life of the grip is greatly lengthened.

Upon the entire system there are 48 depression pulleys to hold the cable down, and 60 crown pulleys to raise it, the system being necessary to make the rope run easily in the slot and to enable the gripmen to grasp it without difficulty.

There are curves, the greatest bane of cable road builders, upon every one of the three great viaducts of the system, and, in fact, a very large number of curves in all its parts. This is particularly true upon the section from Seventh street and Grand avenue to the Plaza, there being 12 sharp curves upon that one road.

There are three great viaducts, and, of these, the San Fernando-street viaduct, now just completed, is something unique in its construction. It carries the line, in one great leap over all the yard tracks of the Southern Pacific Railroad company. The first plans for the structure were made by W. A. Seymour, under Mr. Wright's personal supervision, and were submitted to the most eminent bridge experts in the country, or in the world, for that matter, Mr. Samuel G. Artingstall, of Chicago, and Mr. A. Gottlieb, president of the Keystone Bridge company, of Chicago. These gentlemen pronounced the structure not strong enough for the purpose, and they submitted plans for a stronger viaduct. The plans from which the structure was built as it stands were drawn by Mr. Samuel G. Artingstall. The Southern Pacific company had two tracks upon San Fernando street, and refused to allow the placing of the posts to carry the cable tracks being set between their surface tracks, as that would have thrown the railroad lines out close to the curbstones upon either side. The city refused to allow the double posts set outside the railway tracks, which would have amounted to a practical blocking up and appropriation of the street for private purposes. The engineers were, therefore, reduced to the necessity of using single posts, and thus have the only instance in the world where a double track is supported upon a single column. In some parts of the New York elevated road a single column carries a single track, but nowhere does it carry two tracks upon the one support. The length of the great viaduct, over all, is 1535 feet. The length of the iron work is 1435 feet, and of the concrete approaches 50 feet each. The height from the ground to the rail level is 25 feet, 9 inches. Width between the hand rails is 25 feet. The main posts are 5 feet wide at the ground line, and 3 feet 14 feet above the ground. Each main post is 12 feet thick and 22 feet long. There are 19 main posts, each of the weight of 4½ tons. The smaller posts are 12 inches square and 20 feet 6 inches long. There are 10 of them, making 29 posts in all. The ruling span is 50 feet, but there are two spans of 55 feet, three of 40 feet, one of 30 feet and one of 20 feet. The main trusses are of the Warren type, 4 feet deep and of the weight of 100 pounds per running foot. The approaches are built of 15 "I" beams, each 25 feet long and of the weight of 50 pounds per foot. The foundation for each main post is a solid concrete block, 15 feet long, 6 feet wide and 5 feet 6 inches deep. Those for the smaller posts are 3 feet long, 3 feet wide and 3 feet deep. The concrete part of the approaches is 8 feet high at the highest point and 19 feet wide. The grade on the approaches is one foot in 5 7 and upon the main viaduct one in 1.75. There are two curves on the viaduct, each of 60 feet radius to the center line, and at these points there are brace posts to take the strain. Where the curves occur on the viaduct, too, as well as at the approaches, the tracks are carried on double posts. This is merely a precautionary measure.

The Downey avenue viaduct is precisely like that at First street. It carries the line over the Santa Fe main road and the Los Angeles River.

A difficulty, which is not yet thoroughly overcome, is the disposition of storm water in winter.

Where the city has storm water drains near any part of the system, the company has connected with them, while at other points pipes have been laid under the cable conduits extending out several hundred feet. But with the steep acclivities of the Los Angeles hilly districts, and the immense water-sheds draining right down upon the streets on which our tracks are laid, the cable company is practically helpless until the city makes some provision to carry off the storm water. The construction of a cable road requires a continuous opening in either track, the slot through which the grip grasps the cable, and

through this slot the storm water pours in a continuous stream, running into the power house.

It is a mechanical impossibility to operate this system through such floods as that of October 20th last, until some system shall have been devised to prevent the water and the sediment that it carries from running in and stopping the wheels of the machinery.

There are over 21 miles of single track on the system. All the material, consisting of iron and steel, was provided by the Pacific Rolling Mills of San Francisco. The cable yokes are placed three and one-half feet apart and weigh 158 pounds each. They are eminently calculated, from their peculiar construction, to stand the immense strain placed upon them. The entire conduit is constructed of Portland cement, of which there were used 36,000 barrels, and nearly 50,000 cubic yards of crushed rock were put in to form the concrete. The result is a roadbed that will last practically for all time. Between the slot and the rails for the entire length of the road the track has been paved with bituminous rock.

The cable company has three large power houses—at Seventh street and Grand avenue, where the general offices for the operation of the system are, at First and Chicago, on Boyle Heights, and at Downey avenue and Workman street in East Los Angeles. At each of these power houses the machinery is designed to propel four cables. Only two are in operation at any one place, however, save at the Grand avenue power house, from which point three ropes are run. The lengths of the various cables are as follows: From Seventh street and Grand avenue to the Plaza, 16,200 feet; from Seventh and Grand avenue to Jefferson street, 24,000 feet; from Seventh and Grand avenue to Alvarado street, 16,000 feet; from Workman and Downey avenue to the Plaza, 23,600 feet; from Workman and Downey avenue to Pritchard street, 7,000 feet; from Boyle Heights to Spring and First streets, 23,200; from First and Chicago streets to Evergreen cemetery, 7,000 feet.

The machinery for operating the road was designed by W. R. Eckart, of San Francisco, and possesses some very novel features. The principal of these, and the one effecting the greatest saving, consists in giving motion to the cable winding drum by means of endless cotton ropes. This connects the forward cable winders, making all of them drivers, and enables the working of the cables at half shaft length—effecting a great saving in the life of the rope by lessening the wear and tear.

Each power house is designed to contain four engines, two high and two low pressure, which can be used coupled together or either one separately, as required in working the system. Each power house contains, also, two five-hundred horse power tripod boilers. All the machinery at the power house at Seventh and Grand avenue was manufactured by Fraser & Chalmers of Chicago, who have done their work excellently, while that at the other two power houses reflects equal credit upon its makers, the Risdon Iron Works of San Francisco.

Besides the machinery for operating the road there are at each of the power houses immense pumps designed to aid in getting rid of the storm water. These pumps at the Seventh and Grand avenue, and at the Downey avenue power houses, have a proved capacity of 500,000 gallons per hour. A deep well at each power house, giving from 4,000 to 6,000 gallons per hour. The greatest difficulty to be overcome was the right angled curves. One of these offers as much resistance as half a mile of straight track, and again, where the line crosses the the Second street cable road, the cars have to come to a dead stop, release the cable, and then run across by gravity and catch again upon the other side. The gripmen are very careful, the system of pulleys there works perfectly, and as yet there has been no accident to the crossing cables at that point.

The steel grip used, is very simple, and the first die employed upon the system—the die being that part of the grip seizing direct hold upon the cable—has a record of 10,000 miles running before wearing out. That surpases anything done in any other city.

In addition to the cable lines there are in the system some 25 miles of horse car lines, covering the entire city—and, altogether, the service is perhaps the most complete and effective possessed by any city in the world.

The length of the straight track of the cable lines is 99,328 feet; of the viaduct, 4,220 feet; of the bridges, 2,124 feet; of the curves, 2,010 feet, and of the pits, 562 feet. This gives the enormous total of 108,274 feet, or 20 50 miles.

Judson Pneumatic System.

The following has been received by us from The Judson Pneumatic Street Ry. Co., of New York, and is self-explanatory:

NEW YORK, Nov. 8th., 1889.

Editor Street Railway Gazette, Chicago, Ill.:

Dear Sir:—Enclosed we beg to hand you copy of a letter just received from Mr. Windsor, and also copy of his addenda to the paper which he read at the annual convention, on "Motors other than Animal, Cable and Electric." We feel that a serious injustice was done us in the omission of any mention of the Judson System in the published reports in your journal of the proceedings of the convention, and trust that you will make such correction in your next issue as the occasion demands. These letters will, we believe, furnish you ample authority for so doing. We do not ask you as a particular favor, but simply as a matter of justice. Yours Respectfully,

THE JUDSON P. ST. RY. CO.
By H. L. EARLY, Sec.

Office of Chicago City Railway Co., H. H. Windsor, Sec., 2020 State Street.

CHICAGO, Nov. 5th., 1889.

Harry L. Earle, Esq., Sec. Judson Pneumatic St. Ry. Co., New York:

Dear Sir:—The report printed referred to in your 1st., was from advance manuscript and articles in type long before paper was read. I beg to inclose copy of what I have sent on to be added to the paper, in the official minutes. I regret it did not come out in the street railway papers. With kind regards, I remain Yours truly,

H. H. WINDSOR.

P. S.—I think you will find the addenda a little more complete than the remarks.

Addenda to paper on "Motors other than Animal, Cable and Electric," for insertion at end of chapter on "Compressed Air."

No little interest has been aroused in the recently announced system known as the Judson Pneumatic System, which is wholly unlike any heretofore proposed or tried. A section of a few hundred feet in length, including four curves, experimentally built and operated at the company's headquarters in New York, is said to have accomplished remarkable results. The plan contemplates a condnit, similar to a cable road conduit, in which extends from one end of the road to the other a revolving hollow shaft made of steel, and which is driven by compressed air engines placed at intervals along the line beneath the surface of the street. Friction rollers, suspended from the car similar to the cable grip, are at will brought against the revolving shaft, and the angle of contact determines the direction of the motion, either forward or backward, which the car receives. When the friction rollers are at right angles to the line of the shaft the rollers simply revolve and the car remains stationary. As the Judson company have notified your committee that they would have a working model ready for inspection at this time, and as the principles of the system can be so much better understood from examination than any written description, however complete, we will not trespass on the time of the convention, but refer all present to the very interesting model in the exhibition room.

Mr Aug. W. Wright, formerly Editor in Chief of THE STREET RAILWAY GAZETTE, but now of the firm of Wright, Meysenberg & Co., paid us a friendly call a few days ago, within an hour or two after his arrival in Chicago from Los Angeles, California, where he has just completed the construction of the Los Angeles Cable Railway, 21 miles in length. During the year he has made over six trips to California. This has been a very busy year for Mr. Wright: besides the Los Angeles line, he has cabled the Peoples Ry. in St. Louis and expects to have its 10 miles in full operation by December, the Milwankee Avenue line here, constructed under his supervision, is now approaching completion, and he has built over 15 miles of horse railway in and around Chicago.

A Pleasant Episode.

OFFICE OF
CHICAGO STREET INDICATOR AND ADV. CO.:
CHICAGO, November 2, 1889.

Gentlemen: You are requested to meet the undersigned at Room 34, Palmer House, Monday, Nov. 4th, at 11:30 a m., to inspect the new street indicator with which the cars of the City Railway company are being equipped. The party will proceed to Thirty-Ninth street, where luncheon will be served, and immediately thereafter will return in a special car.

An early reply is requested.

Very truly yours,
C. B. HOLMES,
S. W. ALLERTON,
S. B. COBB,
WM. P. WILLIAMS,
FRANCIS J. KENNETT.

Pursuant to the foregoing invitation, the following named gentlemen met at the place and time indicated:

W. M. Shaddinger, Otis S Favor (representing Sapolio), Wallace Kirk, of J. S. Kirk & Co.; Elliot Flower, Dunlap Smith, Wm. P. Williams, W. P. Johnson, C. F. Harrington, T. C Pennington, H. H. Windsor, J. H. Fairchilds, C. L. Hutchinson, D. G. Hamilton, Geo. Miller, S B. Cobb, S. W. Allerton, Frank Cooper, of Siegel, Cooper & Co.; Yaggy & Kinley, W. B. Williams, Louis D. Webster, W. F. Griffiths, G. B. Shaw, A. Loeb, Frank Lawlor, F. L. Kenfield.

The following named Chicago papers were also represented: *Tribune*, *Times*, *Inter-Ocean*, *Mail*, *Elite*, *Staats Zeitung* (Mr. Jansen,) *Saturday Evening Herald* (John M. Dandy), STREET RAILWAY GAZETTE by S. L. K. Monroe and E. V. Cavell.

After a few minutes spent at the Palmer House, the party embarked on a special train of cable cars and proceeded to the intersection of Thirty-Ninth Street and Cottage Grove Avenue, where an ample collation had been prepared at the Drexel Café for the regalement of the visitors. Escalloped oysters, cold ham, tongue and turkey, lobster,chicken, celery and shrimp salads, Roquefort and other cheeses constituted the solid part of the *menu*, while the finest of Haut Sauterne and Pommery Sec helped, to no small extent, in making the affair one where wit and wisdom kept pace with digestion. At the close of the lunch Mr. C. B. Holmes rose and introduced Mr. Wm. P. Williams, president in the parent company, The United States Indicator company, of which the local concern, The Chicago Street Indicator and Advertising company is an offshoot.

Mr. Williams pleasantly intimated that Mr. Holmes had shirked his duty in calling upon him to speak when it was well known what a past-master of oratory Mr. Holmes was himself, but that, since he was on his feet he would state that the gathering was mainly for the purpose of cold "business," of which the lunch was merely an "incidental." He felt sure that in placing the indicator before the public he was filling the void caused by a "want long felt," and that the general adoption of the device would enable the public to see "where they were, what they wanted and when to get off." He closed by saying that the gentleman on his right had suggested that the company should make the lunch a monthly affair, but that the adoption of the idea would depend largely upon the percentage of dividends earned.

The party returned on two special cars, in which the indicator had been placed. It worked like a charm, the advertisements and the names of the streets being plainly visible in all parts of the car. As a medium for placing an advertisement before the street car traveling public, the device is a most excellent one, and the additional comfort derived by the passengers in having the constant opening of the door by the conductor when calling out the names of the streets avoided, is a "consummation most devoutly to be wished."

Dear Sir: We beg leave to announce that Mr. A. S. Littlefield, of Chicago, and Mr. Emil A. Meysenburg, of St. Louis, have been admitted to membership in our firm, Mr. A. J. Soderer retiring. Very respectfully,

October, 1889. O. W. Meysenburg & Co.

That Cleveland (O.) Accident.

In a recent number of the Cleveland *Leader* we noticed an account of an accident on the Central Viaduct in Cleveland, through which a horse lost its life, and a child, and the coachman who was driving, got somewhat burned about the face. It appears, from the account published, that "at 5:45 o'clock the carriage of Mr. George W. Kinney, was on the viaduct going south. When within about 1,000 feet of the draw they heard a loud electric report ahead of them, and saw an unusually brilliant spark of electric fire, apparently caused by the breaking of a street railroad trolley wire. It was so dark at the time that the driver did not see the ends of the wire drop, and hence he knew not the danger ahead. Soon, however, he saw a guy wire which had also fallen, and, to avoid it, the horse was reined to the left. In doing this the animal was brought upon the track and against the trolley wire, probably coming in contact with the wire a moment or two before his foot rested upon the iron rail. When the horse touched the wire he began to stagger, and very soon fell heavily on his side across the wire and track, forming a perfect circuit through his body." Mr. Kinney jumped from the carriage, detached the horse and killed it with a club.

It seems to us that if ordinary common sense and coolness had been used, that not only the life of the horse might have been saved, but also the alleged injury to the coachman and the child, as described in the same paper the following day.

A similar accident is vividly called to our mind, which occurred on an electric road much nearer our city, wherein the broken wire descended, wrapped itself around a fine, large, black horse, which was thrown to the ground by the shock, and, in his exertions to rise, kept the wire cutting into the flesh, and it looked every moment as though he must die from the shock; but one of the street-car men went promptly to the assistance of the horse, and relieved him by the simple method of cutting the wire in two with his pliers, so that the horse was enabled to regain his feet, and was immediately taken to the veterinary surgeon's stable. We felt interested enough to follow the matter up, and to ascertain whether the horse lived or not, and have been assured by parties who have seen the horse at work on the street since, that the injury resulted in a scar about five inches long, which might affect the horse as to the matter of sale, but that it was as good a worker as ever, and is now valued at over $200. We also learned that the drivers of the cars were all provided with cutting pliers for use in handling the car if necessary, and that they had no fear whatever in cutting the wire, as the method of wiring their line, commonly called the "feed in," was such that, while they had on a number of occasions received a shock, which would inevitably be the case in cutting a live wire, yet they had never felt any uncomfortable effect from it; hence we are led to believe that if the railway company's employee had been a competent, cool-headed fellow, he could have cut the wire, and there would have been no necessity for killing the horse.

The explanation made by Mr. A. L. Johnson, superintendent of the road, regarding the accident was, that one thousand feet on each side of the draw bridge, the company had just broken the circuit by cutting the wire and placing in for connection, a few inches of mica, which is a non-conductor, for the purpose of preventing any possibility of a car plunging off into the river some dark night. When the draw bridge is swung the current is broken on that side, and after the car passes the mica in the trolley wire it would have to stop soon because of lack of current. As it now proves, this piece of mica was not strong enough. The mica broke, and not the wire. The colder weather coming on caused a contraction of the wire, and hence a greater strain upon the strip of mica. As it was, if the horse had not touched both the trolley wire and the track at the same time, it would have escaped with a slight shock, for on the wooden floor of the bridge there was no other way for a circuit to be formed. If the horse had fallen the other way, it would not have lain on the track and would not have been burned. If anyone around had had sufficient presence of mind to pull the wire from under the horse, which one could have done safely by keeping his feet off with slight burns.

the iron track, the horse would have escaped

The hasty erection of the overhead wires in Cleveland, by reason of the reigning fear of injunctions at the time, was undoubtedly the primary cause of the falling of the wire; but we have good reasons for believing that all the weak points along the various electric lines in that city are now being strengthened, and that the probability of another similar occurrence will soon be reduced to a minimum.

Victory for Mr. Charles Cleminshaw.

The Board of Railroad Commissioners has granted the application of the Troy & Lansingburgh Railroad company, to use electricity on the overhead system in Cohoes. The application was strenuously resisted by the Commercial Telephone company, of Troy, and no less so by the common council of Cohoes. In view of the importance of this decision, and for the purpose of making the same a matter of record to street railway companies, we give it herewith in full.

The decision is a complete victory for Mr. Charles Cleminshaw, who is to be heartily congratulated upon the result of his gallant fight against those to whom the advantages of electricity as a motive power are practically unknown.

First—As to the opposition from the Commercial Telephone company:

A large amount of testimony was had at these hearings, particularly touching the matter of the interference with the currents on the wires of the telephone company by conduction and induction from the wires of the railroad company.

It is not deemed necessary to review this testimony in detail. It appeared to be clearly proven however, that there was a substantial interference with the delicate currents on the wires of the telephone company by the high tension currents from the lines of the railroad company. It appears that the current which propels the motors in the cars of the railroad company reaches the motor by a single overhead or trolley wire. What is termed the "feed" wire runs on poles erected near the curb. At intervals of a few hundred feet this feed wire is connected with the overhead wire, thus supplementing the current in the overhead wire as needed. The circuit from the dynamos of the railroad company passes through the feed wire, or through the overhead wire, into the motor, through the wheels to the rail, and then back to the dynamo through the rails and the earth.

It is claimed by the telephone company that in the passage through the rails back to the dynamo, more or less "leakage" takes place into the wires of the telephone company, which may be grounded near the railroad track. This would be interference by conduction.

It is also claimed, and appeared to be proven, that more or less interference takes place from the proximity of the feed wire and overhead wire to the wires of the telephone company by what is known as induction (it being a fact of electrical phenomena that a current passing through one wire induces a current in the opposite direction through a parallel wire; the amount of the current induced being inversely proportionate to the square of the distance).

It appeared to be shown by the testimony of H. V. Hayes, an electrical expert, and by the actual experiments of A. Seeley, superintendent of the telephone company at Troy, assisted by F. W. Sabold, general manager of the Western Union telegraph company at Albany, that the interference from conduction or "leakage" could be remedied by the telephone company by laying a main ground wire, thus improving the circuit of the latter company, but that the difficulties from induction could not thus be disposed of.

It appeared to be further proven that the only way that the telephone company could entirely do away with the difficulties both of induction and conduction, would be by duplicating its wires so as to make a complete metallic circuit from every one of its subscribers to the central office. This was shown to be an exceedingly expensive, if not impracticable thing to do.

The telephone company, on the other hand, claimed that the proper way to remedy the difficulties from both induction and conduction would be for the railroad company to construct two overhead or trolley wires, thus making a metallic circuit complete from the dynamo, through one trolley to the motor and back again through the second wire to the dynamo and that this would be a matter of comparatively small expense to the railroad company.

The electricians on behalf of the railroad company admit that the double overhead or trolley wire would remedy all the evils, but they object to it upon the ground that it is much more difficult to operate than the single wire.

The telephone company request that the board decline to approve of the application of the railroad company, unless the railroad company agrees to construct a double overhead wire or trolley wire rather than a single wire.

The claim of the telephone company, in other words, is that it had constructed its poles and strung its wires lawfully, and was using the earth to complete its circuit; that the railroad company then constructed its poles and strung its wires near to those of the telephone company, and also used the earth to complete its circuit; that in the passage through the earth the currents of the greater intensity of the railroad company interfered with those of the telephone company; that this interference is a trespass and should not be permitted.

While the board recognizes that there is a hardship suffered here by the telephone company, it is in grave doubt whether it is of a character that the board would be justified in redressing, if it necessitated the board taking the position that the railroad company should not use the earth to complete its circuit. It appears to the board that the decision of this question should rather be brought before the courts in a suit for damages, or in some other proceeding, and the respective rights of the two companies to the use of the earth as a conductor be there determined. To determine it in the way petitioned by the telephone company, would be equivalent to saying that any electrical company using a minimum current should have the exclusive right to the earth as a conductor. This the board is not prepared to say. The question, so far as the board is aware, is unprecedented, and it does not feel that it is its duty to decide it. As before stated, it deems that the proper course would be a suit to be brought by the telephone company against the railroad company.

Second—As to the opposition from the city of Cohoes.

The principal objection raised by Mr. Fitts, attorney for the city of Cohoes, was that the erection of the necessary wires by the railroad company would interfere with the operation of the fire department in raising ladders in case of fire. Considerable testimony to this effect was given by Reuben S. Calkins, chief of the fire department of the city of Cohoes.

A brief was subsequently submitted by Mr. Fitts to the same effect, and suggesting that the storage battery system would be preferable to the overhead wires.

The board agrees with Mr. Fitts that great weight should be attached to the protest from the common council of the city in reference to this matter. With this idea in view, the entire board made a careful personal inspection of the streets through which the change of motive power is proposed. It finds that, inasmuch as the overhead system is now in operation through Lansingburgh, and in process of construction through the village and town of Waterford, the very much larger portion of the route of the railroad company, it would be impracticable to use storage batteries through one or two streets of the city of Cohoes.

The board also finds that there can be little or no objection to the wires upon any of the proposed streets of Cohoes except, perhaps, on that portion of Mohawk street between the junction with Ramsen street and Ontario street. Even here, if due precautions are taken by the railroad company, and facilities to cut wires provided in case of fire, the objections do not appear to be serious. It is also to be remembered that electric light wires already exist, carrying a current of 1,500 volts, whereas the current of the railroad company would probably not exceed 500. As the city authorities have permitted the electric light wires to be strung, it would seem but just that they should permit the railroad wires to be also strung, as the latter are far less dangerous than the former.

In view of the fact that the Troy and Lansingburgh Railroad company are now constructing the single trolley system through the town and village of Waterford, with the approval of the local authorities thereof, and with the consent of a large majority of the abutting property holders; that it has also constructed its line through the village of Lansingburgh with the same system; that a very large majority of the abutting property holders upon its line through the city of Cohoes have consented to the proposed change, and that no opposition has been presented from them; and in view of the further fact that the proposed change would be a great improvement upon horse power, the board deems that it is justified in approving, and does hereby approve, of the change of motive power from horses to the overhead single trolley system by the Troy and Lansingburgh Railroad company, on its own behalf, and as the lessee of the railroads of the Waterford and Cohoes Railroad company, the Troy and Cohoes Railroad company, and the Lansingburgh and Cohoes Railroad company, on the following portions of the above lines, to-wit:

On the Western & Cohoes railroad, from the bridge across the Mohawk river to its terminus in the city of Cohoes; on the Troy & Cohoes railroad, from its northern terminus in the city of Cohoes to the intersection of Mohawk with Ontario street in said city; on the Lansingburgh & Cohoes railroad, from its terminus in the city of Cohoes to its terminus in the village of Lansingburgh; with the following conditions, however, which are made part of this approval:

First—The rate of speed shall not exceed that to be definitely fixed by the mayor and common council of the city of Cohoes.

Second—The poles from which the wires are to be suspended shall be of a construction and height appropriate to the streets upon which they are to be erected, so as to impair the use and appearance thereof to the least possible extent, and before erection shall be approved by the board of railroad commissioners.

Third—No car shall run with less than two men to operate it if run alone; if two cars are coupled together there shall not be less than three men for the two cars.

Fourth—The company shall take all reasonable and proper means to prevent the currents from its wires, through leakage, induction or otherwise, from interfering with the currents upon the wires of other companies, whether telegraph, telephone or otherwise. This provision, however, is not intended to require the railroad company to construct a double trolley wire.

Fifth—The railroad company shall provide insulated shears at some convenient point near the intersection of Ontario and Mohawk streets, and at other points on its line designated by the local authorities, with which to cut its wires in case of fire, and shall also supply the fire department of the city of Cohoes with such shears.

Sixth—The company shall remove the snow from its tracks on that portion of the road in Mohawk street between Ontario and Remsen streets, and not throw it on each side, as has been the custom heretofore.

Seventh—The company shall keep the paved part of the streets between the tracks in repair, and also the space of two feet outside of each rail.

The Street Railway Gazette.

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A Diet of Promises.

"No Puff—No Adv."

Again we beg to acknowledge receipt of a most polite request to publish an illustrated write up of a mechanical device, a description of which has appeared in the trade papers of the country, periodically, for the past three or four years:—perhaps we may take a somewhat narrow view of the case, but we can not just see of what possible interest this bewhiskered "chestnut" can be to the street railway fraternity, and especially to the many readers of the Gazette: While we are always ready and anxious to bring all meritorious devices for street railways before the constituency we represent, we believe it to be our duty to exclude from our columns all matter that is of little or no interest to our subscribers.

The request to publish the description of the device in question was artfully tailed off with a hint that "perhaps when the new year opens, we may conclude to place an advertisement with you."

Reference to our letter files reveals the fact that this same glittering inducement has been held out to us by the same parties, during the past three years, no less than three times, and we can not but feel somewhat surprised that it should again be offered after we have repeatedly stated that we would continue to pursue the policy inaugurated with the initial number of the Gazette, of keeping the two departments — the editorial and the advertising—entirely distinct and apart.

Dear possible advertiser, we feel honored and grateful in that we have not been overlooked in these your annual hints that "you may conclude etc.," but did you ever have to pass through the experience of living on hints and promises?

Gentle sir, did you ever try to live through the long weary year, with a constant hankering after the "ads. that never came" or attempt to become good and great upon an annual diet of promises that never materialized? Did you ever try to thrive, and to build your paper up, until it became a large and powerful organ on the buoyancy and expectancy of a sanguine nature, or on promises given in exchange for "write ups," and the prophetic beckonings of a rosy, corn-fed future? If you have passed through any or all of these journalistic experiences, then you should, by this time, have fellow feeling sufficient within the fossilized remnants of your heart, not to ask us to live upon expectancy. Ye, who have been through the mill, well know how "hope deferred maketh the heart sick." Come in, then, out of the rain and snow; in, under the sheltering wing of the Gazette; help us to realize our soaring ambitions, and give us reason to thank God for having our home in this great and glorious country.

Misleading Statements made by the Dailies.

"Chattanooga, Tenn., Nov. 7.—(Special.)—A fate similar to the one that recently befel Lineman Feeks, in New York, overtook Harry Oliver, a 15 year old boy, this morning. Oliver was employed to wipe the gearing of the electric cars. Ignorant of the fact that the current was turned on he touched a live wire connecting with the battery, or else the battery itself, and a loud cry for help called the workmen to him. Blue smoke was already issuing from his hands and he was suffering the most excruciating pain. The current was shut off at once, but too late; the deadly fluid had done its work and the boy expired in the greatest agony after having been removed to his home."

The foregoing article, clipped from the Chicago *Tribune* of the 8th inst., demonstrates the truth of the old adage that "A little knowledge is a dangerous thing." To the average street railway official or common councilman, this carelessly and ignorantly written dispatch means strong antagonism to the adoption of electricity as a motive power for the purpose of inter-urban transportation. There is but one electric street railway in Chattanooga and it has both the Sprague and the Thomson-Houston motors in operation, run from power generated through Edison dynamos, the maximum current of which cannot exceed 500 volts, a potential which might shock, but which can neither kill nor produce the "blue-smoke" effect so vividly described in the foregoing "special" to the "Tribune." In short, the fact is, that the Chattanooga Co., contemplating an increase in its power capacity, had occasion to tear down its old station, in order to utilize the space occupied for the erection of a new and more commodious station, found it necessary to remove its dynamos, temporary, to an arc light station, contiguous to the old power house, from which station power was to be obtained until the new buildings were erected. It is thus probable that, in the making of temporary connections, by one of those unfortunate accidents which occasionally occur, incidental contact was made between the arc and motor systems, which, to the initiated, tells the whole story.

The sooner people are informed on this subject the sooner electrical propulsion will become even more popular than it now is, and the various high potential, arc and incandescent, lighting companies will be compelled to bear the responsibility properly attributed to them.

In conclusion we feel compelled to enter a vigorous protest against the publication by the Daily Press of such so-called "information," without full technical investigation, as grossly misleading as the "Special" to which we now refer, inasmuch as it can not but mitigate against the investment of capital in the interests of Rapid Transit in general and electricity in particular. Within the past year or two, over 200 street railways have adopted the subtle current as a motive power, and we have yet to hear of a case where any serious accident might not have been avoided if the most culpable carelessness had not been exhibited.

Low vs. High Potential.—Practical Illustration.

A would-be electrician, who had learned the whole science of electricity in one night, and thought he knew it all, managed, by some hook or crook, to get a low potential motor fired out of a prominent candy store in New York, where it had been successfully used in the manufacture of ice cream and candies. He claimed that by adopting a motor of a different make he could effect a considerable saving in the cost of current.

Being cautioned by the expert of the Arc Light company from whom current was obtained, to be very careful regarding his insulation when handling the new motor, he erected a small platform upon glass insulators, which he claimed would render the use of the higher potential perfectly safe and innocuous. However, man proposes but—we must paraphrase the axiom and reverse the letters of the next word—"DOG disposes," as was effectually demonstrated within the next day or two.

Scene 1.—Cellar of candy store.

Dramatis Personæ: Would-be electrician. W. B. E. discovered manipulating motor with right hand, while left is cautiously poised in mid-air behind his back.

Scene 2.—Enter Laverick setter dog, thoroughly drenched while interviewing an autumnal shower, in search of master, crosses well saturated floor with silent footsteps, and mistaking the W. B. E. for his master, rubs his moist and frigid nose against said "cautiously poised hand," thus completing the dreaded circuit.

Scene 3.—Kaleidescopic tableau, consisting of dog, ice cream freezers, motor, insulators, platform, cusses—Big, big D's and W. B. E.

Moral: "Let well enough alone."

Vale Horses—*Vale* Mules.

During the past season the street railroads at the seashore reported very heavy business, and the cars operating upon these roads were frequently crowded to their utmost capacity. We understand that, upon Aug. 11, the electric railway at Atlantic City, N. J., carried 42,600 passengers. Every car in operation was crowded with passengers, and the entire equipment of sixteen cars was in constant service. Each car besides carrying its own load of passengers drew one trail car also loaded, and in some cases two trail cars were drawn. In spite of this demand upon the electric motors, the cars made their usual speed of from 18 to 20 miles an hour, and ran without interruption or the loss of a single schedule trip.

The regular schedule of one of the electric cars at Atlantic City includes 18 trips per day, or about 120 miles. This is the lowest schedule allowed for any car, and many make even more than this. Considering the loads which the cars are obliged to carry, and the fact that all the cars were kept in constant operation, a mileage of this kind is particularly significant, and one which indicates the reliability of electricity as a motive power.

Since this line was put in operation, (about three months) the cars made over 100,000 miles. During this time there was not a single schedule trip lost by the electric cars, in spite of the fact that all the cars were in constant operation. We can not but think that records like this force even the most skeptical to believe that "the horse must go."

Maj. George A. Howard, of Nashville, Tenn. has recently entered the electrical field. Maj. Howard is a well-known and influential politician in the Southern states. He has been appointed special agent for the Short Electric Railway company, with headquarters at Nashville. He is already laying up a large amount of business for the company during the winter months, and with his business capacity and large experience, can not fail to succeed well in his new undertaking

Street Railway News.

(See also "New Enterprises," "Extensions," "Elections," etc.

(The following data is compiled with all possible care, but the publishers, receiving news as they do, from almost every state, territory and country, cannot be held responsible for errors, as it would be wholly impossible to obtain a verification of each item received by them in time for each issue.)

CALIFORNIA.

Los Angeles.—A transfer was recently made of the Los Angeles Cable Railroad company, all of its real property, franchises, rights, etc., to the Pacific Railroad company, the consideration being $2,500,000. In explanation of the transaction, Mr. J. R. Robinson, vice-president of the cable company states that the transfer is the consummation of a plan which took place at Springfield, Ill., last summer, and which eventuated in the formation of the Pacific Railroad company, all the principal stockholders of which are eastern men. They felt somewhat uneasy over some of the provisions of the California laws relative to the liability of stockholders. This was one reason for the formation of the new company. Another reason was the need of securing larger facilities for its proper handling.

Oakland.—It is expected that the cars of the Oakland & Berkely Rapid Transit company will be in operation by the 1st of January. The overhead system has been adopted. A list of the directors of the company will be found under the head of elections in this issue.

San Jose.—The San Jose & Santa Clara Railway company has contracted with the Thomson-Houston Electric company for the equipment of an overhead electric system. Work will be commenced at once, and it is expected that the line will be in operation within ninety days.

CONNECTICUT.

Ansonia.—The horse railroad line between this point and Birmingham has now ceased to operate; the franchise of the road and the track equipment were recently purchased by H. Holton Wood, president of the electric railroad here. The horse cars have been stored and the animals disposed of. It is doubtful whether anything will be done with the line by the electric people.

FLORIDA.

Ocala.—The Ocala & Suburban Street Railway company has petitioned for a renewal of its charter, which expired some time ago.

GEORGIA.

Savannah.—The belt line will do nothing toward introducing electricity on its line as a motive power until after the first of the year. President W. G. Cooper says that the company is awaiting the result of experiments now being conducted with a new storage battery. If successful, it will probably be adopted.

INDIANA.

Indianapolis.—The West Street car stables of the Citizens' Railway company were destroyed by fire on the night of September 27th. The loss is estimated by Manager Steele as follows: Stables, $4,000; feed, $1,000; harness, $500; total, $5,500, all, however, covered by insurance. [When will the street car companies take advantage of the "Special Hazard" obtainable upon the adoption of the electric light in car stables? —Ed.]

IOWA.

Des Moines.—The bonds of the Des Moines Street Railway company have been placed with Chicago parties. Under the new management there is little doubt but that the road will be a very paying investment to the stockholders.

KENTUCKY.

Covington.—We understand that the Short Electric system will be adopted on the line of the South Covington & Cincinnati Street Railway company.

LOUISIANA.

Shreveport.—Work on the Belt Line here is being pushed rapidly.

MARYLAND.

Baltimore.—The City Passenger Railway company of this city, has gravely considered the advisability of taking legal steps to adopt the Judson pneumatic system of street car propulsion, and it is more than probable that it will build an experimental line with a view of determining whether the system can be made a commercial success in this city.

Permission has been granted for the adoption of electric or cable traction on the line of the Union Railway company, Central Railway company, Peoples Passenger Railway company, the Citizen's Railway company and other lines here, as also fo the North Avenue Railway company, of which Mr. Frank Slingruff is president.

A public trial was made recently at Laurel, Md., of the Weems Electro-Automatic Railway, in the presence of Dr. J. J. Chisolm, the president of the company; David G. Weems, the inventor and general manager; Wm. M. Pegram, secretary; President John M. Hood, of the Western Maryland Railway; W. W. Spence, Andrew Reid, John W. Hall, Joseph Rieman, William H. Baldwin, Henry Jones, Gen. Bradley T. Johnson, Otto Sutro and others. This railway, a description of which has already been given in the "Gazette," has three rails, one of them overhead for the driving power. There are many changes of grade, the maximum being considerably more than one hundred feet to the mile. Inside the ellipse is the building for the engine and dynamos used in generating the electricity. The motor is something similar to a cigar shape in its construction, and with this motor the trials were made, while the spectators timed the trips. The speed was accelerated with each trip, of which five were given. The first run around the two miles ellipse was done in 3.30 minutes; the second, 2.10 minutes; third, 2.00 fourth, 1.56 minutes; fifth, 1.50 minutes. It was explained that because of the late rains the tracks were not in condition to permit of the attainment of the highest rate of speed, which it was stated has been shown to be one minute for the two miles. But the trial was satisfactory, and many of the gentlemen present gave expression to their surprise at the exhibition, which they admitted was, to them, a marvel of practical mechanical invention.

The Union Line Railway Co. has asked Mayor Latrobe to sign the ordinance permitting it to use electricity or other mode of rapid transit. The mayor said he would not sign an ordinance which gave authority to erect poles on the street, and the only ordinance passed in connection with rapid transit which he would sign was that for making a trial of a system designated by ordinance.

As we go to press news reaches us from this city that the Baltimore Traction company has decided to adopt rapid transit at once, and to have its lines operating under the same by next July.

Mr. Howard Munnikhuysen, counsel for the company, says: "The contracts have all been completed and signed, and there is no doubt but that Baltimore will soon have a first-class cable road. The system to be used will be similar to that adopted by the latest cable roads built in Pittsburg and Chicago. The engines, boilers, machinery and castings are all in process of construction, and I believe that by the 4th of July next, cable cars will be running between Druid Hill and Patterson Parks. No interruption to travel will be caused by the change from horse power to the cable, and the present cars will be run until superseded." The Traction company owns both Citizen's and People's railway. The Citizen's line will probably be cabled first.

An ordinance was recently introduced into the city council for the purpose of authorizing the North Avenue Railway company to use either electricity or cable as a motive power. The matter was referred to the committee on city passenger railways. The tracks of the company have not yet been laid, but a charter for it has been granted by the city council.

We understand that the Central Passenger Railway company, of which Mr. Peter Thompson is president and general manager, contemplates the use of cable or electricity as a motive power, and an ordinance has been introduced into the city council for the purpose of obtaining the necessary authority for using the new motive power. This was also referred to the committee on city passenger railways.

The ordinance for the purchase of the Baltimore City Passenger Railway company by the city came up lately in the second branch of the city council, and was referred to the committee on ways and means. Mr. Wiener, who offered the ordinance, opposed its reference. He had been recently informed, he said, that a Philadelphia syndicate desired to purchase the Citizens' and People's and also the City Passenger Railway. A stockholder in the latter company said the stock could be bought for $250 per share. This gentleman offered $90 per share, and it was then quoted in the market at $72, the par value being $25. If the company was represented before the committee an opportunity will be afforded of inquiring if the city is fairly treated in the park tax payments of that company.

MASSACHUSETTS.

Beverley.—The new Beverley & Danvers Electric Street Railway was opened on October 19th. The line is operated by storage batteries, the cars being charged to run 40 miles.

Lowell.—The annual meeting of the Lowell Horse Railway company was held here on the 22d of last month, 712 shares being represented at the meeting. An annual dividend of 6 per cent. was declared. The report of the treasurer, W. M. Sawyer, showed the receipts to have run less than a year ago on account of the necessity of being compelled to run half trips consequent upon the burning of the stable property of the company, and the stoppage of cars at Gorham street by reason of the improvements being made in the sewerage.

During the year the cars ran 453,105 miles, and 2,096,314 passengers were carried.

Pittsfield.—The company has decided to adopt electricity for running its cars, provided the directors can carry out their financial plans. At a meeting recently held it was voted to dispose of the 64 shares of stock remaining unsold not heretofore legally issued. Upon the payment of these shares mortgaged bonds to the amount of $30,000 or $35,000 will be issued to pay the present indebtedness and procure the necessary plant to run the cars of the road by electric motors. The superior economy of electricity as a motive power, and the better service that can be given, will, it is believed, make the stock valuable and dividend paying. The directors find that the cost of running the road will be about half what it is at present, and the most conservative estimates place the increase in travel at 25 per cent. About half of these 64 shares will be taken by eastern men now owning stock, and the rest will be taken by Pittsfield capitalists. The management of the road is now in the hands of men who have the confidence of the community, and they will receive solid backing. One plan in contemplation is the extension of the road toward Dalton, as that part of the town is growing rapidly.

MICHIGAN.

Grand Rapids.—The electric railway ordinance has been passed with the clause requiring the company to pave a strip of the streets eight inches in width outside the tracks stricken out, but the company was required to plank and keep in repair the roadway on all bridges crossed by its line.

An application was recently made by the cable company here asking that the time for the completion of its third ward lines be extended from Nov. 1st of this year to Oct. 1st, 1890. The matter was referred to the committee on ordinances.

MINNESOTA.

Stillwater.—The Stillwater Street Railway company has filed amendments to its charter.

MISSOURI.

Kansas City.—We understand that the bondholders of the Tenth Street line have applied for a receiver. Some time ago a meeting of the directors was held in Chicago, and the road was turned over to the bondholders, who announced their intention of paying off the indebtedness and operating the road, but in order to obtain formal possession of the same, legal proceedings had to be instituted. The Mercantile Loan & Trust Co., of Chicago, holds the first mortgage on the road, the indebtedness on which is now in the neighborhood of $110,000, which, however, represents but part of the cost of construction. The majority of the bonds are held by the stockholders. Mr. Lysle Hopkins has been acting treasurer of the company, and is now made its general man-

ager. The road is in a very prosperous condition, and will probably be considerably extended in the immediate future.

At a recent meeting of the stockholders of the Ivanhoe Street Railway company, the capital stock was increased from $120,000 to $125,000. A list of the new officers appears under the head of elections in this issue.

The Metropolitan Street Railway company is preparing to change its Rosedale line from animal to electric traction. The power house will be erected on the site of the present car stables. When completed the line will be 2¾ miles long. Work is now progressing along the line, and it is expected that trains will be running by December 1st. We also understand that it is the intention of the company to build a line in the near future connecting Rosedale with Argentine.

St. Louis.—At a recent meeting of the directors of the St. Louis Car company, Messrs. Dan McAllister, Julius Lefmann, Henry Manne and Henry Schroeder disposed of their interest in the concern to John H. Kolush, and have retired from the company and its management. A list of the new directors of the company will be found in the list of elections in this issue.

NEW JERSEY.

Jersey City—Permission has been accorded the Jersey City & Bergen Railroad company to use electricity as a motive power.

It is probable that the storage battery will be adopted in the more thickly populated part of the city, and the overhead system will be used only upon grades.

NEW YORK.

Binghamton—We understand that a New York syndicate is negotiating for the purchase of all the street car lines here.

Brooklyn—The Brooklyn City Railroad company has decided to increase its capital stock from $3,200,000 to $6,000,000.

The franchise to build a horse railroad on Flushing Avenue, from Graham to Bushwick Avenue, and from Knickerbocker Avenue to the state line, has been sold to the Brooklyn City Railroad company for one tenth of one per cent. of the gross receipts of the road. This road will be an extension of the present Flushing Avenue line, and passengers will be transferred to it without extra charge.

Frankfort—At a recent meeting of the Frankfort & Ilion Street Railroad company, a dividend of 5 per cent. was declared, leaving a balance in the treasury of $300, as a result of the six months business.

The earnings of the road during that time were $1,958.68 against operating expenses of $994 22. A list of the newly elected officers and directors will be found under the head of elections in this issue.

Rochester—The Crosstown Railway company has secured by purchase the Rochester City & Brighton Railway company, including 40 per cent. of the stock of the Electric Railway company, $10,000 worth of the stock of the Bay Railroad company, and $5,000 worth of the stock of the Rochester & Glen Haven Railroad company. We also understand that the Crosstown people will take possession of all the property of the old corporation, will unite the two systems as one, and carry out all the plans for improvement that it designed for its own lines. Information reaches us that a syndicate of New York and Pennsylvania capitalists is behind the deal. The sum of $45,000 has been paid on the contract, which calls for the payment of the balance of the purchase money, a sum amounting to something like $2,135,000 at a date not far from the present.

The present stock of the Rochester & Brighton Railway company is $500,000, with a bonded indebtedness of $875,000; that of the Crosstown & South Park Railways being $250,000, with no bonded indebtedness.

The Crosstown & South Park Railroads have awarded the contract for electrical equipment to the Thomson-Houston company; ten motor cars will be in operation before January 1st; the Johnson rail will be used.

The Rochester City & Brighton Railway company owns and operates forty-five miles of track. Its capital stock is $500,000 and its bonded indebtedness $700,000. The gross earnings from operation last year were $462,208.66, operating expenses $366,405 85, and the net earnings $95,802.81. The income from all other sources was $3,063.33, making the gross income from all sources $98,866.11. There are thirteen lines, all starting from the Four Corners. The company owns in the neighborhood of 190 cars and has about 850 horses. There are four barns besides the main barn on State street, viz: North Saint Paul street and Park avenue; and the number of men employed varies from 475 to 500. During the last year there were carried nearly 11,000,000 passengers. During the summer just past cars connected with the electric road were put on, and they carried about 100,000 passengers to the Ridge road, where the connections were made with the electric road.

Seneca Falls. — The Seneca Falls & Waterloo Street Railway has been sold under foreclosure sale to S. L. Phillips, of the Thomson-Houston company, the consideration being $6,700. The road has not been in operation for nearly two years on account of legal and financial embarrassments, but if the right of way through certain premises can be obtained, the cars will be operated by steam power until electricity can be substituted.

Syracuse.—It is very probable that electricity or cable power will be adopted on the lines of the Syracuse & Onondaga Railway company in the spring.

Utica.—At a meeting of stockholders in the Utica Belt Line company, recently held, the amount of capital stock was increased from $150,000 to $300,000, and the treasurer was authorized to negotiate for the sale of $500,000 worth of first mortgage bonds to take up the present bonded indebtedness of $300,000, consisting partly of first and partly of second mortgage bonds. The balance of $200,000 will be used to make the proposed improvements in the road.

It is expected that cars will be running by electricity on the Belt Line tracks before the end of the year.

The Belt Line Street Car company has received permission to adopt electricity, and it is expected that cars will be running with the new motive power by the 1st of January. We give in detail the reply of the State Board of Railroad commissioners to the application of the company to change its motive power:

"In view of the facts that the local authorities having control of all the streets, both in Utica and the outlying villages through which the lines of the railroad run, and that the property owners to the amount of $14,500,000 out of a total assessed valuation on the line of the route of $23,000,000, have consented to the change of motive power, and that even on Genesee street a majority appear to have consented, this board is of the opinion that it is justified in approving, and does hereby approve, of the change of motive power by the applicant from horses to electricity So that the said Utica Belt Line Street Railway company may operate its present system of street surface railways, and each of them, whether leased or owned, by electric power transmitted to the cars from wires suspended overhead, with the following conditions, however, which are made part of this approval:

"First—The rate of speed shall not exceed that to be definitely fixed by the mayor and common council of the city of Utica and the boards of trustees of Whitesboro and New Hartford on the streets within the respective jurisdictions of said municipal or village corporations.

"Second—The poles from which the wires are to be suspended shall be of a construction and height appropriate to the streets on which they are erected, so as to impair the use and appearance thereof to the least possible extent, and before erection shall be approved by the aforesaid municipal or village authorities respectively.

"Third—No car shall be run with less than two men to operate it, viz., conductor and brakeman.

"Fourth — The company shall take all reasonable and proper means to prevent the currents of its wires, through leakage, induction or otherwise, from interfering with the currents upon the wires of other companies, whether telegraph, telephone or otherwise."

NORTH CAROLINA.

Charlotte.—We understand that the Charlotte Street Railway company will probably adopt electricity in the spring.

OHIO.

Akron.—We understand that J. H. Wade and S. I. Everett, of Cleveland, have traded the Akron Electric Street Railway here for the Academy of Music.

Canton.—The lines of the Canton Street Railway company and the Lakeside Street Railway have been sold to a syndicate of Akron capitalists for $120,000, and will in future be operated by electricity.

The Canton Street Railroad company has increased its capital stock from $45,000 to $100,000.

Tiffin.—We understand that the Street Railway company here will probably adopt electricity as a motive power in the immediate future.

Toledo —By the time this issue of the GAZETTE reaches its subscribers, a contract for the electrical equipment will probably be closed by the Toledo Street Railway company. Mr. Lang, the general manager of the system is determined to leave nothing undone to bring the property up to the highest possible standard of excellence.

Zanesville.—President Townsend of the Street Railway company here, has been investigating the overhead electric system with a view to converting his horse car lines to the same.

ONTARIO.

Windsor.—All Street Railway stock held in Windsor of the Wickerville and Windsor Street Car company has been sold to A. L. Patrick, and the road now practically belongs to Messrs. Boomer & Patrick. The amount of stock transferred was about $25,000 worth, and 100 cents on the dollar was paid for the same.

PENNSYLVANIA.

McKeesport.—An attempt was recently made to stop work on the line of the McKeesport Railway company. The burgess who ordered the work stopped claimed that he was acting under instructions from the street committee, which claimed that an ordinance was passed about two years ago compelling every person to secure a permit from the committee before tearing up improved streets. The matter was however adjusted, and work proceeded.

Johnstown.—The Johnstown Street Railway and its franchises have been bought by Tom L. and Albert Johnson, of Cleveland. Electricity will be used as the motive power of the new road. Out of the fifteen cars and one hundred horses owned by the company before the flood, there have as yet been found only the trucks of one car.

Philadelphia.—The Commercial Street Railway company, which is said to be a branch of the Traction company, has filed a bill in equity in the Court of Common Pleas against the Germantown Passenger Railway company and the Peoples' Passenger company, to restrain them from laying tracks on Fourth Street between Norris Street and Lehigh Avenue.

Pittsburg.—An ordinance has been presented to the city council with a view of prohibiting the construction of overhead wires for street car transmission. We understand, however, that it is merely a question of politics.

Wilkesbarre.—We understand that the Wilkesbarre & South Side Street Railway company, which was chartered about two years ago as an electric road, has been compelled to abandon its project, and refund the money paid in by stockholders.

TENNESSEE.

Clarksville.—A permit has been granted to John H. Shelton, president of the Street Car Railway company, to commence work on the proposed line out to Greenwood Cemetery.

Memphis.—The petition of the Memphis Electric Railway company for a right of way over the county roads has been granted.

The Hon. R. J. Vivian, the Kansas City capitalist who is interested in the road, says that it will be completed within two years from now.

TEXAS.

Dallas—The West Dallas Electric Railway company has been transferred to T. L. Marsailas, who, we understand, will convert it into a belt line.

Galveston—Suit has been entered in the U. S. Circuit Court by Walter T. Miller, of New York, against the Houston Street Railway for the recovery of $8,000, the value of 43 shares of stock. Mr. Miller alleges that he purchased these shares of stock from the late T. W. House, of Houston, on the 1st day of October, 1873, that at the time of the purchase, and thereafter, the stock was recognized as a bona fide obligation of the railway company, and of proper issue; that, in seeking to have this stock legally and properly transferred to his credit, and in his name upon the books of the company, his demand has been persistently refused by the managers of the com-

pany; upon all of which he bases the ground for his suit, which is brought to recover the value of the stock, at its present market value.

Weatherford—The Weatherford City & Suburban Railroad company has executed a mortgage on its property for $20,000.

VIRGINIA.

Portsmouth—The Portsmouth Street Railway company has been purchased by Commodore A. E. Bateman, of the Atlantic & Danville Railroad and a New York syndicate, and the property will be improved at once.

WASHINGTON TERRITORY.

Seattle—Work is progressing on Mr. J. M. Thompson's motor line along Commercial street, but it has not yet been decided whether the road will be double or single track. When completed the road will be about 2¼ miles in length. The track will be standard gauge, and steam motors of the latest improved pattern will be used. It is expected that the road will be in operation by spring.

Work on the Madison Cable Road is progressing finely, and it is expected that the road will be in operation by the first of next March.

The Salmon Bay extension of the Front Street Cable Railway is to be built by the company itself, under the personal supervision of Mr. A. Jackson. The franchise is still before the council, but will probably be awarded.

WISCONSIN.

Racine—We understand that the Belle City Street Railway company of this city has been sold to eastern capitalists for $78,000; the news is, however, unconfirmed.

New Enterprises.

ALABAMA.

Gadsden.—The Alabama Street Car company of this city will build a street car line here. Obal Christopher, J. S. Stewart and others are interested. The capital of the company is $25,000.

CALIFORNIA.

San Francisco.—An application has been made for a franchise for a cable railway from the terminus of the Haight Street road down Stanyon to J. and thence out to the ocean beach.

San Jose.—The San Jose & Santa Clara Street Railroad company has accepted the provisions of the franchise for the overhead system.

COLORADO.

Denver.—A meeting of capitalists was recently held here for the purpose of considering the advisability of the construction of an electric line from the heart of the city through Jerome Park into Fairview. Funds sufficient for the construction of the road were subscribed at the meeting. We believe that the road will undoubtedly be built. The cost of the road when constructed will be in the neighborhood of $75,000.

CONNECTICUT.

New Haven.—The West Haven Horse Car company will build a two story brick building, with stable in the rear and accommodations for cars on the second floor. The building will cost about $6,000.

ILLINOIS.

Chicago.—The secretary of state has licensed the Chicago, Lake View & Evanston Tramway company, to operate street railway lines in Chicago and elsewhere. The capital stock is $1,000,000. The incorporators are: J. W. Dyrenforth, P. C. Dyrenforth and Samuel R. Hibben.

KANSAS.

Fort Scott.—The Fort Scott Street Railway company, capitalized at $250,000, has been incorporated. A list of the directors will be found under the head of elections in this issue.

Junction City.—The Junction City & Fort Riley Rapid Transit Street Railway company, capitalized at $50,000, has been incorporated. A list of directors elected for the ensuing year will be found under the head of elections in this issue.

KENTUCKY.

Georgetown.—The Georgetown Street Railroad company has now been organized. S. M. Davis is president. The company is now open to receive bids on material and construction.

MAINE.

Bethlehem.—If the right of way can be obtained, a street railway will probably be built here next spring.

MASSACHUSETTS.

Boston—The Hyde Park & Dedham Street Railway company, of which Mr. C. A. Coffin of the Thomson-Houston company is treasurer, has been chartered with a capital of $80,000.

Nantucket.—It is probable that Nantucket will have a street railway sometime next year. Mr. Thos. Macey, of this place, is interested. We understand that electricity will probably be adopted.

MICHIGAN.

Kalamazoo—At a recent meeting of the city council two local companies petitioned for franchises to build electric roads in this city. The companies are the Peninsular Electric Street Railway company and the second company is an eastern syndicate. Both companies are backed by large capital and each ask for five routes. When the council comes to choose between the two companies some lively times may be expected.

MINNESOTA.

Faribault—We understand that an electric street railway will probably be built here in the near future.

MISSOURI.

Kansas City—An ordinance has been passed giving A. Mardis and Norton Thayer a franchise to build and operate a street railway over certain streets in the city. Sixty days is given in which work must be commenced, and the road must be in operation within eighteen months on a $10,000 forfeit. We understand that electricity will be adopted as the motive power.

Joplin—A company has been formed under the name of the Joplin Rapid Transit company, for a cable or electric street railway here. Mr. O. B. Stein, of Kansas City, is interested. We understand that the company proposes to connect Webb City, on the east, and Galena, Kas., on the west, with a system.

St. Louis—The St. Louis County Street Railway company is an organization recently incorporated under the laws of the state of Missouri, with a capital stock of $7,000 divided into shares of $150. The object of the company is to construct a street railway from the present terminus of the Citizens' Railway, at what is known as Rinkleville, in the city of St. Louis, westwardly along the St. Charles rock road to the point of intersection of said road with the Wabash, St. Louis & Pacific railroad, in the county of St. Louis, a distance of some two miles. The enterprise was projected some 15 months ago, by M. B. Greensfelder, Emil L. Dosenbach, Henri Choteau, P. M. O'Neil, F. W. Rauchenstein, William C. Wengler and George Autenrieth. They obtained from the county court the right of way over the St. Charles road with the conditions that they construct their grade so as to correspond with that of the road, and not obstruct the travel; that the motive power should be either horse, cable or electricity; that the rate of fare shall not exceed 5 cents for one ride each way; that the width of the bed of said railway shall extend from the southern boundary line of the St. Charles road northwardly a sufficient distance to enable the roadbed to be properly constructed without infringing upon the macadamized portion of the rock road, or in any way obstruct travel upon the full width of the macadamized portion of said road, and that they shall construct the railway and every part thereof within two years from December 12, 1887.

The company has applied to the county court for an order confirming unto the company the rights and powers granted unto the gentlemen mentioned above, and after due consideration it was so ordered by the court. All of the above-named gentlemen are members of the corporation, and it is officered as follows: Emil L. Dosenbach, president; George Autenrieth, vice-president; F. W. Rauchenstein, treasurer; W. C. Wengler, secretary. To be within the statute law they must have the road completed and in operation by next February. The route is said to give promise of liberal remuneration. When constructed it is more than probable it will be leased to the Citizens' Railway company.

NEVADA.

Nevada City—A company has recently been formed in San Francisco to build and equip a street railway connecting this city with Grass Valley, a distance of about four miles. The company intends the road to be in operation within one year. It is as yet uncertain whether electric, cable or animal traction will be adopted.

NEW JERSEY.

Newark—The Summer Avenue Railroad company of this city has been incorporated by Theodore Clarkson and Richard Coff of New York, Milton C. Quimby, Henry A. Hudson, Henry Ehman, Arthur W. Hapley and John Dooley of Newark. The capital stock is $100,000.

The object is to construct a double track road from the centre of Bloomfield Avenue, via Summer and Vernon avenues, to Lake Meet.

The question of motive power has not yet been decided.

The Cable Motor Traction company of this city has been incorporated with a capital stock of $3,000, with the object of operating, selling and manufacturing cable grips and other appliances for cable roads.

Orange—The East Orange Rapid Transit company has been incorporated for the purpose of building and operating a crosstown road, to be operated by storage batteries: a list of the officers will be found under the head of "Elections" in the present issue.

NEW YORK.

Buffalo.—Mr. Henry Altman, president of the Buffalo Electric and Cable Street Car Railway company, which proposes to build and operate street car lines upon about 50 miles of streets here, expresses the opinion that the road will undoubtedly be built.

The majority of the stock is owned in Buffalo, but we have good reasons for surmising that the Philadelphia syndicate is back of the scheme.

East Syracuse.—An application for a franchise for the Eastwood Heights Electric Street Car company, to build a line through this village, has been made.

Rochester.—The work of laying the tracks of the Crosstown Railroad is progressing well, and it is expected that the road will be in running operation by the 15th of December. Five miles of double track will be laid this fall. Ten motor cars have been ordered, and Johnson rails will be used.

OHIO.

Cleveland.—The Cleveland and Mt. Pleasant Street Railroad company, capitalized at $25,000, has been incorporated.

Defiance.—Mr. Wm. Carter is interested in an electric railway project here, and it is probable that the Short Electric company furnish the equipment.

Salem—The Salem Electrical Railway company, of Salem, Ohio, capitalized at $100,000, has been incorporated.

PENNSYLVANIA.

Beaver Falls.—Beaver Falls College & Matamora Electric Street Railway company of this city has been incorporated with a capital stock of $50,000.

Greensburg.—The Greensburg & Hempfield Electric Street Railway company has been chartered. The capital of the company is $60,000.

The road will be four miles in length. A list of directors will be found under the head of elections in this issue.

Hollidaysburg.—The Hollidaysburg and Altoona Street Electric Railway company of this city has been incorporated with a capital of $50,000.

Philadelphia.—William Wharton, Jr., recently appeared before the board of surveys and presented plans for the Catherine and Bainbridge streets railway. The proposed road will run east on Bainbridge street to Front street, and on the north side of Bainbridge street market; thence along Front to Catherine; west on Catherine to Gray's Ferry road; thence to Christian street; west on Christian street to Schuylkill avenue and then northeast to Bainbridge street. The plans of the road were approved, as were plans for the tracks. William H. Kemble is president of the new company, it being operated by the Traction company.

The contract for the building of the road has been awarded to William Wharton, Jr. & Co., incorporated, and the work of construction will be commenced as soon as the action of the Highway Supervisors is taken.

Pittsburgh. — A new electric road, over four miles in length and costing $350,000, will probably be built on the South Side. The route proposed is from the head of the Monongahela incline, over Boggs avenue and Washington pike, to West Liberty. A number of Pittsburgh capitalists are in the scheme, and Select Councilman John Paul will father it in councils. It will result in greatly developing Mt. Washington and the hill districts.

The Market Square Railway company, capitalized at $6,000, has been incorporated.

Shamokin. — An electric railway will probably be built here in the near future, and we understand that the Short Electric company of Cleveland, O., has contracted to equip the same.

TENNESSEE.

Chattanooga. — An application for a charter, under the name of the Street Railway & Trust company, with a capital stock of $1,000,000, with the privilege of increasing it to $10,000,000, has been made by R. B. Cook, C. L. Morrison, William H. Taylor, R L. Bright, S. B. Smith, N. C. Ford and S. A. Bright.

Humboldt.—At the recent meeting of the Humboldt Street Railway company, the organization was perfected by the election of officers for the ensuing year, a list of which will be found under the head of elections in the present issue. The capital stock of the company is $10,000, all paid up. For the present the company will merely build one line of track, and operate two cars, but will probably extend its system at an early day.

Lebanon.—A street railway company has been organized here, a charter obtained, and officers elected, a list of which will be found under the head of elections in the present issue. The road, which will be about three miles long, will extend from the Nashville & Chattanooga depot to the intersection of High street and North Cumberland, and from Divinity Hill on West Main street to Cave Spring on the Sparta Pike.

Memphis — The Memphis Belt Line and Suburban Railroad company, chartered to build a line from the K. C. M. & B. R. R. at Magnolia station to Raleigh, has received a franchise to use certain streets here, conditional upon the work being completed within a year.

TEXAS.

Uvalde.—The Uvalde Street Railway company has been incorporated with a capital of $5,000.

Waco.—The city council has granted a franchise for an electric railway, and work will be commenced at once. The terms of the grant require the company to build five miles of track within the next two years.

Waxahatchie—A franchise has been granted to local parties to construct and operate a street railroad here.

VIRGINIA.

Richmond.—The Richmond Street Motor company, capitalized at $50,000, with the proviso that said capital can not be increased in excess of $1,000,000, has been incorporated. Allen Talbott is president, and William Simpkins is vice president and general manager. We understand that the purpose of the company is to manufacture motors for street railway purposes.

WASHINGTON.

Port Townsend. — The Port Townsend Construction & Street Railway company of this city has been incorporated, with a capital stock of $100,000. A list of the trustees will be found under the head of elections in this issue.

Seattle.—A franchise has been granted for a street railway over Railroad avenue to the tracks of the Seattle, Lake Shore & Eastern Railway.

The Madison Street Cable Railroad company has been incorporated, with a capital stock of $750,000, for the purpose of building and operating street and cable railways, telegraph, telephone and electric light lines, and to invest in real estate. The incorporators and trustees are: J. M. Thompson, Bailey Gatzert, F. J. Grant, H. G. Struve, John P. Hoyt, J. C. Haines, Jacob Furth, A. B. Stewart, Geo. H. Heilborn, A. P. Mitten, Roland H. Denny and Maurice McMicken.

The Jackson County Electric Railway, Light and Power company, of this city, has been incorporated, with a capital of $50,000, to build and operate a street railway here.

Tacoma.—The Southern Street Railroad company, of this city, has been incorporated, with a capital of $100,000, to build a street railway here. A list of its trustees will be found under the head of "Elections," in this issue.

WISCONSIN.

Waukesha. — An ordinance has been passed authorizing Fitch & Jarvin, of Louisville, Ky., to construct a street car line here.

EXTENSIONS.

Asheville, N.C.—We understand that the Asheville Street Railroad company will extend its line to Weaverville in the near future. The Sprague system is working magnificently here.

Brunswick, Ga. — Information reaches us that the Brunswick Street Railroad company will make a number of extensions in the spring.

Columbus, O.—The Oak Street extension of the Consolidated Street Railway company to the new stables on Rose Avenue has been completed.

Danville, Va.—The Danville Electric Street Railway company will extend its line.

Georgetown, N.C.—The City Railway company will make considerable extensions in the spring.

Meridian, Miss.—The Meridian Street Railroad company is extending its line.

Pierre, So. Dak.—We understand that the City Railway company will extend its line in the immediate future, operating the same with electricity.

Pueblo, Col. — The Pueblo Street Railway company will extend its line out on Palmer Avenue to Lake Minneaqua.

Syracuse, N Y.—The Peoples line will be extended here at once, for a distance of about ¾ mile.

The Woodlawn & Butternut Street Railway company has decided to extend its line

Tiffin, O.—It is rumored that the Tiffin Street Railway company will extend its line in the spring.

Toledo, O. — The Central Passenger Street Railroad company will extend its line from the present terminus on Nebraska avenue, and will probably extend its system about three miles on the east side.

Waco, Tex.—The Waco Street Railway company will extend its line in the spring.

ELECTIONS.

Des Moines, Ia.—Mr. Polk has been elected president of the new Consolidated Street Railway company here, and Mr. George B. Hippee elected secretary.

Fort Scott, Kan.—At a meeting of the stockholders of the recently incorporated Fort Scott Railway company of this city, the following gentlemen were elected as directors for the ensuing year: Warren Reed, Milton Lucas, F. Sentiff, James Powelson, Jacob Conine.

Frankfort, N. Y.—At a recent meeting of the Frankfort & Ilion Railroad company, the following named gentlemen were elected officers and directors for the ensuing year:

President—A. C. McGowan.
Vice President—W. W. Crosby.
Treasurer—P. A. Skiff.
Secretary—W. I. Piper.
Superintendent—J. L. Hoard.
Directors—A. C. McGowan, P. A. Skiff, J. L. Hoard, W. W. Crosby, J. H. Hoard, John Loftus, W. I. Piper, S. T. Russell, F. B. Parkhurst, M. F. Terrell, Jeremiah Myers, J. W. Burris, J. J. Duddleston.
Executive Committee—J. H. Hoard, Jeremiah Myers and S. T. Russell.

Greensburg, Pa.—The following named gentlemen form the board of directors for the Greensburg & Hempfield Electric Street Railway company: R. S. Jamieson, Geo. M. Jones, W. A. Huff, Ed. Donahue, Jno. B. Hend

Humboldt, Tenn.—At the recent meeting of the Humboldt Street Railway company, the following named gentlemen were elected officers of that company:

President—Hon. H. C. Burnett.
Vice President—C. H. Ferrell.
Secretary—A. R. Dobson.
Treasurer—Geo. D. Ferrell.
Attorney—W. H. Babbitt.

Junction City, Kas —The following named gentlemen have been elected directors of the Junction City & Fort Riley Rapid Transit Street Railway company: John Davison, Geo. E. Harvey, John K. Wright, W. W. Cook, C. L. Linton (all of Junction City), and J. R. McClure, C. H. Trott, J. W. McKnight and J. F. Streator (Geary County).

Lebanon, Tenn.—John S. Sanders is president, and the Hon. R. P. McLean treasurer of the new street railway company which has recently been organized at this point.

Lowell, Mass.—At a recent annual meeting of the Lowell Horse Railroad company, the old board of directors, consisting of the following named gentlemen, was re elected: Edward M. Tucke, W. M. Sawyer, Soloman Backan, Ethan A. Smith.

Memphis, Tenn.—The electric railway company of this city recently elected the following officers:

President—Hon. R. J. Vivian.
Vice President—Thomas H. Allen, Jr.
Treasurer—Jno. M. Peters.
Secretary—E. R. Thomas.
General Counsel—M. B. Trezevant.

Kansas City, Mo —At a recent meeting of the stockholders of the Ivanhoe Street Railway company, the following named gentlemen were elected as officers for the ensuing year:

President—J. W. Morton.
Vice President—H. A. King.
Treasurer—J. W. Tobin.
Secretary—C. E. Finlay.
General Manager—G. E. Norton.

Nashville, Tenn.—At the recent meeting of the stockholders of the City Electric Railway company of this city, the following named gentlemen were elected as directors for the ensuing year: J. T. Rhea, J. H. Bruce, T W. Wrenne, J. M. Fogg, Sanford Duncan, J. W. Cunningham and R. W. Turner.

Oakland, Cal.—The following named gentlemen constitute the Board of Directors of the Oakland & Berkely Rapid Transit company:

J. E. McElrath, A. J. Snyder, James McNear, J. M. Coleman, Jas. Gamble, F. K. Shattuck, J. Poirer, L. Gottshall, J. McGee, Jas. Eastland.

Among the other stockholders of the company are V. C. Moody, W. J. Dungee, J. L. Barker, Leland Gamble, Robt. Fitzgerald and Arthur Thomas.

Orange, N. J.—At the recent organization of the East Orange Rapid Transit company, the following named gentlemen were selected as officers of the company for the ensuing year:

President—James E. Reynolds.
Vice President—O. W. Child.
Secretary—H. S. Ferman.
Directors—F. W. Child, R. W. Hawkesworth, H. S. Iselin, George Cooley.

Pittsfield, Mass.—At the recent annual meeting of the Street Railway company here, the old Board of Directors was re-elected, with the exception of Mr. Allen, who was succeeded by Mr. Clark, and J. W. Clark was chosen clerk in his place.

Port Townsend, W. T.—The following named gentlemen are the officers of the Port Townsend Construction & Street Railway company recently organized here:

President—R. C. Hill.
Vice President—Henry Lambes.
Secretary—Henry L. Burkett.
Treasurer—J. Smiller.

Rochester, N. Y. — The officers of the new Rochester City & Brighton Railway company are as follows:

President—George E. Mumford.
Vice President—George W. Archer.
Secretary—M. H. Briggs.

Treasurer—Arthur Luetchford.
Directors—A. G. Yates, William S. Kimball, H. H. Craig, George Weldon, Charles M. Everest, F. S. Upton, W. H. Gilder, J. C. Kilbreth.

St. Louis, Mo.—The following named gentlemen have been elected as officers of the St. Louis County Street Railway company:
President—Emil L. Dosenbach.
Vice President—Geo. Autenrieth.
Secretary—W. C. Wengler.
Treasurer—F. W. Rauchenstein.

Seattle, W. T.—The following is a list of the trustees of the recently incorporated Jackson County Electric Railway, Light and Power company, of this city, reported under the head of New Enterprises, in this issue: W. H. Lewellyn, J. F. Eshelman, W. W. Kirkwood, Fred B. Converse, C. J. Eddy and R. R. Spencer.

Syracuse, N. Y.—The following named gentlemen have been elected as officers of the Syracuse, Eastwood Heights & De Witt Street Railway company:
President—N. L. Williams.
Vice President—R. N. Gere.
Sec. and Treas.—George B. Leonard.
Directors—M. S. Williams, G. N. Caleb, Geo. B. Warner, L. A. Williams, Chas. Hiscock, W. J. Hart, et al.

At the annual meeting of the Genessee & Water Street Railway company, the following named gentlemen were named as officers for the ensuing year:
President—F. C. Wicks.
Vice President—D. P. Wood.
Sec. and Treas.—G. J. Gardner.
Superintendent—W. J. Hart.
Directors—F. C. Wicks, D. P. Wood, G. J. Gardner, W. E. Abbott, G. F. Comstock, jr., Chester Hair, A. W. Palmer, R. G. Winkoop, H. D. Didana, G. C. Chase, W. H. Niven, James Burns, Jacob Crouse.
Executive Committee—The President, Vice President, and Messrs W. H. Nevin, W. E. Abbott and R. G. Winkoop.

The stockholders of the Syracuse & Onondaga Railway company held their annual meeting on the 7th of October, and elected the following officers for the ensuing year:
President—A. N Palmer.
Vice President—Chas. P. Clark.
Secretary and Treasurer—George W. Garrett.
Superintendent—Mr. Thompson.
Directors—A. S. Newell, C. P. Clark, A. N. Palmer, J. E. Britten, T. W. Meacham, J. M. Schermarhorn, jr, George W. Garratt, H. W. Hanchett, Geo. J. Schermarhorn, J. C. Chase, C. T. Redfield, H. T. Gilbert, John Lyman.
Executive Committee—A. S. Newell, J. C. Chase and Geo. W. Garrett.

At a recent meeting of the stockholders of the 5th Ward Belt Line of this city, the following named gentlemen were elected as officers for the ensuing year.
President—H. S. White.
Vice President, Secretary and Treasurer—S. B. Merrill.
Directors—S. B. Merrill, H. R. White, W. C. Brayton, Clarence Tucker, E. W. Marsh, Hugh Purnell.

At a recent meeting of the Third Ward Railway company, the following named gentlemen were elected officers for the ensuing year:
President and Treasurer—W. S. Wales.
Vice President and Secretary—H. McGonegal.
General Superintendent—S. D. Lake.
Directors—Walter S. Wales, Hiram McGonegal, H. L. Leydem, George S. Wales, S. D. Lake, F. C. Howlett. A. E. Matthews, F. F. Kingsley, W. J. Crawford.

St. Louis, Mo.—The following named gentlemen now constitute the Board of Directors of the St. Louis Car company: Peter M. King, Henry Kraft, Henry Rotherman, Jacob Rodderger, Ernest Scilling, Geo. J. Kolush.

Tacoma, W. T.—Following are the names of trustees of the newly incorporated Southern Street Railway company of this city: R. F. Radebaugh, Theo. Hormer, Frank O. Meeker.

Tiffin, O.—At a recent meeting of the Tiffin Street Railway company, which has been sold to New York parties for $75,000, the following named gentlemen were elected officers for the ensuing year:
President—D. A. Lindley.
Secretary and Treasurer—T. B. Williams.
Directors—D. A. Lindley, T. B. Williams, F. W. Brighton, M. Scannell, Joseph Murphy.

Echoes from the Convention.

EXTRACTS FROM PRESS CLIPPINGS.

Omitted from October Issue.

Pioneer-Press, Oct. 17.

"The delegates to the Street and Electrical Railway conventions are jolly, whole souled fellows in all that the name implies. There is a bond of friendship between them and the all rail magnates, who, more properly speaking, are classed as railroad men. Among the jolliest and popular men who are brought to Minneapolis by the convention is Daniel Coolidge, vice president of the Johnson company, of Johnstown, Pa. 'Anything Coolidge says goes,' is an axiom which is echoed by all the delegates to the convention, and he wears his honors with an ease and grace born only of long familiarity with the niceties of life."

"The *personnel* of the convention is very interesting. It would be hard to get 200 longer-headed men together. Of course the most conspicuous man of them is President George B. Kerper, of the Mount Adams & Eden Park Incline Railway company, Cincinnati. He is a thoroughly good-natured person, something of a wag, in fact, and by always putting in the right word at the right time, keeps everybody else in good humor."

"The secretary, Mr. William J. Richardson, also has the distinction of being the handsomest man in the convention. It was largely due to his ability and firmness that the great Brooklyn strike was broken up."

Tribune-Star, Oct. 17, '89.

T. J. Evans, of Council Bluffs, Ia., the president of the Western Electric Railway association, is a practical railroad man in his chosen field of work. Mr. Evans does not think that electrical roads can be called experimental any longer, and says that their present efficiency is a guarantee for future satisfactory service. He is also the leader in the move to have the Western association amalgamated with the American association, and says that there are so many points of common interest between the two organizations that they could be better served by a union of the two."

"Bernard H. Schmidt, of the J. G. Brill company, is one of the army of jolly agents attracted to Minneapolis by the Street Railway convention Mr. Schmidt always wears a tuberose in his coat lapel, and this fact was breezily commented upon by a delegate, as he caught Mr. Schmidt and buttonholed him, saying:
'You are sweet enough without wearing that funeral reminder.'
'Yes,' was the reply, 'I intend to substitute a rose and place it on the Chicago grain market. Why? Because Shakespeare remarks that a rose by any other name would smell as wheat.'"

Several agents of rival companies, who have charge of the exhibits spread for the edification of the street railway magnates, had a lively game of poker en route from New York to Minneapolis. Table stakes were the order of the day, or rather the night, and money changed hands fast and furiously, in proportion to the fluctuations of the game during the first twenty-four hours "out." Monday evening, however, there were several spirited contests for the boodle, which were terminated when a king full, four jacks a flush and four modest little queens crossed each other's paths. The winning hand was dealt pat, and its owner was so confident and eager that he did not notice that the joker was a ghastly fifth in his aggregation of court cards until the "show down." Mutual explanations showed that it was the first hand round with a new deck, and the dealer had carelessly neglected to remove the joker. Were pistols drawn and a free fight indulged in? Oh, no! It was rather hard on the holder of the winning hand, but it was laughingly decided to make a big jack pot, which the fifth man came into by putting up his percentage towards swelling it. The careless dealer was fined the drinks for the party, and an adjournment was taken to the dining car, after the fifth man had won the pot and pocketed the money.

"Julius Walsh is a solid millionaire from St. Louis, and his reputed wealth runs well into eight figures. Mr. Walsh was president of the street railway company in '84, and made one of the best presiding officers the body ever had. By the way, it is not generally known, but Mr. Walsh is a count in his own right, having had titles of nobility conferred on him by the late Victor Emanuel, king of Italy. He wears his honors modestly and in silence."

"T. P. Bailey is one of the all star hustlers of the Thomson-Houston company, and is considered by his fellows to be one of the most valuable men in its employ. Like all clever men, he declines to talk shop out of business hours, but can see through a prospective deal as quickly as a stump speaker can answer a question from the political platform."

"G. H. Hathaway, Jr., is the best rifle shot in the Association, and wonderful are the tales which are told of his prowess in this direction. "He can shoot anything but a snipe," said a friend this morning, "but he never smokes anything less than three for a half.

Tribune, October 17.

[In view of the reference to the Knights of Labor in report of executive committee, the following interview with two prominent members of the order will undoubtedly prove interesting.—Ed.]

J. P. McGaughey: "Yes, I saw what our friends, the street railway men, have said about us. The article in the GAZETTE simply goes to prove that the opinion which was generally expressed here, and was believed with more or less assurance all over the country, that the street car strikes of last spring were the result of a concentrated action of this Gentlemen's association was correct. We more than suspected that they were bound together to down all organizations. The tenacity with which Tom Lowry held out in spite of his heavy losses showed that he was acting upon some general plan.

"Well, they have temporarily downed labor organizations in many cases. It is also true that the order of the Knights of Labor is not numerically as great as it was several years ago; but that can not be taken as an evidence that labor organization is a failure.

"In my opinion the greatest and best influence of labor organizations is the education that is given the members. I have watched hundred thousands of men going through the schooling that labor organizations give. I have seen the poor, timid, foreigner, who dare hardly claim his soul as his own, broaden into a fine independent man. I have seen the rustic farmer boy, who never heard more of his rights than was whistled by the birds, develop into a strong reasoning citizen. Then if they do down one organization, another will rise from its ashes. The weakening of the Knights of Labor was only to strengthen the trades organizations. The Federation of Labor has in a manner taken the place of the older organizations, and it in turn will no doubt be followed by some other form. But rest assured, the labor societies will live as long as there is a wrong to right and as long as the laborer gets less than the full value of his exertions."

Thomas A. Clark said: "They charge us with violence and crime. It is they and not labor organizations that are the aggressors. They have more sins to account for every day than can be charged against all the labor organizations of the country in a year. We do not claim to be perfect; nor always to do what is equitably right. Labor organizations and laboring men are human; we make mistakes, but we do not live off the bone and sinew of other poor humanity that is struggling madly for a chance to live. We have no special privileges, and the trouble between us and the street car magnates is that we object to their having any."

Car Heating in Chicago.

The West Division Road is at present putting 300 car stoves in its cars.

Three hundred cars constitute about half of the rolling stock of the company, and the remaining three hundred cars will have no heaters because the cars are old and worn out, and will be retired when the cable line is started. Until the cable line is started these stoveless cars will be used as little as possible. Manager Parsons has tried a variety of heaters in his cars, and all of them have proved failures. Last winter and the winter before the public was compelled to ride in cars that were heated by charcoal stoves, sulphur heaters, that froze a man when he sat near one, furnaces that smoked, oil stoves that were worse than no stove at all, and extension pipe stoves. None of these heated the cars properly. Some of them exploded, while others threw off a noxious gas that was extremely dangerous to health.

This winter Mr. Parsons transferred the responsibility of getting up a car stove to Superintendent Bridges, of the Western avenue car barns The latter went over on the South Side, got some pointers from Mr. C. B. Holmes' heaters, and then decided upon a pattern almost identical with that used in the South Side cars, except that the stove can be made cheaper, though still about as good. The new stove for the West Side cars is a sort of iron box, in some cases round and in others square, set into the floor of the middle of the car, the top of the stove being almost flush with the flooring. The stove is fed from the top, on which is a small cover which is slid off when coal is put in. The bottom of the stove opens on the outside of the car, and here the ashes are raked out with a small poker. The smoke is carried to the open air through a small pipe covered with a wire shield to protect the clothing of passengers. Small hard coal is used, and a fire will last a round trip, although the conductor will carry a supply of coal in case of any delay. Superintendent Bridges has thoroughly tested the stoves, and says that the cars will be much warmer than those of the South Side, the heating capacity being about the same as those used by Mr. Holmes, while the cars on the West Side are much smaller. The company is about to construct fifty or a hundred new and larger cars for the cable line, and the stoves to

be used in them will be much larger. Taken altogether the new stove promises to be a success. The cost of fuel is very small, the average being about eight cents a day for each stove.

Patents.

The following is a complete list of such patents as relate to Street Railway Interests, issued during the past month, especially prepared for the STREET RAILWAY GAZETTE, by Messrs. Higdon & Higdon, solicitors of patents and trademarks, room 7, St. Cloud Building, opposite U. S. Patent Office, Washington, D C. A printed copy of any patent here named will be furnished by them for 25 cents (stamps).

Issue of September 3, 1889.

410,264. Electric Railway Plow, F. O. Blackwell, New York, N. Y.
410,265. Commutator Brush, F. O. Blackwell, New York, N. Y.
410,498. Tubular Conductor for Electric Railways, L. Daft, Plainfield, N. J.
410,550. Street or Station Indicator, H. Heitmann, Brooklyn, N. Y.
410,170. Regulation of Coupled Dynamos, Loomis Electric Manufacturing Co., New York, N. Y.
410,386. Car Brake and Starter, A. M. Vereker and S. M. Yeates, Dublin, Ireland.
410,324. Car-Wheel, H. F. Mann, Allegheny, Pa.
410,536. Motor for Land Carriages, C. R. Cowley, Wyoming, and L. H. Cowley, Rochester, N. Y.

Issue of September 10, 1889.

410,871. Electric and Cable Railway Car, S. A. Bemis, Springfield, and L. Pfingst, Boston, Mass.
410,663. Regulator for Dynamo-Electric Machines, J. M. Bradford, Portland, Me.
410,557. Elevated Railway, L. J. Cody, Sault Ste. Marie, Mich.
410,578. Fare Register, H. R. Coffey, Stockton, Cal.
410,896. Commutator-Brush for Dynamo-Electric Machines or Motors, M. Oerlikon, near Zurich, Switzerland.
410,670. Brush-Holder for Dynamo-Electric Machines, Thomson-Houston Electric Co., of Conn.
410,987. Dynamo-Electric Machine or Motor, F. J. Patten, New York, N. Y.
410,988. Operating Electric Motors, F. J. Patten, New York, N. Y.
410,700. Cable Sheave and Hanger for Cable Tramways, H. C. Simpson, Brooklyn, N. Y., and A. Waggoner, Columbus, O.
410,656. Determining the shape of Pole Pieces for Dynamos, J. G. Statter, London, England

Issue of September 17, 1889.

411,030. Combined Electric Motor and Blower, C. J. Hirlimann, Fort Lee, N. J.
411,354. Car Wheel, J. Rigby, Minneapolis, Minn.
411,204. Pole for Supporting Electric Conductors, S. H. Short, Columbus, O.
411,399. Thrust-Receiving Plate for Car Wheels, Tanner Anti-Friction Wheel Co., Chicago, Ill.
411,313. Overhead Frog for Electric Railways, M. J. Wightman, Lynn, Mass.
411,314. Overhead Frog for Electric Railways, M. J. Wightman, Lynn, Mass.
411,050. Advertising and Street-Announcing Apparatus, G. W. McKenzie, Van Port, and W. I Miller, Beaver, Pa.
411,360. Post, Rail-Tie, Beam, etc., O. A. Stempel, St. Louis, Mo.

Issue of September 24, 1889.

411,761. Cable Sheave, J. D. Davies, Cincinnati, O.
411,762. Cable Railway, J. D. Davies, Cincinnati, O.
411,584. Aerial Railway, A. H. DeCamp, Boonton, N. J.
411,496. Electric Railway, G. B. Fraley, San Francisco, Cal.
411,594. Car Starter and Brake, J. J. Hooker, Tideswell, Stockport, County of Derby, England.
411,725. Hose-Elevator over Railway Tracks, T. McHenry, St. Louis, Mo.
411,675. Tension Device for the Cables of Cable Railways, W. H. Paine, New York, N.Y.
411,611. System of Synchronizing Electric Motors, R. H. Read, Washington, D. C.
411,612. System of Synchronizing Electric Motors, R. H. Read, Washington, D. C.
411,613. Trolley for Electric Railway Systems, A L. Riker, New York, N. Y.
411,688. Car Starter and Brake, W. Smith and J. R. Allen, Philadelphia, Pa.
411,630. Cable Gripper, H. M. Wrede, San Francisco, Cal.

Issue of October 1, 1889.

412,157. Trolley Attachment for Electric-Railway Cars, C. L Edgar, Boston, Mass.
412,155. Trolley for Electric-Railway Service, C. E. Edgar, Boston, Mass.
411,950. Armature, A. S. Atwater, Cleveland, O.
411,782. Governor for Electro-Dynamic Machines, G. F. Card Manufacturing Co., Cincinnati, O.
412,022. Car-Starter, E. Degerholm, Helsingfors, Finland.
411,982. Electric Motor, P. Diehl, Elizabeth, N. J.
412,177. Electric Motor, H. Groswith, Philadelphia, Pa.
411,983. Electric Motor, P. Diehl, Elizabeth, N. J.
411,989. System for Electric Conductors for Electric Cars, C. A. Jackson, Billerica, Mass.
411,833. Electric Motor, Giant Electric-Motor Co., Kittery, Me.
411,907. Grip-Hoisting Arch-Bar for Cable Cars, John Stephenson, New York, N. Y.

Issue of October 8, 1889.

412,605. Electric Railway, L. Daft, Plainfield, N. J.
412,700. Regulator for Dynamo-Electric Machines, W. H. Elkins, Cambridge, Mass.
412,496. Apparatus for Cleaning Snow from Railway Tracks, P. Graeb, Berlin, Germany.
412,528. Electric-Motor for Railway Cars, W. M. McDougall, East Orange, N. J.
412,666. Electric-Railway Conduit and Current-Plow, J. W. Reno, Denver, Colo.
412,671. Gripping Device for Cables, T. H. Ross, St. Louis, Mo.
412,560. Wheel-Brake, J. Stephenson, New York, N. Y.
412,298. Driving Gear for Cars, E. Samuel, Philadelphia, Pa.
412,561. Track-Brake, J. Stephenson, New York, N. Y.
412,567. Governor for Electric Generators, P. J. Tracy, Racine, Wis.
412,349. Dynamo-Electric Machine, C. F. Winkler, Hoosick Falls, N. Y.
412,350. Commutator, C. F. Winkler, Hoosick Falls, N. Y.
412,353. Dynamo-Electric Machine or Motor, C. F. Winkler, Hoosick Falls, N. Y.
412,351. Dynamo-Electric Machine, C. F. Winkler, Hoosick Falls, N. Y.
412,352. Dynamo-Electric Machine, C. F. Winkler, Hoosick Falls, N. Y.

Issue of October 15, 1889.

412,732. Car-Mover, E. Dederick, Milwaukee, Wis.
413,040. Fender-Guard Attached to Cars, R. M. Edwards, San Francisco, Cal.
412,922. Hand-Power Motor for Street Cars, J. N. Johnson, Decatur, Ill.
412,854. Dynamo-Electric Machine, J. A. Kingdon, London, England.
413,145. Switch for Street Railways, H. W. Libbey, Boston, Mass.
412,928. Governor or Regulator for Electric-Motors, R. Macrae, Baltimore, Md.
413,085. Electric Motor, F. J. Patten, New York, N. Y.
413,148. Dynamo-Electric Machine, G. Pfannkuche, Cleveland, O.
412,933. Discharge Device for Dynamos, Westinghouse Electric Co., Pittsburg, Pa.
413,151. Electric Railway Car, Sprague Electric Railway and Motor Co, New York, N. Y.
413,120. Signal Device for Cable-Railway Crossings, G. H. Wright, San Francisco, Cal.
413,008. Alternating Current Machine, C. Zipernowsky, Buda-Pesth, Austria-Hungary.

Issue of October 22, 1889.

413,158. Railway System, C. B. Askew, Chicago, Ill.
413,160. Electric Car Lighting, D. Holland, Springfield, Mass.
413,610. Elevated Railway System, E. M. Boynton, Newbury, Mass.
413,337. Dynamo-Electric Machine, R. Eickemeyer, Yonkers, N. Y.
413,363. Dynamo Electric Machine, R. Eickemeyer, Yonkers, N. Y.
413,228. Car-Mover, L. B. Gifford, Toledo, O.
413,505. Tramway Locomotive, G. D. Gilbert, Corry, Pa.
413,604. Electric-Railway, Thomson-Houston Electric Co., Boston, Mass.
413,455. Switch-Operating Device for Street Cars, D. J. McOsker, Providence, R. I.
413,287. Contact Trolley for Electric-Railway Cars, J. Mitchell, DesMoines, Iowa.
413,557. Carrier for Pneumatic Transit Apparatus, G., J. G. and M. O. Rehfuss, Philadelphia, Pa.
413,294. Conduit for Electric Railways, E. Thomson, Lynn, Mass.
413,584. Cable-Grip, Volk Cable-Crossing Grip and Car Brake Co., Chicago, Ill.
413,637. Electric Railway System, M. Wheless, Washington. D. C.

Issue of October 29, 1889.

413,838. Street Car Coupling, G. R. Allen and E. J. Wallace, Philadelphia, Pa.
413,750. Car-Mover, L. A. Fort, Raleigh, N. C.
413,740. Car-Wheel, R. Stalter, New Straitsville, O.
413,890. Truck for Cable or Electric Cars, S. A. Bemis, Springfield, Mass.
413,816. Car Ventilator, O. H. Taylor, Brooklyn.
414,069. Car Roof, P. H. Murphy, East St. Louis, Ill.
414,052. Regulating Electric-Motors, M. Immisch, London, Eng.
413,731. Conduit for Electric-Railways, C. P. Poole, Lynchburg, Va.
414,049. Electric-Railway, R. M. Hunter, Philadelphia, Pa.
414,061. Rail for Street Railways, H. W. Libbey, Boston, Mass.
414,060. Street-Railway, H. W. Libbey, Boston, Mass.
413,958. Station-Indicator, G. H. Patterson and J. W. Allison, Montreal, Canada.

Expiring Patents.

The following patents will shortly be public property, and may be used by anyone.

Manufacturers may determine to what extent they may act independently of patent rights, and inventors may gain an insight into the prior state of the art by consulting copies of them.

A printed copy of the drawings and specifications of any of the following will be furnished by Messrs. Higdon & Higdon for 25 cents.

Expired During October, 1889.

131,913. Street Railway, A. Thompson.
132,535. Registering Fare Box, T. L. Johnson.
132,698. Fare Box, J. B. Slawson.
132,218. Self-Acting Switch, D. Rowe.
132,460. Railroad Switch, H. Fitzsimmons
132,213. Spiral Car Spring, J. Murray.

Expire During November, 1889.

133,073. Street Car Axle Box, A. Wight.
132,988. Railroad Rail Joint, T. Slaughter.
133,157. Car Starter, S. H. Kenney.
133,418. Lubricating Car Wheel, W. W. Crane.
133,218. Car Starter, D. W. Garst.

Business Notes.

The Pond Engineering company is contracting engineer for the steam plant at the new Thomson-Houston lighting station at Joliet, Ill. It will furnish and erect three, one hundred horse power boilers, one two hundred and fifty horse power, Lane & Bodley Corliss Engine, Hoppes Live Steam Purifier, Lowe Heater, Pump, Injector etc. The station will be complete in every detail and equipped with the latest improvements.

It will furnish the San Diego, Cal. Cable Railway with four, ninety horse power boilers, and the Palmetto Brewing company, Charleston, S. C., with a one hundred horse power, Lowe Heater.

Dorner & Dutton, of Cleveland, O., have now extended their works, and have added some new wheel-fitting machinery to their present facilities. The addition to their works consists of the erection of a large two-story brick building on Fall street, immediately in the rear of the old place; and they are now well equipped for turning out work for electric and cable roads without delay.

The J. G. Brill Co. is building about 70 electric cars for Atlanta, Ga., Americus, Ga., Auburn, N. Y., West Bay City, Broadway & Newburgh Ry, in Cleveland (Sprague system), Chattanooga, Washington, Nashville, Laredo, Harrisburg and Wilkesbarre. It is also making 30 truck cable cars for the Philadelphia Traction company, is full of orders for home work, and has orders for some 40 or 50 cars for export trade. With the new works that the Brill Co. is erecting it will have a total capacity for 1,000 cars per year.

The Broadway Line in St. Louis, Mo., operated under the Short electric patent, is making extensive additions to its present outfit. A new 300 h. p. Wheelock engine will soon be put in place. Sixteen new motors and two large generators, 125 h. p., have been ordered from The Short Electric Ry. Co. The company is using 80 lb. Johnson steel girder rails on the track.

The Pond Engineering company has furnished the American Electric Light company of Kansas City with a fifty horse power, Armington & Sims Engine, and the Empire Cordage Co., of Champaign, Ill., with a fifteen horse power, Gardner Vertical Engine for driving its isolated Edison plant. It will furnish and erect two, one hundred and fifty horse power boilers complete, with Pond Engineering company's setting for the St. Louis Smelting and Refining Works.

The following list of orders, etc., has been received by us from *Pullman's Palace Car Company.*

Patton Motor Manufacturing Company, one open car, adapted to its apparatus, for immediate delivery.

South Nashville St. R.R. Co., ten cars, equipped with Sprague electric motors, for December delivery.

Nashville & Edgefield St. R.R. Co., ten cars, similar to the South Nashville cars above referred to (to be equipped with the same system of electricity), for delivery the first of next year.

Julien Electric Traction Company, one car body, adapted to its system, for January delivery.

The Knoxville Street R.R. Co., of Knoxville, Tenn., six car bodies, to be equipped with Thomson-Houston motors, for January delivery.

For the Clinton & Lyons Horse Ry. Co., some small horse cars, for January delivery.

The Des Moines Street R.R. Co., six motor car bodies and two trail cars, for its line, for December delivery. The motor car bodies are to be equipped with Thomson-Houston motors.

The West Side Street R.R. Co., of Milwaukee, six motor car bodies, for January delivery, to be equipped with Sprague motors.

The Sioux City Street Ry. Co., fifteen car bodies equipped with Sprague motors, for January delivery.

The Elgin City Railway company, which, we understand, is soon to be changed to an electric road, has ordered three horse cars for immediate use, it being the intention to change these to trail cars when the electricity is put in.

The Saginaw Union Street Railway company has ordered two car bodies, for January delivery. These car bodies are to be equipped with the Nat. Elec. Traction Co's system, of Detroit.

You will note that, of all of the above mentioned cars, only six are to be operated by horses, the balance being constructed for service on electric lines. In this connection, it is only proper to say that the six horse cars in question, are all the horse cars that we have in our works today out of over 200 cars, the rest being for cable and electric service. We would further state that in all new orders for electric cars, the tendency is to get a finer finished and more luxurious car than formerly, and we are building more mahogany finished street cars to-day than ever before.

The Walker Mnfg. Co. has secured the contract for cable machinery, for the Seattle Cable Railway.

Brownell & Wright of St. Louis have built four motor cars for the St. Louis & East St. Louis R. R. Co.

The Ide Engine company of Springfield, Ill., furnished one of its Ideal, 125 h. p. engines for the St. Louis & East St. Louis electric railway.

Woodbridge and Turner of New York have under contract the construction of the Wilmington City Passenger Railway, in Wilmington, Del., and the Brooklyn & Jamaica Electric Railway. The latter is an old Vandepoele road, but is now being reconstructed under the Sprague patents. It is about 7 miles long, one half of which is double track.

Book Reviews.

Some time ago the Detroit *Free Press* offered $3,000 in prizes for the three best serial stories sent in before July 1st. The result of this competition has been that Major Joseph Kirkland, of Chicago, Ill., has taken the first prize of $1,600. His story is entitled, "The Captain of Company K" Mr. Kirkland is the author of "Zury, the Meanest Man in Spring County," "The McVeys," and other stories. The second prize goes to Omaha, Neb., and is taken by Mrs. Eliza W. Peattie. Her story is entitled, "The Judge." The third prize of $500 was awarded to Elbridge S. Brooks, of Boston, Mass. The title of his story is, "The Son of Issichar."

"Decorative Lattice," published by Cutting & DeLaney, Buffalo.

This handsomely illustrated little book contains chiefly quotations from recent articles that have appeared in leading American magazines on the art of decorating, and anyone building a house or having one remodeled would do well to secure a copy, as it is replete with artistic illustrations of this graceful art.

The Sprague Electric Equipment Co. of Chicago, sends us an 8-page illustrated catalogue of some of its goods, and will forward a copy of the same upon application.

"Illustrated Journal of Useful Inventions and of Art Applied to Industry."

The October issue of this periodical contains nearly thirteen pages of reading matter descriptive of new useful inventions. This paper is showing considerable enterprise, and is gradually climbing the ladder, from the top of which the pennant of success is flying.

"A Dictionary of Electrical Words, Terms and Phrases," by Edwin J. Houston, published by the W. J. Johnston Co., Times Building, New York.

In view of the marvelously rapid growth of the electrical industry during the past few years, it has become a matter of the greatest difficulty to keep posted as to the technical significance of the many new words, terms and phrases used to denote certain parts of electrical apparatus and in the description of articles pertaining to this science. In the compilation of this dictionary the author has been assisted by well known electricians, and has certainly achieved a success in making his book one that is indispensable to the student of electricity, and scarcely less so to those best educated in the science. The author has endeavored to give a general consensus of opinion as to the significance of the peculiar terms and phrases applied to electricity, not confining himself to an expression of his own opinions. The book contains 640 pages of vocabulary matter, and an appendix of another 15 pages, and is, undoubtedly, one of the most comprehensive and valuable works of reference of its kind that has yet been placed upon the market.

"The Bond Medium," published by the Bond Medium company, 71 Broadway, New York, is the name of a new weekly financial paper, devoted to the interests indicated by its title. Its initial issue gives a list of bonds, City, Electric Light, R.R. etc., offered by various parties, and contains a number of business cards of dealers in bonds, stocks and other investment securities.

We have received a copy of "The Annual Statistician and Economist" for 1889, published by L. P. McCarly of San Francisco and New York. This is the thirteenth issue of this annual, and is a very valuable compendium of accumulated facts condensed into the most accessible form. We notice that a supplemental index has been added to the volume, containing a list of the principal subjects of interest contained in previous editions.

Statistics and data relative to the history, politics, economy and geography of this and other countries, are embraced in the book, as also rules, formulæ, principles and multifarious suggestions on applied mathematics. No less than 26 pages are devoted to the history of California, by counties. Taking it as a whole, the book is most highly to be recommended as a very valuable addition to the library of the business man, the political economist, the politician and the student.

The Short Electric Railway Co. sends us a copy of its very handsome catalogue of 42 pages. It contains a splendid illustration of the works of the Brush Electric company, and 23 pages of cuts descriptive of apparatus used by this company, and roads in operation under its system.

Scribner's Magazine for November contains a third African article—a valuable addition to the notable papers of Professor Henry Drummond and Joseph Thomson; a discussion of some startling problems in International Law affecting the United States in the event of another European war; the description of an old Spanish university by a well-known novelist; an explanation of the relation of electricity to health by a high medical authority; an army surgeon's account of the modern Sanitary Corps which relieves the sick and wounded; and interesting essays, fiction and poems. Most of the articles are richly illustrated.

Colonel H. G. Prout (Baroud Bey), an American Governor-General of the Equatorial Provinces of Africa, and a trusted friend of General Gordon, writes of that little known region under the title "Where Emin Is"

It is the intention of *Scribner's* to publish more articles in the African field, to which Colonel Prout will contribute.

Professor J. Russell Soley, U.S.N., discusses "The Effect on American Commerce of an Anglo-Continental War."

Doctor M. Allen Starr writes of "Electricity in Relation to the Human Body," drawing the line very sharply between its legitimate use and quackery. This article is a thoroughly wholesome and acute presentation of a subject on which the public is frequently misled.

William Henry Bishop (author of "Detmold," "The Golden Justice," etc,) describes the picturesque features of the old Spanish University of Salamanca.

Dr. James E. Pilcher, U S.A., tells of "A New Field of Honor"—the Sanitary Corps of both the regular army and National Guard, which is organized for the relief and care of sick and wounded.

Harold Frederic's serial ("In the Valley") increases in interest. There is a short story by Arlo Bates, and poems by Richard E. Burton, Andrew Lang and Mrs. James T. Fields.

Electric Street Railways in North America.

IN OPERATION OR UNDER CONTRACT, NOV. 1, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Adrian Electric Ry	Adrian, Mich	Nat. Elec. Trac. Co.		3
Akron Electric Ry. Co	Akron, O	Sprague	22	12 5
Albany City Railway Co	Albany, N. Y	Thomson-Houston	32	14
Alliance St. Ry. Co	Alliance, O	Thomson-Houston	3	2
Americus Street RR. Co	Americus, Ga	Thomson-Houston	4	5.5
Appleton Elec. St. Ry. Co	Appleton, Wis	Van Depoele	6	5.5
Asheville St. Ry. Co	Asheville, N. C	Sprague	8	4.5
Atlanta & Edgewood St. Ry. Co	Atlanta, Ga	Thomson-Houston	4	4.5
Atlantic City Elec. RR	Atlantic City, N.J	Sprague	16	5.5
Attleboro & North Attleboro RR. Co	Attleboro, Mass	Thomson-Houston	5	8
Auburn Street RR. Co	Auburn, N. Y	Thomson Houston	3	3
Bangor St. Ry. Co	Bangor, Me	Thomson-Houston	5	5
Bay City RR	Bay City, Mich	Sprague	8	5
Bay Ridge Elec. RR	Bay Ridge, Md	Sprague	2	2
Belt Line	Lynn, Mass	Thomson-Houston	4	4 5
Bloomington St. RR. Co	Bloomington, Ill	Daft	12	10
Broadway & Newburgh St. Ry. Co	Cleveland, O	Sprague	16	10
Brooklyn St. Ry. Co	Cleveland, O	Thomson-Houston	18	10
Buffalo St. Ry. Co	Buffalo, N. Y	Sprague	4	2.5
Canton St. Ry. Co	Canton, O	Sprague	9	6
Central Passenger Ry. Co	Louisville, Ky	Thomson-Houston	10	10
Central Ry. Co	Peoria, Ill	Thomson-Houston	15	10
Chattanooga Elec. St. Ry. Co	Chattanooga, Tenn	Thomson Houston	2	
Chattanooga Electric St Ry. Co	Chattanooga, Tenn	Sprague	6	5
Cincinnati & Inclined Plane Ry	Cincinnati, O	Sprague	20	6
Cincinnati St. Ry. Co	Cincinnati, O	Thomson-Houston	8	2.7
Citizens Elec St Ry	Decatur, Ill	Thomson-Houston	4	5
Citizens' St. Ry	Elkhart, Ind	Nat. Elec. Trac. Co.	5	7
City Elec. Ry. Co	Nashville, Tenn	Thomson-Houston	6	3 61
Colerain Ave. Ry. Co	Cincinnati, O	Thomson-Houston	8	5
College Park Elec. Ry	Sherman, Tex	Sprague	5	4
Columbus Consolidated St. Ry. Co	Columbus, O	Short	2	2
Dallas Rapid Transit RR	Dallas, Tex	Sprague	2	2
Danville St. Car Co	Danville, Va	Thomson-Houston	4	2
Davenport Cent. St. Ry. Co	Davenport, Ia	Sprague	6	3 5
Dayton & Soldiers' Home	Dayton, O	Sprague	2	2
Decatur Electric St. Ry	Decatur, Ill	Nat. Elec. Trac. Co.	5	3
Derby Horse Ry. Co	Ansonia, Conn	Thomson-Houston	1	4
DesMoines Broad Gauge Ry. Co	DesMoines, Ia	Thomson-Houston	8	10
Detroit City Ry., Mack St. Line	Detroit, Mich	Nat. Elec. Trac. Co.		2
Detroit Elec. Ry. Co	Detroit, Mich	Nat. Elec. Trac. Co.	2	4
Detroit, Rouge River & Dearboro RR.	Detroit, Mich	Sprague	1	1
Douglas St. RR. Co	West Superior, Wis	Daft	2	
East Cleveland Ry. Co	Cleveland, O	Sprague	32	10
East Cleve. St. Ry. (Collamer Branch)	Cleveland, O	Sprague	8	3
East Detroit & Grosse Pointe	Detroit, Mich	Nat. Elec. Trac. Co.	10	8.5
East Harrisburg Pass. Ry. Co	Harrisburg, Pa	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa	Thomson-Houston	1	
East Reading RR Co	Reading, Pa	Sprague	3	2.5
" " Extension	" "	Sprague	1	1
East Side St. Ry. Co	Brockton, Mass	Sprague	4	4
Eau Claire St. Ry. Co	Eau Claire, Wis	Sprague	6	5
Erie Electric Motor Co	Erie, Pa	Sprague	15	12
Eckington & Soldiers Home Elec. Ry	Washington, D. C	Thomson-Houston	10	3
Essex Co. Pass. Ry. Co	Newark, N. J	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa	Sprague	31	8.5
Fort Worth City Ry. Co	Fort Worth, Tex	Nat. Elec. Trac. Co.	10	10
Fort Worth Land & St. Ry. Co	Fort Worth, Tex	Nat. Elec. Trac. Co.	15	15
Fulton County St. RR	Atlanta, Ga	Thomson-Houston	8	9
Georgetown & Tenalleytown St. Ry. Co.	Washington, D. C	Thomson-Houston	6	6
Gratiot Elec. Ry	Fort Gratiot, Mich	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn	Sprague	3	3
Highland Park Elec. Ry. Co	Detroit, Mich	Fisher	4	3 5
Highland Park Ry	Detroit, Mich	Nat. Elec. Trac. Co.	6	3.5
Hillside Coal Co	Scranton, Pa	Thomson Houston	1	1
Hoosac Valley St. Ry. Co	N. Adams Mass	Thomson-Houston	6	5
Huntington Elec. Ry. Co	Huntington, W. Va	Short	2	3.5
Ithaca Street Ry. Co	Ithaca, N. Y	Daft	2	1
Jamaica & Brooklyn RR	Jamaica, N. Y	Sprague	4	9
Joliet St. Ry. Co	Joliet, Ill	Thomson-Houston	4	3
Kearney St. Ry. Co	Kearney, Neb	Thomson-Houston	2	8
Key City Elec. Ry. Co	Dubuque, Ia	Sprague	2	2
Lafayette St. Ry. Co	Lafayette, Ind	Sprague	9	3
Lafayette Traction Co	Easton Pa	Daft	2	1
Laredo City RR. Co	Laredo, Tex	Sprague	4	4
Lima St. Ry. Power and Motor Co	Lima, O	Van Depoele	7	6
Lindell Ry. Co	St. Louis, Mo	Julien	1	
" Ave. RR Co	" "	Sprague	12	5.5
Lng. Island City & Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Lynn & Boston Ry. Co	Lynn, Mass	Thomson-Houston	9	6.75
Macon City & Sub. Ry	Macon, Ga	Thomson-Houston	4	4
Main Street Line Extn., U. P. Ry	St. Joseph, Mo	Sprague	4	1
Mansfield Elec. St. Ry. Co	Mansfield, O	Daft	5	4.5
McGavoc & Mt. Vernon St. Ry. Co	Nashville, Tenn	Thomson-Houston	6	3
Marlboro St. Ry. Co	Marlboro, Mass	Sprague	3	3
Meriden Horse Ry. Co	Meriden, Conn	Daft	12	5
Metropolitan RR	Portland, Ore	Sprague	4	3
Metropolitan St. Ry. Co	Kansas City, Mo	Thomson-Houston	4	5.4
Metropolitan St. Ry. Co	Toronto, Can	Thomson-Houston	2	3
Milwaukee Cable Co	Milwaukee, Wis	Thomson-Houston	12	5
Minneapolis St. Ry. Co	Minneapolis, Minn	Thomson-Houston	10	8
Moline St. RR	Moline, Ill	Sprague	2	3
Mt. Adams & Eden Pk. Incl. Ry. Co	Cincinnati, O	Daft	3	1
Multnomah Elec. Ry	Portland, Ore	Sprague	10	3
Nashville & Edgefield Ry	Nashville, Tenn	Sprague	10	6
National Electric Tramway etc. Co	Victoria, B. C	Thomson-Houston	4	4
Naumkeag St. Ry. Co	Salem, Mass	Thomson-Houston	6	3
Nay Aug Cross-Town Ry	Scranton, Pa	Thomson-Houston	3	1.5
Newburyport & Amesbury H. Ry. Co	Newburyport, Mass	Thomson-Houston	2	6
Newport Street Ry. Co	Newport, R. I	Thomson-Houston	6	4 5
Newton St. Ry. Co	Newton, Mass	Thomson-Houston	10	8
N. Y. & Harlem RR. Co. (4th Ave)	New York, N. Y	Julien	10	8 5
Observatory Hill Pass. Ry. Co	Allegheny, Pa	Bentley Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg. Co.	Council Bluffs, Ia	Thomson Houston	24	14
Omaha & Council Bluffs Ry. & B. Co	Omaha, Neb	Sprague	2	4
Omaha Horse RR	Omaha, Neb	Sprague	20	10
Omaha Motor Ry. Co	Omaha, Neb	Thomson-Houston	26	10
Ontario & San Antonio Heights Ry. Co	Ontario, Cal	Daft	4	8
Ottawa Electric St. Ry. Co	Ottawa, Ill	Thomson-Houston	8	5
Ottumwa St. Ry. Co	Ottumwa, Ia	Thomson-Houston	4	5
Pacific Ave. St. Ry. Co	Tacoma, Wash. Ter	Sprague	8	6
Passaic St. Ry. Co	Passaic, N. J	Thomson-Houston	3	3
Passenger RR., Extension	East Harrisburg, Pa	Sprague	4	3
Peoples RR. Co	St. Joseph, Mo	Sprague	20	10
Piqua Electric RR	Piqua, O	Sprague	4	3
Pittsburgh Sub. Rapid Transit Co	Pittsburgh, Pa	Daft	3	2·5
Pittsb., Knoxville & St. Clair St. Ry	Pittsburgh, Pa	Daft	4	2·25
Plattsmouth Elec. RR	Plattsmouth, Neb	Sprague	2	2
Plymouth & Kingston Ry. Co	Plymouth, Mass	Thomson-Houston	3	4.5
Port Chester & Rye Beach St. Ry. Co	Port Chester, N. Y	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich	Van Depoele	6	4
Quincy St. Ry. Co	Quincy, Mass	Thomson-Houston	4	5
Redbank & Seabright Ry	Redbank, N. J	Thomson-Houston	3	5
Revere St. Ry. Co	Revere, Mass	Thomson-Houston	5	2.5
Richmond St. Ry. Co	Richmond, Ind	Thomson-Houston	6	4
Richmond Union Pass. Ry. Co	Richmond, Va	Sprague	50	7.5
Riverside & Suburban Ry. Co	Wichita, Kans	Thomson-Houston	6	9
Rochester Elec. Ry. Co	Rochester, N. Y	Thomson-Houston	9	7
Ross Park St. Ry. Co	Spokane Falls, W. T	Thomson-Houston	6	7 5
Saginaw Union Ry	Saginaw	Nat. Elec. Trac. Co.		17.1
St. C., Merriton & Thorold St. Ry. Co	St. Catharines, Ont	Van Depoele	10	7
St. Louis Bridge Co	St. Louis, Mo	Thomson-Houston	4	2
St. Louis St. Ry. Co	St. Louis, Mo	Short	5	3
Saint Paul City Ry	St. Paul, Minn	Thomson-Houston	20	5
St. Paul & Minn. Ry. Co	St. Paul, Minn	Thomson-Houston	20	20
Salt Lake City RR. Co	Salt Lake, Utah	Sprague	20	6.5
Saratoga Elec. Ry. Co	Saratoga Springs, N. Y.	Thomson-Houston	4	2
Sault Ste. Marie St. Ry. Co	Sault Ste Marie, Mich	Nat. Elec. Trac. Co.	2	3
Scranton Suburban Ry. Co	Scranton, Pa	Thomson-Houston	10	5
Scranton Pass. Ry. Co	Scranton, Pa	Thomson-Houston	4	2
Scranton Peoples Ry. Co	Scranton, Pa	Sprague	20	12
Seashore Elec. Ry. Co	Asbury Park, N. J	Daft	20	4
Seattle Elec. Ry. & Power Co	Seattle, W. T	Thomson-Houston	9	5
Second Av. Pass. Ry. Co	Pittsburgh, Pa	Thomson-Houston	10	10.06
Sioux City Elec. Ry	Sioux City, Ia	Sprague	10	6
Southington & Plantville Ry. Co	Southington, Conn	Thomson-Houston	9	2
South Denver Cable Co	Denver, Colo	Sprague	2	2
South Nashville St. RR	Nashville, Tenn	Sprague	10	5 2
South St. Paul Rapid Transit Co	S. St. Paul, Minn	Daft	10	8
Squirrel Hill RR	Pittsburgh, Pa	Sprague	5	3.5
Steubenville Elec. Ry. Co	Steubenville O.	Sprague	6	2.5
Stillwater Elec. St. Ry	Stillwater, Minn	Sprague	6	5
Sunbury & Northumberland St. RR. Co	Sunbury, Pa	Daft	3	3.5
Tacoma Ave. St. Ry. Co	Tacoma, Wash. Ter	Sprague	8	2
The North East St. Ry. Co	Kansas City	Thomson-Houston	10	7
Third Ward Ry Co	Syracuse, N. Y	Thomson Houston	8	4
Toledo Elec. Ry. Co	Toledo, O	Thomson-Houston	2	2
Topeka Rapid Transit Co	Topeka, Kas	Thomson-Houston	30	17
Troy & Lansingburg St. RR	Troy, N. Y	Sprague	12	5.5
Union Depot Ry. Co	St. Louis, Mo	Thomson-Houston	30	10
Union Pass. RR	St. Joseph, Mo	Sprague	10	5
Union Elec. RR	Sterling, Ill	Sprague	10	6
University Pk. Ry. & Electric Co	Denver, Col	Sprague	3	4
Vine St. Ry	Kansas City, Mo	Thomson Houston	6	3
Washington St. Asylum & Park RR	Binghamton, N. Y	Sprague	4	5
Watervliet Turnpike & RR. Co	Albany, N. Y	Thomson-Houston	16	15.5
West Dallas St. Ry. Co	Dallas, Tex	Sprague	2	3
West End St. Ry Co	Boston, Mass	Thomson-Houston	300	230
West Side St. Ry	Milwaukee, Wis	Sprague	12	13
Wheeling Ry. Co	Wheeling, W. Va	Thomson-Houston	5	10
Wilkesbarre & Sub. St. Ry. Co	Wilkesbarre, Pa	Sprague	8	3
Wilkesbarre & West Side RR	Wilkesbarre, Pa	Sprague	3	4
Willamette Bridge RR	Portland, Ore	Sprague	5	1.5
Wilmington City Ry. Co	Wilmington, Del	Sprague	8	3
Windsor Elec. St. Railway Co	Windsor, Ont	Van Depoele	2	2
White Line St. RR	Dayton, O	Van Depoele	12	9
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo	Sprague	9	4.5
Wyatt Park Ry. Co	St. Joseph, Mo	Sprague	8	5.5
Youngstown St. Ry. Co	Youngstown, O	Sprague	6	4

Street Railway Securities.

NEW YORK AND BROOKLYN.

NAME OF COMPANY.	Par Value	Capital.	Period.	Rate.	Date.	Bid.	Asked
Atlantic Avenue Railroad	$ 50	1,000,000	Quar.	6	1st July, 1889	104	108
1st mortgage	----	140,500	M. & N.	7	1st May, 1894	107	112
Central mortgages	----	737,000	A. & O.	5	1st Oct., 1909	103	108
Bleecker St. & Fulton Ferry	100	900,000	J. & J.	3¼	1st July, 1889	28	30
1st mortgage	1,000	700,000	J. & J.	7	July, 1900	115	120
Broadway & Seventh Avenue	100	2,100,000	Q.—J.	4	July, 1889	190	195
1st mortgage	1,000	1,500,000	J. & D.	5	June, 1904	106	108
2d mortgage	1,000	500,000	J. & J.	5	July, 1914	105	106½
Broadway Surface Rds	1,000	1,500,000	J. & J.	5	July, 1924	105	106
Bonds guaranteed	1,000	1,000,000	J. & J.	5	July 1905	90	95
Brooklyn City	----	3,200,000	Q.—F.	2	1st May, 1889	170	173
1st mortgage	1,000	800,000	J. & J.	5	Jan., 1502	103	105
Brooklyn Crosstown	100	500,020	A. & O.	5	1st July, 1889	195	200
1st mortgage	1,000	200,000	J. & J.	5	Jan., 1898	108	110
Bushwick Avenue (Brooklyn)	100	500,000	Q.—F.	2	May, 1889	110	115
1st mortgage	1,000	400,000	J. & J.	6	Jan., 1902	105	110
Central Park, North and East River	100	1,800,000	Q.—J.	1½	April, 1889	99	102
Consolidated mortgage bonds	1,000	1,200,000	J & D.	7	Dec., 1902	118	121
Christopher & Tenth St	100	650,000	Q.—F.	1¾	1st May, 1889	130	132
1st mortgage	1,000	150,000	A. & O.	7	1898	114	116
Dry Dock, East Broadway & Battery	100	1,200,000	Q.—F.	2	1st May, 1889	120	125
1st mortgage consolidated	500&c.	900,000	J. & D.	7	June, 1893	107	109
Scrip	100	1,200,000	F. & A.	6	May, 1914	104	106
Eighth Avenue—stock	100	1,000,000	Q.—J.	2	April 1889	150	155
Scrip	100	1,000,000	F. & A.	6	Feb., 1914	107	110
Forty-Second Street & Grand Street Ferry—stock	100	748,000	Q.—F.	3	May, 1889	218	220
1st mortgage	1,000	236,000	A. & O.	--	April, 1893	108	112
42d St., Manhattanville & St. Nicholas ave—stock	100	2,500,000	------	--	------	40	41
1st mortgage	1,000	1,200,000	M. & S.	6	March. 1910	114	118
2d mortgage, income	1,000	1,500,000	J. & J.	6	July, 1915	55	60
Houston, West St. & Pav. Ferry—stock	100	250,000	Q.—F.	2	Feb., 1886	165	----
1st mortgage	500&c.	500,000	J. & J.	7	July, 1894	109	112
Ninth Avenue	100	800,000	------	3	Sept., 1885	75	83
Second Avenue—stock	100	1,862,000	J. & J.	5	Jan., 1887	98	101
Consolidated convertible	1,000	1,600,000	M. & N.	5	1st Nov., 1909	106	107
Debenture bonds	-- --	150,000	------	5	1909	100	----
Sixth Avenue—stock	100	1,500,000	Q.—F.	1½	1st May. 1889	165	175
1st mortgage	1,000	500,000	J. & J	7	July, 1890	105	106
Third Avenue—stock	100	2,000,000	Q —F.	5	1st May, 1889	240	250
1st mortgage	1,000	2,000,000	Q.—F.	7	Jan., 1890	105	107
Twenty-Third Street—stock	100	600 000	F. & A.	2½	1st May. 1889	225	230
1st mortgage	1,000	250,000	M. & N.	7	May, 1893	110	112
Debentures	----	150,000	------	5	1903	101	103

ST. LOUIS.

Benton Bellefountaine	$ 100	400.000	Jan.	1½		95	96
" " Bonds	1.000	50,000	A. & O.	6	1880	105	110
Cass Avenue (Bonds)	1,000	200,000	F. & A.	6	1886	102	104
Citizens Cable	100	1,500,000	N.	1½		75	80
" Bonds	1,000	1,500,000	I. & I.	6	1887	105	107
Lindell	100	600,000	Jan	2		120	130
" Bonds	1,000	87,500	F & C.	7	1879	103	105
People's	50	300 000	Sept.	6		48	50
" 1st Mortgage Bonds	1,000	125,000	I. & C.	6	1882	103	105
" 2d Mortgage Bonds	1,000	75,000	M. & N.	7	1886	104	105
St. Louis	100	1,000,000	May	4		112	115

HOLYOKE.

Springfield Street RR. Co	100	300,000	1889	10	1889	200	210
Holyoke Street RR. Co	100	50,000	1889	5	1889	140	150

PROVIDENCE.

Union RR. Co	100	1,500,000	Q. & I.	8		170	175

Bond Offerings.

OFFERED BY ROLSTON & BASS, 20 BROAD ST., NEW YORK.

Bangor Street Railway Company, Bangor, Me. (Electric) 1st m.

Rate	Price	Pays	Amt. Offer'd	Mature	Int. Pbl.	Miles Bnd. p.M.	Issue	Net Earn'gs May 21 to Oct. 1
6	101 & Int	6	20,000	1909	F. & A.	8¼	70,000	$6,561,60

OFFERED BY S. V. WHITE & CO, 36 WALL ST., NEW YORK.

Consolidated Street Railway Company, Columbus, O., 1st m. gold.

Rate.	Price.	Pays	Amt. Offer'd	Mature	Int. Pbl.	Miles Bnd. p.M.	Issue	Net Earn'gs May 21 to Oct. 1
5	104&Int.	4.75	175,000	1909	J. & J.	30	800,000	Abt $120,000

Stocks Wanted.

BY VAN SCHAICK & CO., 32 BROAD ST., NEW YORK.

Broadway & Seventh Ave. Street Ry. Co., New York.
Third Avenue Street Ry. Co., New York.

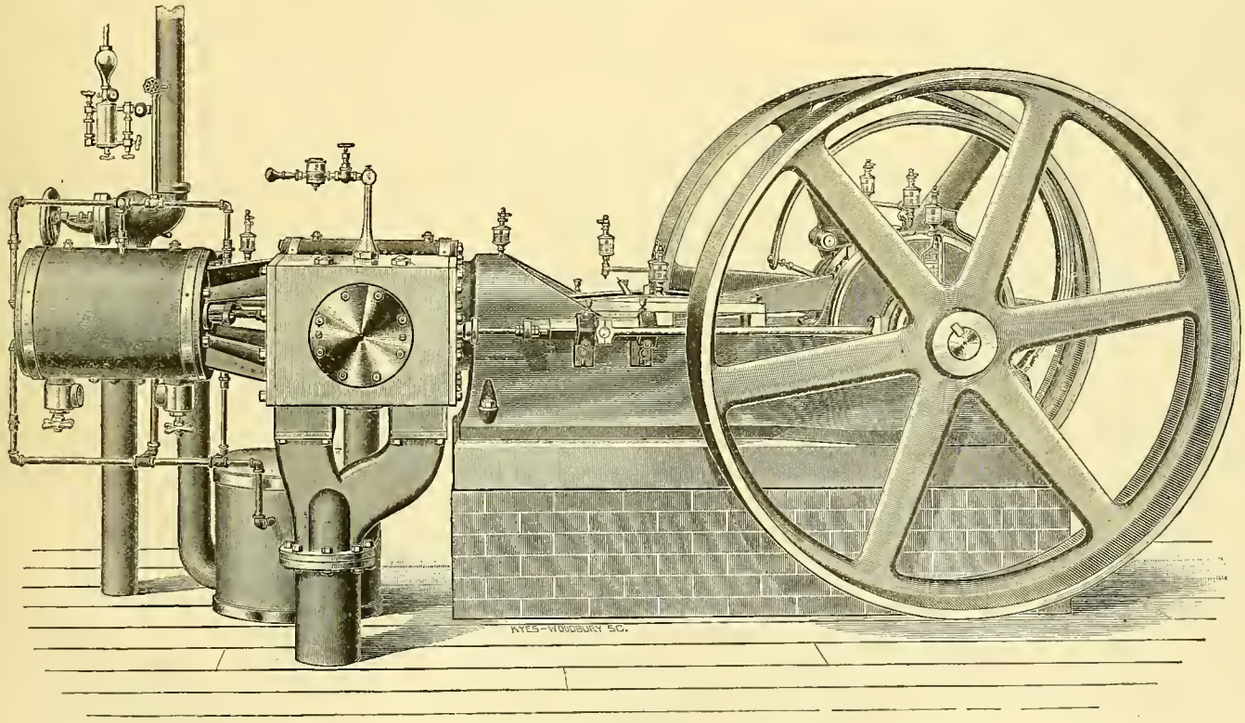
The Street Railway Gazette.

VOL. IV. DECEMBER, 1889. No. 12

ELECTRIC RAILWAYS.

New Tandem Compound Engine.*

The phenomenal development in the application and use of electricity, not alone for lighting purposes, but also for power, in operating street railways, mining and other machinery, has necessitated the construction of engines specially adapted to this class of work. As an aid in making electric lighting a commercial success, high speed engines for direct belting to dynamos were developed, their use not only effecting a saving in the initial cost of the machinery, but also in ground space, a very important item in large cities.



For these and other reasons electrical engineers started in with the single cylinder high pressure engines, though not as economical in fuel consumption as the slow motion Corliss. As the electric business developed and large central stations were required, progressive engineers looked about for some means to reduce running expenses, and yet hold on to the advantages embodied in the high speed engines. The large coal piles naturally attracted their attention and they set about reducing them by the use of more economical engines.

Engine builders were quick to detect the drift, and while many ridiculed the idea of constructing an engine better than those then upon the market a few wide awake and advanced builders at once commenced to build compound high speed engines. Several made the mistake of constructing them double or cross-compound; a mistake, because it was found that working under the great variation of load incident to station work and the low pressure cylinder exhausting into a vacuum, it was found impossible to "cushion" satisfactorily on the low pressure side, causing a pounding and preventing smooth running.

The Tandem compound high speed engine, here shown was one of the first of its kind designed for electric lighting and railway purposes. It combines the most economical type obtainable, with all those characteristics peculiarly valuable in an engine for this service.

When a number of engines of smaller powers are belted direct to dynamos or generators, obviously they must be of the simplest form, require a minimum of attendance and be capable of running at high speeds, requirements which render inadmissible the complexity which has always been considered necessary with an economical type of engine. However, the advantages of direct belting and divided power are so great that notwithstanding the acknowledged inferiority in economy of the engines adapted for them, a large majority of electric light stations have been arranged upon this plan.

The peculiar design and arrangement of the engine shown in the accompanying cut is such that every part is of the simplest possible form. It runs at the highest speeds used with high pressure engines, in a perfectly quiet and satisfactory manner, and requires no more care or attention. This is the universal testimony of those who have these engines in use, who also report a reduction of fuel consumption of over 40 per cent in actual every day service, where they have supplanted automatic cut-off high pressure engines. This speaks well for their economy and means a great saving in itself. Add to this the ability to use direct belting and divided power, with their convenience, simplicity, the absence of friction and other evils of shafting and lessened first cost, while only enough engines need be run at any time to do the work, avoiding long runs under light loads, so wasteful of fuel. Also in case of a slight accident to any single part, its load may be distributed and a shut down avoided.

When water for condensing purposes is not available, these engines can be furnished, adapted to run non-condensing, but, in that case the saving in fuel is not as great as with the condensing engines.

This engine, as will be seen from the cut, is a horizontal tandem compound engine, with high pressure cylinder and receiver steam jacketed. This is considered the most economical type, with as high pressures as can be ordinarily carried. The chief peculiarity of this engine is the position of the high pressure valve, together with its actuating gear upon one side of the engine, and that of the low pressure upon the opposite side. This allows each valve to be driven in the most

* McIntosh, Seymour & Co., Auburn, N. Y. Pierce & Thomas, Cortlandt Street, New York.

direct and simple manner, separates and makes easily accessible the moving parts, and is the only arrangement possible with a tandem engine which avoids a very complicated and unsatisfactory valve driving gear. This arrangement, is essential in a successful high speed compound engine for electric railway purposes. As the low pressure cylinder exhausts into a vacuum, it is almost impossible to "cushion" satisfactorily on this side of a double compound engine. This prevents smooth running and renders necessary frequent adjustment and attention. Since both pistons are on the same rod, this difficulty is avoided in the tandem engine, and the compression, obtained in the high pressure cylinder, gives remarkable smoothness and quietness to the running of the engine.

Live steam, after passing through the jackets of the high pressure cylinder, is used to jacket the receiver. The lower temperature of the steam in the latter causes considerable condensation in its jacket and this induces the brisk circulation of hot and dry steam through all the jackets, which is so essential to their efficiency. The water condensed is returned to the boiler.

The low pressure valve is moved by a fixed eccentric and the high pressure valve by a governor or automatic cut-off regulator. The simple, perfectly balanced piston valves are prevented from leaking by adjustable seats, the efficiency of which has been fully proven in actual service. The governor commends itself for its simplicity, durability and power. Without any tendency to over sensitiveness, it will regulate the speed of the engine within one per cent for all changes of load and pressure from zero to full load. The engine is of the double crank class, with two over-hanging wheels, making it entirely self-contained.

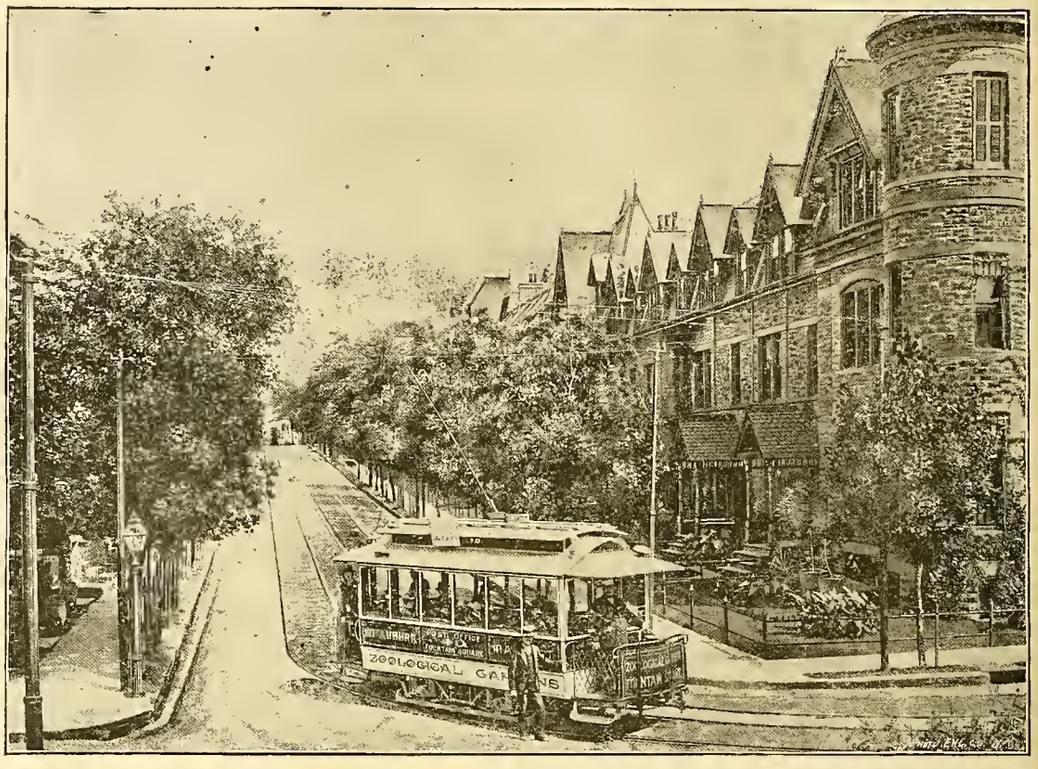
For electric railway purposes this engine is made much heavier, than for ordinary work, and is provided with a larger shaft and greater length of bearings, and the wheels are made nearly double the weight of the regular engine wheels. Three wheels are put on one engine when desired. These special features make it an engine which holds its speed and easily withstands the sudden and extreme changes of load incident to this class of work.

New Electric Car Truck.

The newly designed street car truck, the main feature of which is the arrangement of the springs, which are located so as to prevent the tilting and longitudinal oscillatory motion so annoying to passengers in street cars is the subject of our sketch. By constructing the frame of double wrought-iron longitudinal bars, depressing the lower ones a few inches and dispensing with the usual side braces, ample openings are left on either side for removing the armature, adjusting the brushes, and for inspecting the motor from the outside. With the present trucks these operation are usually performed through a trap-door in the floor of the car. To remove the car body from the truck it is only necessary to take off eight nuts and then raise the body 1½ inches.

The truck has a double spring action. The springs placed directly over the axle take all sudden shocks without communicating them to the car body, while the body itself is supported by eight independent springs. The truck is furnished with a novel double-acting brake, the brake beams sliding in horizontal slots and supported by the upper and lower beams of the frame. The two connecting rods are provided with turnbuckles, enabling a fine adjustment of the compound levers so that the brakes may be simultaneously applied to the outside of the four wheels in a half turn of the brake wheel, and a leverage of 1 to 80 obtained.

Four of these trucks are now in use on the Lansingburgh & Troy Electric Railroad, of which Mr. Charles Cleminshaw is president, and sixty more have been ordered by various street railroad companies.



Cincinnati Inclined Plane Electric Railway.

Cincinnati Inclined Plane Electric Railway.

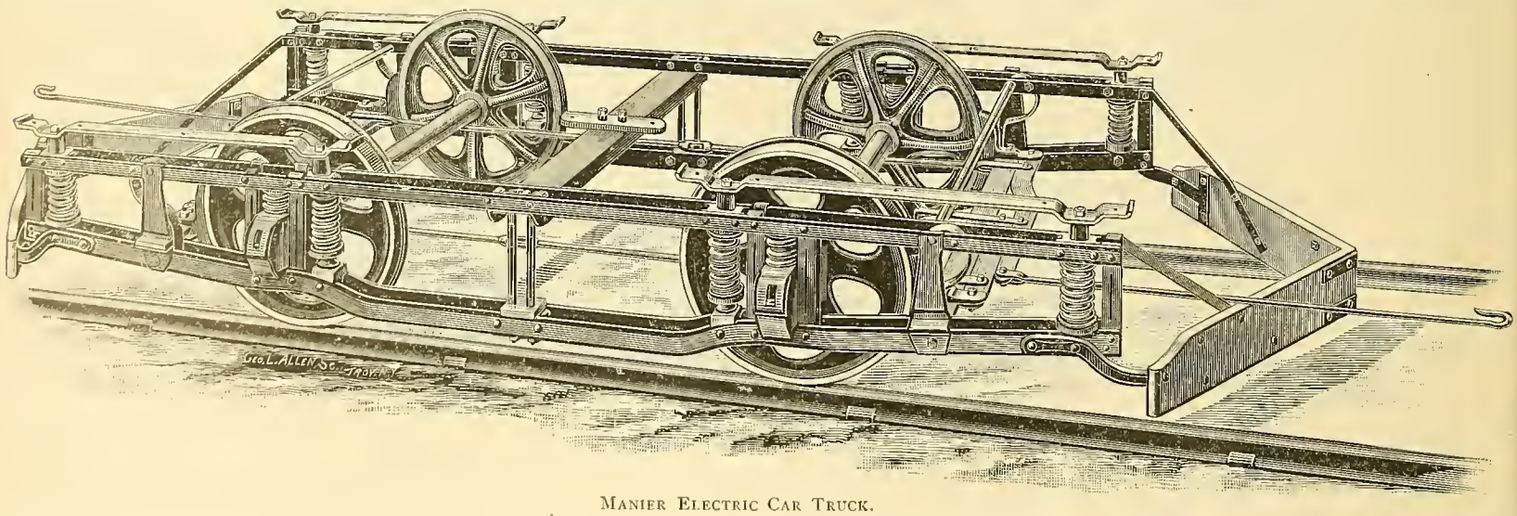
The accompanying illustration represents a car on the Cincinnati Inclined Plane Electric Railway. The view is taken at the corner of Locust and Mason streets, and gives a very good idea of the style of overhead wiring used along the line. All the poles are of iron, and of neat and tasteful design, and the construction and line work throughout, while showing evidence of durability and strength, is, at least, unobtrusive, and, by no means, unsightly.

Although the grades upon this line are very heavy, reaching in some cases as high as 12½ per cent, the average amount of coal consumed per day is only three and one-half tons of nut and slack for 17 cars, or an average of only about one-fifth of a ton per day per car. The steam power required at the power station for the operation of these 17 cars is supplied by one 150 h. p. engine.

The motors used on the line are of the Sprague improved type, using two motors to each car, equipped with all the latest improvements and devices. The management of the company reports that it has never had either a field or an armature burn out since the road was turned over to them.

The care of these motors, and car equipments requires about two hours attention per day from one man, whose duty is simply to look over each equipment and clean commutators, gears, and other wearing parts, from oil and dirt.

The dynamos are of the standard Edison type for railway power circuits, and it is interesting to note that they have been in operation for over seven weeks without renewal of oil in bearings. The self-oiling bearings upon these dynamos are of the well known ring pattern in which the oil is distributed over the interior of the bearings automatically by the revolution of the shaft, and after performing its duty of lubrication is returned to the reservoir where it has opportunity to cool and settle. Two pints of oil which were placed in the dynamo bearings at the starting of the road have not been added to, and the dynamo bearings have ever since run without any attention whatever.



Manier Electric Car Truck.

The Central Railway, Peoria, Ills.

The energy and push which characterize our western cities is shown in no better way than the rapid introduction of the electric railway. Realizing the great benefits and advantages to be derived from electricity as a motive power, they have been quick to avail themselves of it.

The electric railway at Peoria, which is shown in the accompanying illustration, has been in operation since Sept. 28th, 1889, and, as expressed by a local paper, "without losing a single trip from any electrical trouble."

Electric Railway in Peoria, Ill.

The electrical equipment was done by the Thomson-Houston company, the overhead cross-suspension method being used throughout. The road is ten miles in length, and has fifteen motor cars, each equipped with two 15 h. p. motors. The steam plant consists of three 60 in. x 18 ft. boilers, and one 250 h p. Reynolds' Corliss engine, which is belted to a countershaft, to which are belted two 80 h. p. Thomson-Houston railway generators.

The cars used in Peoria are somewhat different from those ordinarily employed, as will be seen from the illustration. A closed compartment containing the controller stand and brake handle is provided at each end of the car, thus protecting the motor man in stormy weather and separating him from the passengers and consequent interference in operating the car.

When this line was first put in operation it was compelled to take care of an unusually large traffic on account of the county fair, which was done to the satisfaction of the public and the officers of the road.

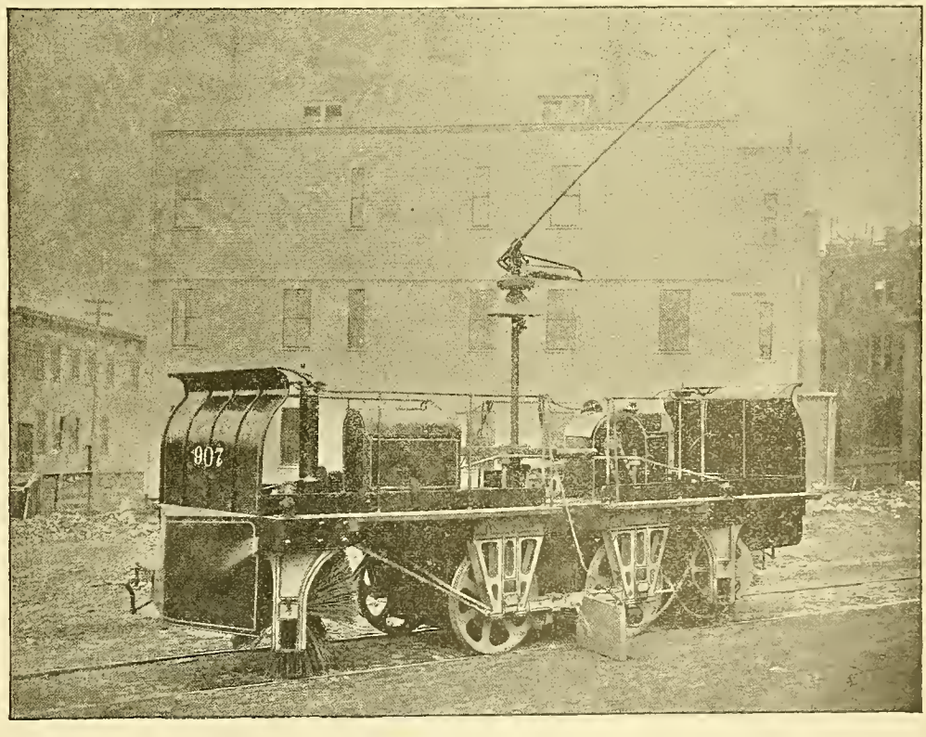
Electric Cars and Snow.

Thus far in the progress of electrical propulsion of street cars snow has been considered one of the most formidable obstacles which would in any way interfere with their successful operation. The trouble arising from this cause has been, however, overestimated, as has been shown conclusively by the operation of cars last winter during heavy snow storms, and the recent storm in Boston and vicinity on December 14th. This storm gave the first opportunity to test, not only the motor cars, but the new snow brooms which have been made by the West End Company, to use on the lines which are equipped electrically. This snow brooms consists of a platform car equipped with two fifteen-horse power Thomson-Houston motors, provided with brooms thirty inches in diameter, at each end set at an angle of forty-five degrees, and driven by two Thomson-Houston stationary motors placed upon the platform of the car. They were brought into requisition for the first time on Saturday the 14th, and showed conclusively that they are particularly adapted to the work required of them, as they cleared the tracks of snow much better and much quicker than could be accomplished in any other way, and without piling it up on the sides as is done when the ordinary snow plow is used.

The cars on the three lines at present operated by electricity did not fail in a single instance, and with the heaviest loads stopped and started again on the heaviest of the grades, up which four horses with difficnlty could draw a partially loaded car.

There never has been in Boston a better opportunity to compare the merits of the two systems, electrical and animal power, than during this storm, and the ease with which the motors were able to do the work required of them was the subject of universal comment.

President Whitney, of the West End company, witnessed in person the operation of the snow brooms, and the motor cars on each of the three divisions, and expressed himself as most highly gratified with the excellence of the performance of each. It certainly reflects credit upon the Thomson-Houston system that its cars should so successfully have coped with the storm.



Electric Snow Broom.

Huntingdon (W. Va.) Electric Railway.

Mr. E. M. Hathaway, superintendent of the Huntingdon Electric railway (Short system), writes that the road in his charge has been doing a rushing business since Nov. 27th. The storms of Thanksgiving week damaged a bridge over the Guyandotte river, and passengers from the C. &. O. and Ohio River railroads, have been transferred from Huntingdon to Ensign, W. Va., over the electric railway, which connects the two towns. This road has been constructed almost a year, and every part of the equipment has been thoroughly tested. The gears show little sign of wear, and the under-running trolley has not reduced the size of the trolley wire.

The earning capacity of the road, published elsewhere, is very large, as the expense of repair of fallen wires, burned out machinery, and other results of poor construction has been in great measure avoided. The road owns no horses.

New Edison-Sprague Offices in Chicago.

The Edison-Sprague offices in the Rialto building, Chicago, have been handsomely furnished throughout and will be the headquarters of the western business of these companies. Both concerns recently removed from the Rookery, where they found their old quarters inadequate to the demands of their business. Their present quarters are on the ground floor of the Rialto, the main entrance being on Van Buren street, opposite the Lake Shore depot, while there is another leading from the main corridor of the building. The floor space in these offices exceed 6,000 feet, one-fourth of the space on the main floor of the building.

Special attention has been devoted to securing ample light; the entire west front is glass, extending from 25 to 31 Sherman street, inclusive. The private offices of the heads of departments are arranged along this front, while over the space occupied by book-keepers and clerks, is a massive sun light of stained glass. From these are suspended three handsome clusters of incandescent lamps. Thus excellent light is furnished throughout. The walls have been handsomely decorated, and the partitions, railings, counters, in fact all the woodwork, highly finished in antique oak. The chipped glass in the partition, separating the private from the general offices, adds greatly to the appearance of the offices. At the main entrance on VanBuren street are the

general offices of the Sprague Equipment company, to the left and directly opposite the stationary motor department in charge of C. M. Barclay. Further down the corridor, to the left, is the engineering department of the Sprague company, and next to this the private office of J. L. Barclay, and the desks occupied by the agents in the railway department. About the center of the row of offices is that of H. McL. Harding, general agent of the Sprague company, who will give his personal attention to the electric mining department. Across the corridor is the engineering department of the Edison company, while at his left is the private office of F. B. Badt, who is in charge of the construction and engineering department. The north end is occupied by the private office of C. C. Warren, manager of the western department of the Edison company, and the general offices of that concern.

In all these offices, handsomely finished desks and furniture to harmonize with the woodwork, have been provided.

Edison dynamos and Sprague motors will be displayed in conspicuous places and shown in operation. Electrical devices of all kinds handled by these companies, may be found at these offices. In addition to the space occupied for offices and salesrooms there are 10,000 square feet in the basement devoted to store rooms and repair shops. A large number of men are employed here, and it is the intention of the companies to do all their western work in Chicago. The Edison company have their dynamos, switch-boards, etc., in operation here, and the Sprague company are building a track on which they will operate a car illustrating the features of their street railroad system.

The wonderful growth of the electrical interests in the west is well illustrated in the development of these companies. A few facts in this connection will suffice. Since Mr. Warren assumed his present position he has contracts to install forty-two plants aggregating about 25,000 lamps. Mr. Warren was an extremely successful manager when he represented the United States Electric Lighting company in Chicago, and the figures just given would seem to indicate that he will be no less successful in his new position. Electric lighting is a growing business, and it requires just such enterprising, vigorous men as Mr. Warren to handle it in the west.

H. McL. Harding, the general agent of the Sprague company, has been with that corporation since its organization. He will make Chicago his home, devoting himself to the development of the mining and irrigation department In relation to other departments of this field it may be said that the Sprague company has fifty offices in the United States and 1,500 workmen employed day and night manufacturing electrical machinery.

Crucial Test of Electric Car Service.

It is doubtful whether there was ever a more severe test of the merits of the overhead system than the one made by Chadbourne, Hazelton & Co. with the Sprague motor car No. 4 on the East Reading electric railway on Dec. 18th. A steady rain kept the tracks so slippery and in a condition so adverse to experiments that a trial with a less perfect machine would have resulted in a total failure, instead of not only proving highy satisfactory, but surpassing the expectations of the experienced gentlemen in whose presence the examination was made. From 2 to 4 o'clock the most severe tests that could be conjured up in the minds of the persons giving the exhibition were made and all were stamped with success.

Among the gentlemen present were: A. H. Chadbourne, Philadelphia; H. W. Barrett, Bryn Mawr; Samuel Duncan, Ardmore; J. M. Cardeza, Leonard Atwood and Robert Lewis, Philadelphia; James Kent, Wm. Rydler, J. G. Leech and J. A. McLure, New York, and W. A. Stadelman, Philadelphia. Hon. Daniel Ermentrout, B. F. Owen, John A. Rigg, Wm. D. Smith, Thomas P. Merritt, Jonathan Leinbach, Chas. B. Miller, Jacob Hunter, Maj. S. E. Ancona, John H. Rhoads, A. J. Brumbach, Charles F. Miller, Frank P. Esterly, R. T. Leaf, Paul D. Milholland, L. P. Muthart, Geo. W. Bard, Henry T. Kendall, J. A. Strohecker, Wm. R. McIlvain, John H. Printz, S. S. Scholl, all of Reading, Pa., and a representative of the STREET RAILWAY GAZETTE (Chicago).

The exhibition was in charge of Messrs. Stadelman and McLure of the Sprague Co., and Mr. Scholl, supt. of the East Reading railroad, and was given through the kindness of A. J. Brumbach, president of the company.

Car No. 4, the one used yesterday, belongs to the East Reading company, and is their most recent purchase. It has the improved truck and is equipped with the new "Boston motor." The "Boston" is a double motor, so regulated that a cutout under the seat of the car makes it possible to operate one or both. Each motor weighs about 1,500 pounds and the entire car 8,500. They are geared to run 15 miles per hour on a level.

The test consisted of starting and stopping the car with about 35 passengers, on curves and grades with one or two motors, showing absolute control and safety, and that in case of an accident to one motor the other would be sufficient to handle the load, while the powerful brakes could be dispensed with if necessary.

The first run was made from 19th and Perkiomen avenue to the summit with one motor. Then the two were put into operation and the car was sent back at full speed down the 8 per cent grade to the centre, or what is known as the 40-foot portion of the curve at 19th and Fairview, where the grade is 8½ per cent. At this point, the worst on the road, the current was reversed, the car stopped instantly and flew back up the hill again. This experiment was repeated over a dozen times, and was pronounced by the electricians present the most severe ever attempted with any motor, yet in each case the result was the same—complete success.

Mr. Stadelman, who had charge of the switch, then gave exhibitions of starting and stopping on a level and while going up a grade, of running down without brakes, controlling the car with the current, and of skidding the car along the tracks. All were equally satisfactory and so were other tests made.

Ammonia Motors.

The following letter has been received at this office, and refers to the paper "Motors other than Cable or Electric" read at the recent convention in Minneapolis, by Mr. H. H. Windsor:

OFFICE OF STANDARD FIRELESS ENGINE CO.
New Orleans, La., Nov. 9, 1889.

ED. STREET RAILWAY GAZETTE, Chicago, Ill.

Sir: My attention has this day been called to an article in the October number of your "GAZETTE" in which, after referring to an experiment made by Mr. P. J. McMahon of this city, with a fireless engine using ammonia gas as a motor, you state that "the plan was abandoned as impracticable."

So far from this being the case, a wealthy English syndicate has been organized and duly incorporated, including men of eminent scientific and mechanical ability, who, after varied and thorough experimental tests, are at this moment engaged in constructing ten or more ammonia cars to be put in practical operation on a tramway in England.

In refutation of your disparaging statements, I am convinced:

1st. That the cost of running our cars, based on the report of the leading tramway company in London, so far from being "not as cheap as mule power," will not exceed one-half cent per mile.

2d. There will be no "leak" whatever in gas.

3d. That each car can be charged with the utmost promptness.

4th. That every portion of our machinery will perform its functions with perfect ease and regularity.

I am further convinced that the advantages of cheapness, security, easy control and handling will so far exceed those of any other known motor, as to lead to the adoption of ammonia gas as *the* tramway motor of the age.

We expect no *public* demonstration of our patent to be made before February or March next. Meanwhile, perhaps it would be wise for the street car corporations contemplating a change in their traction power, to patiently await the result of our practical test. Very respectfully,

ATWOOD VIOLETT, President.

New Automatic Switch.

In this switch,* which is intended for use preferably on combination surface and cable lines, similar to those of the Chicago City Railway company, and the North Chicago Cable company, The Mount Adams and Eden Park line in Cincinnati and others, the ordinary form of pivoted triangular switch rail is used, with a horizontal rod connected with it pivotally, which, in turn, is connected, by means of intermediate crank arms and shafts, with the platform, so that the switch is set for the side track, when the platform or deck is depressed.

The other extremity of the horizontal bar is mounted upon the crank arm of a rod that extends along the track underneath the same and which is mounted in suitable bearings. A lever is pivoted to the track and bears upon a crank arm that is bolted to the other extremity of this revoluble rod when the side track is open. This lever is raised above the level of the track in such a manner that when a car is passing over the track the lever will be depressed, and by this means will rotate the longitudinal rod which shifts the horizontal rod to the left, and will open the main line. A guard rail may be placed parallel with the lever to prevent its being depressed by the passage of wagons or trucks across the rails. It will thus be seen that a cable car in approaching the switch will open the main line by depressing the lever; but should a horse car approach, and it should be desirable to use the side track, the switch will be set for the side track by walking the horse on to the platform and depressing it.

New Construction Company.

The Equitable Electric Railway Construction company was recently organized in Pittsburgh, with headquarters in that city. Messrs. A. W. Chadbourne, W. A. Stadelman, and Wm. Hazelton, 3d, are the principal stockholders. With such a financier and clever business man as Mr. Hazelton, an electrician like Mr. Stadelman, and a salesman like A. H. Chadbourne, it will be passing strange if the new company fails to make a striking success in its particular field. It is now prepared to bid on construction and equipment work, and the GAZETTE, in complimenting the before mentioned gentlemen upon their enterprise, extends to them its heartiest wishes for a brilliant career.

The Terre Haute Improvement Co. of Terre Haute, Ind., has its patent anti-rattler adopted by the following street railway companies. The device is a simple, but very excellent one, and we hear nothing but good words spoken for it:

Citizens Co., Indianapolis, Ind.; Terre Haute St. Ry. Co., Terre Haute, Ind.; Metropolitan St. Ry. Co., Kansas City, Mo.; Holyoke St. Ry. Co., Holyoke, Mass.; Lafayette St. Ry. Co., Lafayette, Ind.; Grand Island St. Ry. Co., Grand Island, Neb.; Pittsburgh, Allegheny & Manchester Co., Pittsburgh, Pa.; Niagara Falls Ry. Co., Niagara Falls, Ont.; Missouri Ry. Co., St. Louis, Mo., and the Baden & St. Louis Ry. Co., of St. Louis, Mo.

The Davenport Foundry and Machine Shop, of Davenport, Ia., recently sold to the Davenport Electric St. Ry. Co. one 200-h. p. 18″x24″ Meyer engine, and one to the Stillwater St. Ry. Co. of Stillwater, Minn., of 125-h. p. 14″x21″.

Two 200-h. p. engines of a similar type, have also been ordered from this concern, for the Electric Railway Light and Power company of Dubuque.

These engines are built with extra heavy crank pins, etc., and are wonderfully well adapted for street railway service.

The annual report of Treasurer Holmes, of the East Side Street Railway company, of Brockton, Mass., shows the receipts for fares to be $11,316. The equipment of the road consists of two open and two closed cars. Except on special occasions, only two have been in operation. The cost of power, which has been furnished by the Edison Illuminating company, for the year ending September 30 was $1,805.

* John E. Wolfe, New York City.

Electric Street Railways in North America.

IN OPERATION OR UNDER CONTRACT, NOV. 1, 1889.

OPERATING CO.	LOCATION.	SYSTEM.	CARS	MILES.
Adrian Electric Ry	Adrian, Mich	Nat. Elec. Trac. Co.		3
Akron Electric Ry. Co	Akron, O	Sprague	24	12.5
Albany Railway Co	Albany, N. Y.	Thomson-Houston	32	14
Alliance St. Ry. Co	Alliance, O.	Thomson-Houston	3	2
Americus Street RR. Co	Americus, Ga	Thomson-Houston	4	5.5
Appleton Elec. St. Ry. Co	Appleton, Wis.	Van Depoele	6	5.5
Asheville St. Ry. Co	Asheville, N. C.	Sprague	8	4.5
Atlanta & Edgewood St. Ry. Co	Atlanta, Ga.	Thomson-Houston	4	4.5
Atlantic City Elec. RR.	Atlantic City, N.J.	Sprague	16	5.5
Attleboro & North Attleboro RR. Co	Attleboro, Mass	Thomson-Houston	5	8
Auburn Street RR. Co	Auburn, N. Y.	Thomson Houston	3	3
Bangor St. Ry. Co.	Bangor, Me.	Thomson-Houston	5	5
Bay Ridge Elec. RR.	Bay Ridge, Md.	Sprague	2	2
Belt Line	Lynn, Mass	Thomson-Houston	4	4.5
Bloomington St. RR. Co	Bloomington, Ill.	Daft	12	10
Broadway & Newburgh St. Ry. Co	Cleveland, O.	Sprague	16	10
Brooklyn St. Ry. Co.	Cleveland, O.	Thomson-Houston	36	10
Buffalo St. Ry. Co.	Buffalo, N. Y.	Sprague	4	2.5
Canton St. Ry. Co.	Canton, O.	Sprague	9	6
Central Passenger Ry. Co	Louisville, Ky.	Thomson-Houston	12	10
Central Ry. Co.	Peoria, Ill	Thomson-Houston	15	10
Chattanooga Elec. St. Ry. Co	Chattanooga, Tenn.	Thomson Houston	2	
Chattanooga Electric St. Ry. Co.	Chattanooga, Tenn.	Sprague	6	5
Cincinnati Incline Plane Ry	Cincinnati, O.	Sprague	20	6
Cincinnati St. Ry. Co	Cincinnati, O.	Thomson-Houston	8	2.7
Citizens Elec St. Ry	Decatur, Ill	Thomson-Houston	8	5
Citizens' St. Ry	Elkhart, Ind	Nat. Elec. Trac. Co.	5	7
City Elec. Ry. Co.	Nashville, Tenn.	Thomson-Houston	6	3.5
Colerain Ave. Ry. Co.	Cincinnati, O.	Thomson-Houston	8	5
Colfax Av. Elec. Ry.	Denver, Col.	Sprague		
College Park Elec. Ry.	Sherman, Tex.	Sprague	5	4
Columbus Consolidated St. Ry. Co.	Columbus, O.	Short	2	2
Dallas Rapid Transit RR.	Dallas, Tex.	Sprague	2	2
Danville St. Car Co.	Danville, Va.	Thomson-Houston	6	2
Davenport Cent. St. Ry. Co.	Davenport, Ia.	Sprague	6	3 5
Dayton & Soldiers' Home	Dayton, O.	Sprague	2	2
Decatur Electric St. Ry.	Decatur, Ill	Nat. Elec. Trac. Co.	5	3
Denver Tramway Co.	Denver, Col.	Thomson-Houston	16	5
Derby Horse Ry. Co.	Ansonia, Conn.	Thomson-Houston	4	4
DesMoines Electric Ry. Co.	DesMoines, Ia.	Thomson-Houston	19	10
Detroit City Ry., Mack St. Line	Detroit, Mich.	Nat. Elec. Trac. Co.		2
Detroit Elec. Ry. Co.	Detroit, Mich.	Nat. Elec. Trac. Co.	2	4
Detroit, Ronge River & Dearborn RR.	Detroit, Mich.	Sprague	1	1
Douglas St. RR. Co	West Superior, Wis.	Daft	2	
East Cleveland Ry. Co.	Cleveland, O.	Sprague	45	16
East Cleve. St. Ry. (Collamer Branch)	Cleveland, O.	Sprague	30	6
East Detroit & Grosse Pointe	Detroit, Mich.	Nat. Elec. Trac. Co.	10	8.5
East Harrisburg Pass. Ry. Co.	Harrisburg, Pa.	Sprague	10	7.5
East Harrisburg Pass. Ry	Harrisburg, Pa.	Thomson-Houston	1	
East Readlog RR Co.	Reading, Pa.	Sprague	2	2.5
" " Extension	" "	Sprague	2	1
East Side St. Ry. Co.	Brockton, Mass.	Sprague	4	4
Eau Claire St. Ry. Co.	Eau Claire, Wis.	Sprague	6	5
Erie Electric Motor Co.	Erie, Pa.	Sprague	15	12
Eckington & Soldiers Home Elec. Ry.	Washington, D. C.	Thomson-Houston	10	3
Essex Co. Pass. Ry. Co.	Newark, N. J.	Daft	4	2.8
Federal Street & Pleasant Valley RR.	Pittsburgh, Pa.	Sprague	31	8.5
Fort Worth City Ry. Co.	Fort Worth, Tex.	Nat. Elec. Trac. Co.	10	10
Fort Worth Land & St. Ry. Co	Fort Worth, Tex.	Nat. Elec. Trac. Co	15	15
Fulton County St. RR.	Atlanta, Ga	Thomson-Houston	10	9
Georgetown & Tenalleytown St. Ry. Co.	Washington, D. C.	Thomson-Houston	6	6
Gratiot Elec. Ry.	Fort Gratiot, Mich.	Van Depoele	2	2
Hartford & Wethersfield Horse Ry. Co.	Hartford, Conn.	Sprague	3	3
Highland Park Elec. Ry. Co.	Detroit, Mich	Fisher	4	3.5
Highland Park Ry	Detroit, Mich.	Nat. Elec. Trac. Co.	6	3.5
Hillside Coal Co.	Scranton, Pa.	Thomson-Houston	1	1
Hoosac Valley St. Ry. Co.	N. Adams Mass.	Thomson-Houston	6	5
Huntington Elec. Ry. Co.	Huntington, W. Va.	Short	2	3.5
Ithaca Street Ry. Co.	Ithaca, N. Y.	Daft	2	1
Jamaica & Brooklyn RR.	Jamaica, N. Y.	Sprague	4	9
Joliet St. Ry. Co	Joliet, Ill.	Thomson-Houston	4	3
Kearney St. Ry. Co.	Kearney, Neb.	Thomson-Houston	2	8
Kearney Elec. Ry.	Kearney, Neb.	Sprague	2	8
Key City Elec. Ry. Co.	Dubuque, Ia.	Sprague	2	2
Knoxville St. Ry. Co.	Knoxville, Tenn.	Thomson-Houston	5	2
Lafayette St. Ry. Co.	Lafayette, Ind.	Sprague	9	3
Lafayette Traction Co.	Easton Pa.	Daft	2	1
Laredo City RR. Co.	Laredo, Tex.	Sprague	4	4
Lima St. Ry. Power and Motor Co.	Lima, O	Van Depoele	7	6
Lindell Ry. Co.	St. Louis, Mo.	Julien	1	
" Ave. RR. Co.	" "	Sprague	12	5.5
Lng. Island City& Newtown Elec. RR.	Long Island City, N. Y.	Sprague	2	3
Lynn & Boston Ry. Co	Lynn, Mass.	Thomson-Houston	9	6.75
Macon City & Sub. Ry.	Macon, Ga.	Thomson-Houston	8	6.25
Main Street Line Extn., U. P. Ry.	St. Joseph, Mo.	Sprague	4	1
Mansfield Elec. St. Ry. Co.	Mansfield, O.	Daft	5	4.5
McGavoc & Mt. Vernon St. Ry. Co.	Nashville, Tenn.	Thomson-Houston	26	3
Marlboro St. Ry. Co.	Marlboro, Mass.	Sprague	4	3
Meriden Horse Ry. Co.	Meriden, Conn.	Daft	12	5
Metropolitan RR.	Portland, Ore.	Sprague	7	3
Metropolitan St. Ry. Co.	Kansas City, Mo.	Thomson-Houston	12	5.5
Metropolitan St. Ry. Co.	Toronto, Can.	Thomson-Houston	2	3
Milwaukee Cable Co.	Milwaukee, Wis.	Thomson-Houston	12	5
Minneapolis St. Ry. Co.	Minneapolis, Minn.	Thomson-Houston	10	8
Moline St. RR.	Moline, Ill.	Sprague	2	3
Mt. Adams & Eden Pk. Incl. Ry. Co.	Cincinnati, O.	Daft	3	1
Mt. Adams & Eden Pk. Incl. Ry. Co.	Cincinnati, Ohio.	Thomson-Houston	16	4
Multnomah Elec. Ry.	Portland, Ore.	Sprague	10	3
Muskegon Ry. Co.	Muskegon, Mich.	Short (parallel)	10	4.2
Nashville & Edgefield Ry.	Nashville, Tenn.	Sprague	10	6
National Electric Tramway etc. Co.	Victoria, B. C.	Thomson-Houston	4	4
Nanmkeag St. Ry. Co.	Salem, Mass.	Sprague	6	3
Nay Aug Cross-Town Ry.	Scranton, Pa.	Thomson-Houston	3	1 5
Newark & Granville	Newark, Ohio	Sprague	1	1
Newburyport & Amesbury H. Ry. Co.	Newburyport, Mass.	Thomson-Houston	2	1
Newport Street Ry. Co	Newport, R. I.	Thomson-Houston	6	4.5
Newton St. Ry. Co.	Newton, Mass.	Thomson-Houston	10	8
N. Y. & Harlem RR. Co. (4th Ave)	New York, N. Y.	Julien	10	8.5
Observatory Hill Pass. Ry. Co.	Allegheny, Pa.	Bentley Knight	6	3 07
Omaha & Council Bluffs Ry. & Brdg. Co.	Council Bluffs, Ia.	Thomson Houston	24	14
Omaha & Council Bluffs Ry. & B. Co.	Omaha, Neb.	Sprague	2	4
Omaha Horse RR.	Omaha, Neb.	Sprague	20	10
Omaha Motor Ry. Co.	Omaha, Neb.	Thomson-Houston	30	26
Ontario & San Antonio Heights Ry. Co.	Ontario, Cal.	Daft	4	8
Ottawa Electric St. Ry. Co.	Ottawa, Ill.	Thomson-Houston	8	5
Ottumwa St. Ry. Co.	Ottumwa, Ia.	Thomson-Houston	4	5
Pacific Ave. St. Ry. Co.	Tacoma, Wash. Ter	Sprague	8	6
Passaic St Ry. Co.	Passaic, N. J.	Thomson-Houston	3	3
Passenger RR., Extension	East Harrisburg, Pa.	Sprague	4	3
Peoples RR. Co.	St. Joseph, Mo.	Sprague	20	10
Piqua Electric RR.	Piqua, O.	Sprague	4	3
Pittsburgh Sub. Rapid Transit Co.	Pittsburgh, Pa.	Daft	8	2·5
Pittsb., Knoxville & St. Clair St. Ry.	Pittsburgh, Pa.	Daft	4	2·25
Plattsmouth Elec. RR.	Plattsmouth, Neb.	Sprague	2	2
Plymouth & Kingston Ry. Co.	Plymouth, Mass.	Thomson-Houston	3	4.5
Port Chester & Rye Beach St. Ry. Co.	Port Chester, N. Y.	Daft	5	3
Port Huron Elec. Ry.	Port Huron, Mich.	Van Depoele	6	4
Quincy St. Ry. Co.	Quincy, Mass.	Thomson-Houston	4	9
Redbank & Seabright Ry.	Redbank, N. J.	Thomson-Houston	3	5
Revere St. Ry. Co.	Revere, Mass.	Thomson-Houston	5	2.5
Richmond St. Ry. Co.	Richmond, Ind.	Thomson-Houston	6	4
Richmond Union Pass. Ry. Co.	Richmond, Va.	Sprague	40	7.5
Riverside & Suburban Ry. Co.	Wichita, Kans.	Thomson-Houston	6	9
Rochester Elec. Ry. Co.	Rochester, N. Y.	Thomson-Houston	9	7
Ross Park St. Ry. Co	Spokane Falls, W. T.	Thomson-Houston	6	7.5
Saginaw Union Ry.	Saginaw	Nat. Elec. Trac. Co.		17.4
St. C., Merriton & Thorold St. Ry. Co	St. Catharines, Ont.	Van Depoele	10	7
St. Jose & Santa Clara RR. Co.	St. Jose, Cal.	Thomson-Houston	6	9
St. Louis Bridge Co.	St. Louis, Mo.	Thomson-Houston	4	2
St. Louis Ry Co.	St. Louis, Mo.	Short	21	3
Saint Paul City Ry.	St. Paul, Minn.	Thomson-Houston	20	5.1
St. Paul & Minn. Ry. Co.	St Paul, Minn.	Thomson-Houston	20	20
Salt Lake City RR. Co.	Salt Lake, Utah	Sprague	20	6.5
Saratoga Elec. Ry. Co.	Saratoga Springs, N. Y.	Thomson-Houston	2	2
Sault Ste. Marie St. Ry. Co.	Sault Ste Marie, Mich.	Nat. Elec. Trac. Co.	2	3
Scranton Suburban Ry. Co.	Scranton, Pa.	Thomson-Houston	10	5
Scranton Pass. Ry. Co	Scranton, Pa.	Thomson-Houston	4	2
Scranton Peoples Ry. Co.	Scranton, Pa.	Sprague	20	12
Seashore Elec. Ry. Co.	Asbury Park, N. J.	Daft	20	4
Seattle Elec. Ry. & Power Co.	Seattle, W. T.	Thomson-Houston	13	5
Second Av. Pass. Ry. Co.	Pittsburgh, Pa.	Thomson-Houston	10	10.06
Sioux City Elec. Ry.	Sioux City, Ia.	Sprague	12	6
So. Covington & Cincinnati St. Ry. Co.	Cincinnati Ohio	Short	20	8
Southington & Plantville Ry. Co.	Southington, Conn.	Thomson-Houston	9	2
South Denver Cable Co.	Denver, Colo.	Sprague	2	2
South Nashville St. RR.	Nashville, Tenn.	Sprague	10	5 2
South St. Paul Rapid Transit Co.	S. St. Paul, Minn.	Daft	10	8
Squirrel Hill RR.	Pittsburgh, Pa.	Sprague	5	3.5
Steubenville Elec. Ry. Co.	Steubenville, O.	Sprague	8	2.5
Stillwater Elec. St. Ry.	Stillwater, Minn.	Sprague	6	5
Sunbury & Northumberland St. RR. Co.	Sunbury, Pa.	Daft	3	3.5
Tacoma Ave. St. Ry. Co.	Tacoma, Wash. Ter	Sprague	8	2
The North East St. Ry. Co.	Kansas City	Thomson-Houston	10	7
Third Ward Ry. Co.	Syracuse, N. Y.	Thomson-Houston	8	4
Toledo Elec. Ry. Co.	Toledo, O.	Thomson-Houston	2	2
Topeka Rapid Transit Co.	Topeka, Kas.	Thomson-Houston	30	17
Troy & Lansingburg St. RR.	Troy, N. Y.	Sprague	12	5.5
Union Depot Ry. Co.	St. Louis, Mo.	Thomson-Houston	30	10
Union Pass. RR.	St. Joseph, Mo.	Sprague	14	5
Union Elec. RR.	Sterling, Ill.	Sprague	7	6
University Pk. Ry. & Electric Co.	Denver, Col.	Thomson-Houston	3	4
Vine St. Ry	Kansas City, Mo.	Thomson Houston	6	3
Washington St. Asylum & Park RR.	Binghamton, N. Y.	Sprague	4	5
Watervliet Turnpike & RR. Co.	Albany, N. Y.	Thomson-Houston	16	15.5
West Bay City, Elec. Ry.	West Bay City, Mich.	Sprague	8	5
West Dallas St. Ry. Co.	Dallas, Tex	Sprague	2	3
West End St. Ry Co	Boston, Mass.	Thomson-Houston	300	230
West Side St. Ry.	Milwaukee, Wis.	Sprague	10	13
Wheeling Ry. Co.	Wheeling, W. Va.	Thomson-Houston	5	10
Wilkesbarre & Snb. St. Ry. Co.	Wilkesbarre, Pa.	Sprague	6	3
Wilkesbarre & West Side RR.	Wilkesbarre, Pa.	Sprague	3	4
Willamette Bridge RR.	Portland, Ore	Sprague	5	1.5
Wilmington City Ry. Co.	Wilmington, Del.	Sprague	8	3
Windsor Elec. St. Railway Co.	Windsor, Ont.	Van Depoele	2	2
White Line St. RR.	Dayton, O	Van Depoele	12	9
Woodstock & Waverly Elec. Ry. Co.	Portland, Oregon	Thomson-Houston	4	5.25
Wyatt Park Ry. Co. (Northern Div.)	St. Joseph, Mo.	Sprague	9	4.5
Wyatt Park Ry. Co.	St. Joseph, Mo.	Sprague	8	5.5
Youngstown St. Ry. Co.	Youngstown, O.	Sprague	6	4

Street Railway Securities.

NEW YORK AND BROOKLYN.

NAME OF COMPANY.	Par Value	Capital.	Period.	Rate.	Date.	Bid.	Asked
Atlantic Avenue Railroad	$ 50	1,000,000	Quar.	6	1st July, 1889	104	106
1st mortgage	----	140,500	M. & N.	7	1st May, 1894	107	112
Central mortgages	----	757,000	A. & O.	5	1st Oct., 1909	103	108
Bleecker St. & Fulton Ferry	100	900,000	J. & J.	8¼	1st July, 1889	28	30
1st mortgage	1,000	700,000	J. & J.	7	July, 1900	115	120
Broadway & Seventh Avenue	100	2.100,000	Q.—J.	4	July, 1889		
1st mortgage	1,000	1,500,000	J. & D.	5	June, 1904	106	108
2d mortgage	1,000	500,000	J. & J.	5	July, 1914	105	106½
Broadway Surface Rds	1,000	1,500,000	J. & J.	5	July, 1924	105	106
Bonds guaranteed	1,000	1,000,000	J. & J.	5	July. 1905	90	95
Brooklyn City	----	3,200,000	Q.—F.	2	1st May, 1889	155	160
1st mortgage	1,000	800,000	J. & J.	5	Jan., 1902	103	105
Brooklyn Crosstown	100	500,020	A. & O.	5	1st July, 1889	195	200
1st mortgage	1,000	200,000	J. & J.	5	Jan., 1888	108	110
Bushwick Avenue (Brooklyn)	100	500,000	Q.—F.	2	May, 1889	108	110
1st mortgage	1,000	400,000	J. & J.	6	Jan., 1902	105	110
Central Park, North and East River	100	1,800,000	Q.—J.	1½	April, 1889	99	102
Consolidated mortgage bonds	1,000	1,200,000	J. & D.	7	Dec., 1902	118	121
Christopher & Tenth St	100	650,000	Q.—F.	1¾	1st May, 1889	130	132
1st mortgage	1,000	150,000	A. & O.	7	1898	114	116
Dry Dock, East Broadway & Battery	100	1,200,000	Q.—F.	2	1st May, 1889	120	125
1st mortgage consolidated	500&c.	900,000	J. & D.	7	June, 1893	107	109
Scrip	100	1,200,000	F. & A.	6	May, 1914	104	106
Eighth Avenue—stock	100	1,000.000	Q.—J.	2	April 1889	150	155
Scrip	100	1,000,000	F. & A.	6	Feb., 1914	107	110
Forty-Second Street & Grand Street Ferry—stock	100	748,000	Q.—F.	3	May, 1889	218	220
1st mortgage	1,000	236,000	A. & O.	--	April, 1893	108	112
42d St., Manhattanville & St. Nicholas ave—stock	100	2,500,000	------	--	------- ------	40	45
1st mortgage	1,000	1.200,000	M. & S.	6	March, 1910	114	118
2d mortgage, income	1,000	1,600,000	J. & J.	6	July, 1915	55	60
Houston, West St. & Pav. Ferry—stock	100	250,000	Q.—F.	2	Feb., 1886	165	-----
1st mortgage	500&c.	500,000	J. & J.	7	July, 1894	109	112
Ninth Avenue	100	800,000	------	3	Sept., 1885	90	95
Second Avenue—stock	100	1,862,000	J. & J.	5	Jan., 1887	98	101
Consolidated convertible	1,000	1,600,000	M. & N.	5	1st Nov., 1909	106	107
Debenture bonds	--	150,000	------	5	1909	100	-----
Sixth Avenue—stock	100	1,500,000	Q.—F.	1½	1st May, 1889	170	175
1st mortgage	1,000	500,000	J. & J.	7	July, 1890	105	106
Third Avenue—stock	100	2,000,000	Q.—F.	5	1st May, 1889	240	250
1st mortgage	1,000	2,000,000	Q.—F.	7	Jan., 1890	105	107
Twenty-Third Street—stock	100	600,000	F. & A.	2½	1st May, 1889	230	235
1st mortgage	1,000	250,000	M. & N	7	May, 1893	110	112
Debentures	----	150,000	------	5	1903	101	103

ST. LOUIS.

Benton Bellefountaine	$ 100	400,000	Jan.	1½		95	96
" " Bonds	1,000	50,000	A. & O.	6	1880	105	110
Cass Avenue (Bonds)	1,000	200,000	F.& A.	6	1886	102	104
Citizens Cable	100	1,500,000	N.	1½		75	80
" Bonds	1,000	1,500,000	I. & I.	6	1887	105	107
Lindell	100	600,000	Jan.	2		120	130
" Bonds	1,000	87,500	F.& C.	7	1879	103	105
People's	50	300,000	Sept.	6		48	50
" 1st Mortgage Bonds	1,000	125,000	I.& C.	6	1882	103	105
" 2d Mortgage Bonds	1,000	75,000	M.& N.	7	1886	104	105
St. Louis	100	1,000,000	May	4		112	115

HOLYOKE.

Springfield Street RR. Co.	100	300,000	1889	10	1889	200	210
Holyoke Street RR. Co.	100	50,000	1889	5	1889	140	150

PROVIDENCE.

Union RR. Co.	100	1,500,000	Q.& I.	8		170	175

Bond Offerings.

OFFERED BY ROLSTON & BASS, 20 BROAD ST., NEW YORK.

Bangor Street Railway Company, Bangor, Me. (Electric) 1st m.

Rate	Price	Pays	Amt. Offer'd	Mature	Int-Pbl.	Miles	Bnd. p.M.	Issue	Net Earn'gs May 21 to Oct. 1
6	101 & Int	6	20,000	1909	F. & A.	3¼		70,000	$6,561,60

OFFERED BY ROBT. GLENDINNING & CO., PHILADELPHIA, PA.

Baltimore Traction Coompany, (12 m. to be cabled) 1st m.

5	98½ & Int.	--------	250,000	1929	M. &N.	31	1,500,000	Abt $110,000

OFFERED BY S. V. WHITE & CO, 36 WALL ST., NEW YORK.

Consolidated Street Railway Company, Columbus, O., 1st m. gold.

5	104&Int.	4.75	175,000	1909	J. & J.	80	800,000	Abt $120,000

OFFERED BY HARRIMAN & CO., 120 BROADWAY, NEW YORK.

Suburban Street Railway Company, Scranton, Pa. 1st m.

6	105&Int.	5½	25,000	1909	M. & N.	----	200,000	Abt $73,000

Utica Belt Line Street Railway Company, Utica, N. Y. 1st m.

5	100&Int.	5	20,000	1939	M. & N.	22	500,000	Abt 43,000

Ohio State Tramway Association.

EIGHTH ANNUAL CONVENTION.

[*Verbatim* Report.]

The eighth annual meeting of the O. S. T. A. was held at the Hollenden, Cleveland, November 20th, 1889.

The meeting was called to order shortly after ten o'clock, by President M. A. Hanna, of Cleveland, in the chair.

The delegates present and companies (members) represented by them were as follows:

Akron—H. T. Wilber, General Manager Akron Street Railway Co.

Ashtabula—Jno. N. Stewart, proprietor.

Cincinnati—John Harris, Supt. Cincinnati Street Railway Co.; George B. Kerper, Pres. Mt. Adams & Eden Park Inclined R. R. Co.

Cleveland—J. Stanley, Pres., H. E. Andrews, Vice Pres. Broadway & Newburgh Street R. R. Co; Dr. A. Everett, Pres., H. A. Everett, Sec. and Treas. East Cleveland R. R. Co.; Chas. Hathaway, Pres. St. Clair Street R. R. Co; M. A. Hanna, Pres., J. B. Hanna, Sec., G. G. Mulhern, Supt. Woodland Avenue & West Side Street R. R. Co.

Columbus—A. D. Rodgers, Pres, W. B. Hayden, Treas. Columbus Consolidated Street R. R. Co; A. D. Rodgers, Pres., W. B. Hayden, Treas. Glenwood & Greenlawn Street R. R. Co.

Dayton—Chas. B. Clegg, Stockholder Dayton Street Railway Co.; A. G. Clark, Vice Pres. White Line Street R. R. Co.; Chas. B. Clegg, Stockholder Fifth Avenue Street R R. Co.; Chas. B. Clegg, Pres. Oakwood Street R. R. Co.; Chas. B. Clegg, Stockholder Wayne & Fifth Street Railway.

Sandusky—A. C. Moss, Sec., and Clark Rude, Supt. Sandusky Street Railway Co.

Springfield—Ross Mitchell, Pres., W. H. Hanford, Supt. Citizens' Street R. R. Co.

Toledo—Jno. Gilmartin, Supt. Toledo Consolidated Street Railway Co.

Youngstown—The Youngstown (O.) Street Railway Co., represented by Jas. Parmalee, President, was admitted as a new member.

The following gentlemen were present as visitors: J. A. Hanna, of the J. G. Brill company, car builders; J. R. McLaughlin and C. W. Foote, of the Sprague Electric company; Prof. Sidney H. Short, of the Short Electric Railway company of Cleveland; Mr. E. J. Horton, of the River and Rail Electric company, of New York; Philip Wynne, of the Thomson-Houston Electric company of Boston.

The minutes of the last meeting were accepted as printed.

Letters of regret at their inability to attend the meeting were read from E. V. Cavell, editor STREET RAILWAY GAZETTE, Chicago; B. F. Haughton, Cincinnati; J. M. Doherty, of the Cincinnati Inclined Plane Railway company, Cincinnati; Jas. A. Collins, Secretary Cincinnati Street Railway company, Cincinnati; A. S. Bushnell, Springfield; and A. E. Lang, Vice President Toledo Consolidated Street Railway company, Toledo, O.

ANNUAL REPORT OF J. B. HANNA,

Treasurer Ohio State Tramway Association, for the year ending Nov. 20, 1889:

Balance on hand as per last report		$105 85
Receipts from street railways, etc., as follows:		
Metropolitan Street R. R. Co., Toledo	9 25	
American Publishing Co.	7 00	
Dayton Street R. R. Co.	3 00	
		$125 10

Paid bills as follows:	
B. Perrin	$ 17 00
R. R. Donnelley & Sons, annual rep'ts	44 60
H. A. Everett, stamps and envelopes	8 45
Balance on hand Nov. 20, 1889	55 05
	$125 10

On motion, resolved that the Treasurer's report be accepted.

The President announced that applications for membership were next in order. The application of the Youngstown Street Railroad company, represented by Mr. James Parmalee, as President, was presented to the association. On motion of Dr. Everett, the said company was admitted to membership.

On motion of Mr. Kerper, of Cincinnati, the association proceeded to consider the subject of "Motive Power." The President called upon Mr. Kerper. Mr. Kerper said:

Mr. President—I don't know that I can say much on the subject. I am here to see what is going to be done. There has been a great deal done in this city, especially in the way of electric motors, and the companies are all represented here on that question, and probably they would give us some information as to what they are doing. I see the Thomson-Houston company is represented here, and the Sprague company, and the storage batteries are represented. I understand that in Springfield they are equipping a car with a naphtha or coal oil engine, which they expect to have running in a couple of weeks. In Cincinnati we have mostly adopted the cable, which is peculiarly adapted to our hills. In the suburbs they are undertaking to adopt the Sprague or Thomson Houston overhead system of electricity that you gentlemen have here. Mr. Holmes, of Cincinnati, is rigging up a steam engine which is very simple in construction, and which he has experimented with with very good results. It has a good speed, starts off easily, and stops easily. It is on an entirely new principle—a sort of roadway motor. It has a regular steam motor, but you could lift the engine they have on there, although it develops fifteen horse-power. Whether it is going to be a success or not, I don't know. These other gentlemen can tell us something of what they are doing. I would like to hear something about the engine they have at Springfield.

Mr. Hanford, of Springfield, was called upon, and spoke as follows:

Mr. President and Gentlemen of the Association—A gentleman by the name of Simms has invented the engine, and one is being fitted up now on trucks, which will be ready to run in the next ten days or two weeks. We all anticipate that it is going to be a success. It is operated by gas manufactured on the car from gasoline and water. The power of the motor to start the car is 32 to 1. When the car is in motion we can move it at the rate of six miles an hour. The power to start is so much greater than the power needed to move the car after it is in motion that we claim this feature is going to be of great advantage. The motor will weigh about 800 pounds and is secured to the axles right under the body of the car between the axles. There is no noise from it; the exhaust doesn't amount to anything; you can't hear it on the sidewalk as the car is passing. We expect it is going to be a success, but of course we cannot tell until after it is tried.

Mr. John Harris, Cincinnati: I am in the same shape as brother Kerper. I came up here for a little information. We are interested in a motor line down in Cincinnati just starting; we are about to increase our capacity for running, and I came up here to see what improvements there were in reference to the motor system. I understand they have two systems here, and I want to inspect them as thoroughly as I can. We have the Thomson Houston system in our city, and also the Sprague system. The company I represent has the Thomson Houston system. We have only about two miles of double track finished, but we are ready to go further down in the city. We have contracts made for poles and are preparing contracts for motors and other parts of the machinery. Unfortunately, about the time we got our two-mile route equipped, the city tore down a bridge that we crossed and headed us off, but we expect that it will be finished in a couple of months. It will require eighteen or twenty motors to equip the line. We are now running six motors eighteen hours a day, and we expect to make the loop around in Cummingsville by the time the bridge is finished, and by that time we expect to have the equipment ready to run down into the city. We haven't yet been able to ascertain the cost of running the motor; we have been running a short line, and yet at the same time have had the capacity for running more cars. I don't know that I could say anything more.

Mr. H. A. Everett: How is your cable route working?

Mr. Harris: First-rate; there is no complaint at all.

On motion of Mr. Kerper, it was resolved that gentlemen present, other than members of the association, be invited to express their views on the subject under discussion.

Mr. Philip H. Wynne, of the Thomson-Houston Electric company, of Boston, was invited to address the association, and spoke as follows:

Mr. President and Gentlemen of the Association: I would like to thank you for your courtesy in asking me to speak, and in addressing the gentlemen present I would say that contrary to the general reputation of electrical men my weakest point is talking. I came here to day hoping that I would be allowed to listen to the experience of practical railway men and put myself in the attitude of a learner rather than one who is making statements, since we have to occupy so much time in making statements that we are glad to be relieved of it sometimes. I should be very glad, however, to answer any questions relating to any roads which we have already equipped and with the operation of which I am familiar. But as to the history of the work being done, we know that the electrical railroad system has sprung into existence, so to speak, almost fully developed; and owing to the advantages of rapid transit, improved service and cheaper operation combined, the prominence taken by the electric motor is one of the most astonishing developments in the fields of electrical science; but as the history of this development is already well known I do not think I could add anything to the information of the gentlemen present, unless it may be on some special technical point on which they would like to be enlightened, and which I would be very glad to give in the form of answers to any questions they may wish to ask.

The President (Mr. M. A. Hanna): Does anybody desire to ask any questions? I would like to ask the gentlemen whether they are making any further improvements in their system?

Mr. Wynne: We find, sir, that possible improvements come up continually. We are still retaining the type of motor which after almost a year's study we decided to adopt when we first entered the field of electrical railroading. But we find some details of the apparatus, for instance, the arrangement of the oil cups, etc., that we are continually improving. Moreover, I am of the opinion that one of the most valuable sources of improvements to the electric motor is the suggestions of the practical men who are using the motors, which are of great assistance to the theoretical men, who are busy filling the orders which are piling in upon them. I understand that all the companies manufacturing electric railway appliances are rushed with business, and in their haste the suggestions and points brought up by practical men are of the very greatest value to them. We do find that valuable improvements are being continually suggested, but those improvements relate mainly to the mechanical details and not to the main issues. Although the electric motor and the dynamo were experimented with in the years between 1850 and 1860 it was only between 1860 and 1870 that the laws governing the relations between the electric motor and the dynamo were at all well understood. In the short space of twenty years the motor and dynamo have been developed to an efficiency which the steam engine has never equalled in its two hundred years of development. The reason is that the electricity is more readily controlled in its application, and is limited to no dead stone wall beyond which the development of its efficiency cannot be carried. The efficiency of the modern dynamo runs up to over 90 per cent, while the steam engine of the present day, considered as a prime mover, and considered only from the boiler to the shaft, has a theoretical efficiency of at best less than 60 per cent; the efficiency of the steam plant as a whole, including the furnaces, boilers and engines, is at best under 14 per cent. Now electricity has come into the field. We say that it is a mysterious force, which is true. No man understands the nature of electricity itself, nor does any man understand the nature of heat itself. On the other hand the nature of the laws governing the action of electricity are so well understood, just as the laws governing the application of steam to the production of power are well understand, that we have been able to improve the dynamos and motors to the point where 90 per cent of the power given to the dynamo is returned to the wires as electricity power. Of course this presupposes a knowledge of the laws of electricity which puts it rather out of the position which it has so long been considered to occupy as an infant science; we think it is a very sturdy infant indeed. And while I think the predictions are right that so far as its applications are concerned it is only in its infancy, on the other hand I think the development of the electric motor can scarcely be considered primitive, when we have already reached a point so far ahead of a steam engine.

Mr. Clark: I would like to ask whether you find that the carbon brush produces more heating than the copper?

Mr. Wynne: We have found that that depends very largely upon the condition in which the brush and the commutator are kept. If the brush is of good material and kept smooth, and the communicator is kept smooth, there is formed of a kind of glaze of a dark color upon the armature, which, without impairing the electrical contact almost entirely eliminates the wear of the brush and commutator. Such wear as there is comes almost entirely upon the brush. On the other hand, if the carbon brush and the commutator are allowed to become rough, they get very hot; I think that is due to the increased resistance between the commutator and the brush, as well as to the mechanical friction between them. So the main thing in the use of carbon brushes is this: the carbon brush certainly has some very marked and decided advantages, but on the other hand if it is improperly applied it may be less convenient than the copper brush. The character of the metal on which the brush is used has a great deal to do with the results.

Mr. Hanna: I would like to ask to what cause is due most of the accidents that occur on electric railroads now?

Mr. Wynne: That depends very largely upon the nature of the regulations, and the nature of the motor that is used; but I think I am right in saying that the general cause is the first rush of current through a motor before it is able to turn and start the load, and to protect itself, so to speak. This protection we afford by inserting a rheostat. Another cause is the sudden breaking of the currents that are passing through a motor when a large amount of power is being developed, producing what is called an extra current; the current by the very act of stopping producing an additional induced current of very high potential, which is very apt to injure the motors.

Mr. Hanna: Is that caused by the want of experience in handling it?

Mr. Wynne: Mostly so at present. If a conductor was never allowed to pull off his trolley until the current is shut off, he would save a great deal of the damage done to motors.

Mr. Hanna: But the trolleys get off of their own accord.

Mr. Wynne: I know accidents will take place, but the thing is to minimize them as far as possible. To that end we are trying to bring our trolleys to such a point that the running of one off the wire shall be a very rare thing. Of course there are *mechanical* reasons for various electrical accidents. One thing militating against the success of the electric motor in street railways is that the importance of a certain amount of care and cleanliness which might not be so necessary when horse power is used, is not duly recognized by railway men. Has not that been your experience Mr. Everett?

Dr. Everett: That is so.

Mr. Wynne: Then again, if people recognized the readiness of the electric current to escape from the bounds it is kept in by insulation, they would be very cautious in many things which at first do not show their proper importance, but which might be avoided by proper information on the part of employes. If a steam engineer did not know that beyond a certain point boiler pressure became dangerous, if he did not understand that when he opened wide the valve of a boiler carrying a heavy pressure the result might be an explosion—many more accidents would

happen with the use of steam engines. These peculiarities of the electric current are not so well understood as the peculiarities of steam engines, but they will become so in time.

Mr. Hanna: Has there been any improvement with reference to the burning out of armatures recently?

Mr. Wynne: Well, it is difficult to cover that point exactly. Every improvement in the motor improves it in that particular. The damage to the motor by any accident is very likely to show itself in the armature. All improvements that can possibly be made, and all changes that can be made in construction which will render the armature more thoroughly fire-proof and insulated, are improvements in the direction of a diminished chance of injuring it. Of course, we have not yet any of us produced an absolutely fire-proof armature, and I do not think we can ever expect to produce one. There are certain circumstances under which we never in the world can protect it. The nature of electricity is such that with a wrong arrangement the power instantly increases to a point that is almost immeasurable, or would if the power at the station were not limited by safety devices. That is to-day, we never can make an armature that is *absolutely impossible* to burn out; but we can render that difficulty so rare that it ceases to be necessary to consider it as a very important matter, because we know that whether we run steam cars or anything else they sometimes get out of order.

Mr. Clark: I would like to have Mr. Wynne tell us about the variation in the power required by one car under abnormal condition, as in the case of the Lynn Road.

Mr. Wynne: This was simply a case on a line at Lynn, in Massachusetts, which has a very heavy grade; I do not know the amount of the grade, but my impression has always been that for about 300 feet it averaged about 12 per cent. Mr. Breed, the president of the road, states that at one point it runs up to 14 per cent. The line on which this grade occurs is a belt line; the car runs round and round, going up less severe grades and coming down on the heaviest grade. There is no advantage in going up the heavy grade, as the traffic is better accommodated by running the car in the other direction. On the other hand, in order to demonstrate the possibility of coming back on that grade, at one time when I had with me a party of gentlemen who were looking over the line, we came around and came up the lighter grade to the crest of the hill. We had on board a load of sixty-five persons, by count of noses. At the top of the heavy hill a number of them who were interested in the operation of the line said: "Oh, well, you have shown us some pretty steep grades coming up, but could we go up this grade?" I had the driver stop at the steepest point. (I will say by way of preface that the motors on that car are of fifteen horse power each, making a capacity of thirty horse power to the car; but the electric power is elastic; it is not like the steam engine, which has a certain limited power, dependent upon the piston area and the steam pressure; but with increased current the power will stretch out far beyond the rated and normal capacity of the motor.) By braking down hard we stopped on the fourteen per cent grade, to stop the car requiring almost the entire strength of the driver. Then we started backward with the current. Meantime every one in the car had risen to his feet to see the result of the experiment. Owing to the amount of power required to start the car, we finally started quite suddenly, and ran right back up the hill, every one in the car being thrown forward by the power of the start. They were all pleased with the practical test of being able to stop and start the car on a grade of that severity, showing the power of the motor. But what they did not know was an indication which I afterwards obtained at the power station, where they found that just at the instant of starting the car the overcoming of the friction of the brakes and the inertia of the load took ninety horse power at the generator. Now there was only thirty horse power in the motors, the explanation being that for the time being the motors will produce a great deal more than their normal power without injury. I think that is what Mr. Clark had reference to.

Mr. Clark: I had Mr. Wynne state it merely as an illustration of what a motor can do, but ought not to be called upon to do. I think motor drivers frequently call on these motors to do more than they ought to do I have had them in Dayton stop two cars on a four per cent grade; the car will do it, but I think it is a mistake; the car is not built for that purpose.

Mr. Kerper: Don't you have to do it sometimes?

Mr. Clark: Of course you lose your trolley wire sometimes, when you don't want to do it, but have to. I think the general tendency of these men who drive cars is that they like to show people how much the car will do.

Mr. Wynne: Yes, they treat them as a child would a new toy.

Mr. Kerper: Explain to us how the best results are obtained—whether by the single or the double trolley system?

Mr. Wynne: If you insist on my entering on that discussion—my position is a somewhat delicate one on that point; it puts me in a rather difficult position to ask me to say anything one way or the other, because you and I are exactly at variance in our beliefs on that subject.

Mr. Kerper: That is the reason I want to draw you out. The question is coming up all over the State.

Mr. Wynne: The main disadvantage of the double trolley system is one which does not show on the surface, and is somewhat difficult to explain the force of to any one except a practical electrician. I will try to make my explanation as free as possible from obscure technical terms. We have adopted as the most practical system the "multiple" system. The generator at the power station remains at a constant potential, but the amount of current varies with the requirements of the cars; it is analogous to the case of distribution by water pipes, in which the pressure is constant but the number of gallons per minute delivered to the whole city varies. Now, on that system of distribution, when two wires cross each other, and the single trolley system is used, the potential of both wires being alike, there is no necessity to insulate them from each other. With the double trolley system the case is different, and an additional complication is introduced thereby. The potential of the overhead wires is always 500 volts practically, and that of the rail or ground is zero; that is, all trolley wires overhead are of equal potential. There is, therefore, no tendency for the current to leap away from the overhead wire to anything not connected with the ground, and it is a comparatively simple matter to insulate the overhead system perfectly from the ground. Then, moreover, as all the conductors are of the same potential, it is the simplest matter to join them together in one continuous metallic circuit; whereas, when you take the two-wire systems, the two wires carry different potentials, and are placed six, or twelve, or eighteen inches apart. This being but a short distance for the current to break across, in that short distance you can not possibly insert so much insulation as you can from the overhead wire to the ground. Good insulation is the secret of successful overhead work. Another difficulty is that in the two-wire system the circuit, instead of being continuous, is broken at numerous points where the positive crosses the negative wire. This explains why in some instances where the double wires have been used, a spark is sometimes drawn across the blank space and establishes a circuit where there ought not to be one, burning out wires and causing them to fall to the street. Another thing, in approaching a point of this kind you have got to pull the trolley off or shut off the current very suddenly, and the difficulty of making a driver shut off the current when he ought to is very great. Anything that increases the chance of injury to the motor is objectionable, in my opinion. Moreover, the weight of the construction required where one track crosses another is very objectionable. With the single wire system, where one track crosses another but one piece of metal overhead is required to support that crossing. At every switch or turn out, or where there are complicated curves (to a barn, for instance), it is not simply a matter of doubling but of quadrupling or multiplying by ten the overhead complication. When we have a very complicated arrangement, such as we are obliged to have in some parts of Boston, it would be impossible to support such a structure without overhead trusses resembling the construction required to support an elevated railroad. Mr. Kerper and Mr. Kilgour do not agree with us on that question, and some other electricians differ with us on that point. There are other points besides the foregoing affecting this question, into which it would not be profitable for us to enter at this time.

Mr. E. J. Horton, of the River and Rail Electric company of New York:

Mr. President and Gentlemen of the Association:

I had proposed to take a back seat during this discussion. The principal electric systems, the Thomson-Houston and the Sprague, are in successful operation; the concern I represent is not yet in operation. We have perhaps taken a little too much time to develop our system. We are conscious of the importance of putting before the public a complete system, and of having tested by our own experiments the difficulties inherent in any successful system of car propulsion. We started with the idea that the storage battery, with each car carrying its own power, was the true system. We have a good motor. There are other motors, but we are not ashamed of ours; we consider it the simplest and most economical of any in the market. We could long ago have operated that motor with the overhead system, but we preferred to wait until we had thoroughly tested the storage battery system, believing that that would be the best in the long run. We are just now commencing to get into the market. We are building a lot of cars under our plans for different parts of the country, which we expect to have out in the course of the next three or four months. I do not think it is necessary for me to say anything to this association about the advantage of the storage battery system. My friend Mr. Kerper anticipated everything that I could say in his address at the meeting of the National Association at Minneapolis, and it is the same thing that has been said by others in a better way than I could put it. The great point of our own system is its economy. It does not cost any more, hardly as much, to equip a lot of street cars with the storage battery system that we have than for the overhead system. But, after all, that is not the point; the point is economy of operation. We have, for instance, one motor weighing 800 pounds, geared to both axles of the car, which is operated by storage batteries. We don't have to develop any great amount of power to start that car. It takes no more current to start the car than it does to run it; that we think is a great point gained. My friend Mr. Wynne has told how it took ninety-horse power motors to drive a car up a grade. He had two fifteen-horse power motors on that car, thirty-horse power altogether. Mr. Everett and these gentlemen here that are operating the Thomson-Houston and Sprague systems use two motors, making thirty-horse power together, to do what? To run a car that two horses used to pull. Now it seems to me it goes without saying that there is a great waste somewhere. Why should it take thirty horse power to operate a car which two horses used to run?

Mr. H. A. Everett: Most of them tow another car.

Mr. Horton: The reason of it is very plain; it is the starting the car from a dead rest. To break the inertia of the car you have to develop an extra amount of power. If you could by some mechanical arrangement start that car without requiring that tremendous horse-power, you could run your overhead system a great deal cheaper than you can now. To run a thirty horse power motor on a car takes an unnecessary amount of current. And then, whenever the cars are stopped in any way the current must go somewhere, and as a general thing it goes to the armature of the motor. Therefore, we claim that we can reduce the power necessary to start the car down to its normal place. For instance, we have a set of batteries on a car that weighs 2,700 or 2,800 pounds and gives about a 140 volts of electric motor force, it takes no more electric motor force to start than to run the car. The reason is that the motor on the car never stops running; it revolves continuously. When the car stops the motor runs in space, so that it takes a very little current to run it. When they want to start the car the machinery is thrown into gear and the car starts with a slow motion which is immediately changed to a rapid motion. It therefore takes no more current to start that car than it does to run it, and there is where the economy comes in. We charge those batteries with a regular supply of electricity lasting so many hours, according to the work they have to do, and those batteries are unharmed because they have no extra amount of work to do at any one time; there is a steady outgo of electricity whether the car is running or not.

Mr. Harris: I would like to ask if with the storage batteries a sixteen-foot car could stop on a ten or twelve per cent grade and get away again without any extra power?

Mr. Horton: No, sir, not on a ten or twelve per cent grade.

Mr. M. A. Hanna: I would like to ask whether the batteries are movable in the car, for charging and recharging.

Mr. Horton: The batteries are put in on the side. They slide out easily, and as quick as one is taken away another is put in. The whole operation probably takes about two minutes. The length of time the batteries operate depends entirely on the work. They will be calculated to run say fifty miles. With a larger number of miles they can run a longer time, but with a smaller number they will carry less weight.

There is a disadvantage, of course, in hauling a great weight just in order to have a long supply of power. That is a matter of detail which will be arranged to suit the convenience of street car companies. There is, however, a certain amount of weight which has to be in the batteries, because each cell has its electric motive force, and you can not reduce the number of cells to such an extent that you will not have the electric motive force necessary. The fifty six battery car of 2,700 pounds that I have spoken of, has such a set of batteries as would be used on ordinary grades, of probably not more than six or seven per cent. When it comes to heavier grades than that there would be a special amount of storage batteries probably arranged to give greater electric motive force, that is divided up into smaller sizes so as with no additional weight to have a greater amount of electric motive force to get over such grades as that.

Mr. Harris: How do you apply the power?

Mr. Horton: By a deferential gearing we have been experimenting with for a year and a half. It would be impossible for me to describe it, but the idea is a deferential gearing by which the power is applied to the axle, and it commences to revolve slowly, immediately increases, and is cut off and put on at an ordinary rate of speed. That is the invention by which we are enabled to run our cars with no greater expenditure of electric motive force; it is that alone which enables us to do it, and that same thing would enable the Julien or the Gibson or any of these other storage battery concerns to dispense with their heavy motors and extra amount of battery It is that which enables us to stop and start with ease and without undue expenditure of power That mechanical connection is an invention probably as important to street car propulsion as the storage battery itself.

Mr. Harris: I would like to ask the gentleman if there is any storage battery car in operation that is running successfully on a five per cent grade?

Mr. Horton: I don't remember what the grade is on Fourth avenue in New York, on which the Julien system has been running some time. They were stopped by injunction about two weeks ago, but they were running very successfully, and they overcame grades on Fourth avenue of in some cases at least, I think, five per cent, without any difficulty whatever.

Mr. Harris: I have ridden on the Fourth Avenue road. It worked very successfully the day I was there, but I haven't heard of its being used successfully in any other city. It ran only five or six or seven miles an hour the day I was there, and I don't think the grade was over three or four per cent, and that for only one block.

Mr. M. A. Hanna: It must be up-grade all the way up town.

Mr. Fairchild: Yes, but the per cent is very slight indeed.

Mr. Foote, of the Sprague Electric company was invited to address the association, and spoke as follows:

Mr Chairman and Gentlemen—I do not know as you care to hear a discussion of the minor details in which systems differ, so much as of the general principles involved. The Sprague company, as you all know, was the pioneer in this field of work. Their success in starting the road at Richmond under great disadvantages was such as to establish confidence on the part of other electric companies, so

that they have entered the field. We have abundant occasion to observe that the nature of the work they have done has been in imitation of the Sprague system; it shows that they recognized the establishment of the principles we put forth there, and that in their judgment they are well founded. As to matters of difference between us and other systems, they are matters of detail. It is true they are matters of importance, and those are points which we stand ready to argue and present our claims of superiority at any time or place; but I think this is hardly the place to enter upon these lesser matters. We all much prefer to see electric motors operated successfully. I am frank to say I would like to see the Thomson-Houston system, or the Daft road, in successful operation rather than a failure; it certainly goes farther to establish confidence of the public and street railway men in the possibilities of the development of this work that the large majority of the roads which are in operation are in measureably successful operation. We do not profess to have attained perfection, and see points in which we may improve. We are doing our best in making these improvements. One of the earliest mistakes we made was that of starting in with the assumption that fifteen horse-power would be ample for a car. We think we have established that fact; but very shortly after beginning the work we were confronted with the request that we provide sufficient power for trailing a second or third car, which necessitated additional horse power. We have abandoned the fifteen horse-power motor in all cases where asked, but that is simply because it is advisable to do so. It was not to be expected that we should jump full panoplied into success without any difficulty; but we think we have established the satisfaction and confidence of street railway men and of the public, to a very considerable extent, the fact that there is a possibility of providing and transmitting and applying enough power on our cars to move them and to carry any weights that can ever be loaded upon them. That is the fundamental point involved; if we can show that we can apply power enough to move the cars with all the loads piled on them, all the rest is matter of mechanical detail. We find, for instance, that a certain shaft is too light; put in a heavier. We find that a certain kind of bushing wears rapidly; put in a harder one. When gears give way, put in stronger ones. These matters are, as a rule, mechanical rather than electrical. We have reached a point where the electrical difficulties are comparatively small. The mechanical difficulties are fast passing away, and I think it is entirely within bounds to say that within a very short period the few troubles we encounter now will be so entirely eliminated that there will be no reason why the operation should not be as constant and uninterrupted as horse car service ever was. We ask the street car men to co-operate with us in everything pertaining to these matters of detail; it is to their advantage as well as ours. We, on the other hand, suggest to them points where improvement will aid us greatly, as, for instance, the putting in of better track, careful attention to matters of detail in construction work. We are glad to say that in this respect they are meeting us with the utmost good will and aid, and we feel under great obligations to them for their kindness so heartily extended. The matter of power is a very important one. I have repeatedly taken observations in the power station of the East Cleveland Railroad company, and I presume the officials of the road would have no objection to my stating the amount of power in use. The largest amount of power I have ever obtained in the station was on a Sunday afternoon in summer, when the cars were heavily loaded. Dividing the total amount of energy expended at the station by the number of cars in service, we found the highest amount 4.53 horse-power per car; that includes any loss by leakage, and all loss of every nature beyond the dynamo. The least I have ever observed is 3.41 horse power. I think it is fair to presume, from the number of observations we have taken, that the average runs up to about four horse-power to a car, in the station. Of course we have not heavy grades here to contend with, but very heavy traffic.

Mr. Harris: Where there is a railing car there would be eight horse power?

Mr. Foote: Yes, but there would be a little difference between them by reason of the additional weight on the motor car.

Mr. Harris: How many readings is that?

Mr. Foote: On an average of one to three hundred readings; enough for it to make us very confident of the results obtained The Sprague Company, as other companies in this field, are tremendously driven with business. It is simply impossible to make men expert and skilled in this line of work to the highest extent without devoting some time to educating them. We shall certainly do everything in our power that skill and financial backing can produce to obtain the very best results. The very fact of this haste, this necessity under which we are laboring, tends to interfere to some extent with the degree of carefulness in our work which we would be glad to exercise. Every road wants its equipment immediately, and thinks we can turnish it off-hand. We are all making advancements in that direction, and every day relieves the pressure more and more, so that in that respect we will not be obliged to tread upon the patience of our patrons hereafter so much as we have had to heretofore.

Mr. Harris: You said something about the railroads meeting you in the matter of railroad construction. What is necessary in that respect for your motors, more than the usual construction?

Mr. Foote: We think it is utterly impossible to have too good a roadbed. The better the bed the better for the motors; the less lurch you can get the less trying the circumstances in which the motor is obliged to act. Of course the addition of this weight to the car requires a stronger roadbed. We can run upon light rails, even as light as thirty pounds, but it is not advisable. It is certainly to the advantage of the companies operating these motors that they provide necessary support to the car.

Mr. Kerper: What weight of rails would you advise?

Mr. Foote: Personally I would advise not less than 50-pound girder rails, but beyond that would be even better, though a 52-pound rail is enough for ordinary service. The weight of the rail being put in in Superior street is 78 pounds, and the weight of the East Cleveland Collamer rail is 52 pounds.

Mr. Sidney H. Short, of the Short Electric Railway company, Cleveland, was called upon to address the association, and spoke as follows:

Mr. President and Members of the Association: The subjects which have been under discussion here are very interesting to me as well as to you probably. They have been very well discussed indeed. The matter of the kind of construction which should go into the street is a matter which has to be determined largely by the requirements of the city government as well as the street railway companies. In Cincinnati I believe they are putting up two overhead wires because it is thought best to do so because of the prejudice against single wires. And then again, the single overhead wire is not objectionable in some places, and there it can be used with reliability and safety. There are difficulties in building two overhead wires where you have turnouts on the street. If you have a double track you can if necessary use two overhead wires. I think the construction of overhead wires should be made a little more substantial than it has been heretofore, so that it will be there for time to come. We can do that and still make it look light and attractive, by using steel poles and strong material put into the best possible shape. Then, the matter of the motors is being developed all the time. The difficulties we have met with, as has been stated by other gentlemen here, are mostly mechanical; the electrical ones are very slight indeed. The burning out of bobbins on the armatures I think is due more to mechanical action than to any electrical action. I have found that the wires tend to slip over each other, and when you start the motor in one direction it tends to pull the bobbin in the other direction, and a little movement of the wire on top of the others gradually cuts through the insulation. I find the bobbins burn out almost uniformly in one direction; we have strengthened them up with much success. I think it is pretty well established that two fifteen horse power motors is best for a train of two or three cars. I really believe that street car companies will go back to running more single cars than trains. I may be mistaken. Of course they will not in some places, where the traffic will justify the running of two cars; but one car is handled so easily, the brake appliances are so much simpler, that these advantages will have their weight in the matter. We have to keep down to simplicity of construction in these motors as well as to look after the conveniences of the people. The matter of regulation is pretty well established now. I think that our dynamos are pretty well self-regulated, and in that direction we have nothing to look for, and the efficiency is very great. But the mechanical appliances and the strength of construction are something to be taken into consideration. We hope to have members of the association come out to our works and see us building these machines; and this afternoon we should like to have carriages here at half past one and take you out to our works and show you through them, and give you a ride on our experimental car. We have some appliances which we think very good; for instance, a trolley which we think won't jump the wires. We have probably forty or fifty motors in process of construction there at the present time. When you have looked through the works we can deliver you to the East Cleveland company at their power station.

The President (Mr. M. A. Hanna): There is one point on which I haven't got much information, which I would personally like to get; that is, the cost of operation. I have never yet heard a definite statement as to what it costs to operate any system of overhead electricity per mile from experience.

Dr. Everett: In my opinion the thing is too young to give you any correct estimates on that subject.

Mr. Hanna: I am like some others groping in the dark. I don't want any expert to talk on this subject but some one who has had practical experience. If a man is asked to spend half a million dollars or more to put in motive power, he naturally wants to know where the interest on his money is coming from.

At this point an informal discussion was indulged in between Messrs. Clark, Harris, Rodgers, Dr. Everett, Kerper and Mulhern in regard to comparative operating expenses of horse, cables, and electric systems, the figures given being the reports from each of the gentlemen's experience;

John N. Stewart, of Ashtabula, then read a paper on "Motives for the Development of Motors."

Mr. President and Gentlemen of the Association: The discussion I have just listened to, and the faces of the gentlemen I see here, indicate to me that the horse-car men are in the minority; and as my paper is from the horse-car end it may possibly be appreciated more than it would be otherwise. The subject of my paper seems commonplace enough to warrant any easy and quick solution, and I am very much mistaken if the problem has not already been solved by each and all of you as to the "motives" for the development of motors. Men are daily, yes, hourly, racking their brains to devise some new and novel scheme that may prove taking with the man looking for a "good thing" as an investment. We can all recall the name of a man who can tell us all about how a few drops of water, with considerable wind, produces such an almighty power that the problem with him is how to control it. He has the motor, let some one join him who has the "brake," the two may find another who is blessed with "good lungs," or better yet, plenty of money; and such a combination may start off in good shape to demonstrate the "motives" for its development to the full satisfaction of a speculative community. For nearly half a century the faithful horse has been the motive power for our city railways, and not until now did the rapidly increasing population of our cities and villages seem to demand a more powerful and rapid motor, capable of transporting itself and its burden at as rapid a pace as is compatible with well regulated speed upon our public thoroughfares. The question is, then, upon the merits of the different systems brought daily to your attention, and your selection will depend, of course, upon its particular and distinctive fitness for your uses as you are made to understand them, by an expert and adroit seller, while the qualities of the system as a "money maker" and a "money getter" are the underlying motives of both buyer and seller. It is not my purpose in this paper to cite for your consideration any particular system or systems, supposing that many of you are wrapped in the idolatry of your new found "pet scheme," therefore it is my purpose only to exchange comforting words with those who have not as yet had the scales removed from their eyes or the money taken from their pockets, but still listen to the "tramp and jingle" of the old time motor, from whose "poles" there is not so much electricity escaping, as to excite the envy of any city official or create from any city government the demand for free lighting of its streets. We have a system, each complete in itself, our batteries are of the storage sort, and when one pair has gone its rounds it is changed at the stables without interruption to the system. To be sure our patrons are not jerked through the town at a "breakneck" speed, nor are we obliged to send a man on horseback ahead of each car to insure safety to our rivals, but our motors "get there all the same," while we await an era not far off when much that to-day is new and unheard of shall have blossomed out as perfect and well defined as the fondest hopes might have anticipated. We learn of the conception of our race from the darkey who, when he saw the "electric car," thought these "Yankees" a most remarkable people. "They came down here and freed the nigger; they're coming now to free the mule." We may be criticised and called "fogy," or considered a little short of that material called "Young American enterprise," and our ideas of motors may not be the same as yours, our friends of the "cable," "electric," "gas," "steamless," and others too numerous to mention (not forgetting a clamorous public urged on by men with schemes to sell), no one agreeing with the other, except in so far as that all have some 'ax to grind," specially interested in our welfare and prosperity, and doubly solicitous for the adoption of something personal to each, while we all agree that something is desired by all of us, which will perform the great and growing work we are compelled to do, and relieve the poor and much-abused motor of to day. My progressive friends of the "rapid transit" don't look disdainfully on us of the tramp, tramp, and jingle, jingle kind, or waste your sympathy. We feel for you, and deeply sympathize with you, appreciating the fact that "times do change," and perchance a "Keeley" or some other "genius" may come to *our* rescue and yet place *us* in the front rank of *progression*.

On motion of Mr. Clegg, a vote of thanks was tendered Mr. Stewart for his interesting and entertaining paper, and the paper was ordered to be printed in the proceedings of the association.

The President appointed Messrs. Rodgers, Kerper and Clegg as a committee to nominate officers and place of meeting for the next annual convention.

Dr. A. Everett, President of the East Cleveland R. R. Co., extended an invitation to the association to visit the power station of that company and take a ride over its lines. On motion the invitation was accepted.

On motion of Mr. Geo. B. Kerper, seconded by Mr. Clegg, the following resolution was adopted:

Resolved, That after the meeting of 1889 the Association pay to the Treasurer the annual dues of twenty-five cents per car run, and in addition thereto that each delegate representing a member be assessed the sum of five dollars, which shall provide for and pay all costs of entertainment, the bills for which entertainment shall be rendered to and paid by the Treasurer.

A letter from Mr. H. A. Everett, resigning his office as Secretary of the Association, was then read, and on motion the resignation was accepted.

The President: Is the committee appointed to select place of meeting and officers for next year ready to report?

Mr. A. D. Rodgers, as chairman of the committee, reported as follows:

"Your committee respectfully nominate the following officers to serve for the ensuing year: For President, William B. Hayden; for Vice President, John N. Stewart; for Secretary, A. E. Lang; for Treasurer, J. B. Hanna; for Executive Committee, Ross Mitchell. Place of meeting, Columbus, Ohio, the third Wednesday in November, 1890."

On motion the Secretary was instructed to cast the ballot of the Association for the officers named, and they were duly elected, and the report of the committee on place of meeting was also adopted.

On motion of Mr. Rodgers, a vote of thanks was extended to the retiring officers of the association, and especially to the Secretary, for their faithful services.

The newly elected President, Mr. Hayden, was escorted to the chair by the retiring President, Mr. Hanna.

On motion the association adjourned, to meet again the third Wednesday in November (the 19th), 1890.

H. A. EVERETT, Secretary.

THE BANQUET.

The banquet was served at the Hollenden, at 8:30 p. m. A large number of invited guests were present, and sixty-five persons were seated at the table, which was arranged around three sides of a hollow square, and profusely decorated with chrysanthemums and princess pine.

MENU.

Blue Points.

Celery. Boston Brown Bread. Haute Sauterne

Consomme a la Royale. Olives.

Kippered Whitefish. Olive Butter.

Parisienne Potatoes.

Roast Tenderloin of Beef with Truffles. Chateau la Rose.

Creamed Potatoes.

Siberian Punch.

Roast Turkey. Chestnut Sauce.

French Peas. Mushrooms.

Broiled Snipe. Guava Jelly.

Asparagus Salad.

Omelette Souffle. Pommery Sec.

Macedoine of Fruit.

Crackers. Cheese. Coffee.

Liqueurs.

When the last course had been served, the Chairman, Mr. Chas. Hathaway, of Cleveland, opened the speaking of the evening as follows:

If I mistake not, it is now eight years since we organized and had our first banquet. We see a good many of our friends here now who were there, and others I suppose are at home enjoying themselves with their families. You will remember that eight years ago Cleveland was running bobtail cars; everybody was pleased with them, and thought them the best thing in the world. How is it to-day? Elegant horse cars, gentlemanly conductors, elegantly lighted electric motors running over our streets, and in a short time we hope to have a cable road. Gentlemen, we propose to introduce to you to night some of the greatest speakers of the age, and first I will introduce to you our President, Mr. Hayden, of Columbus.

Mr. Hayden: Gentlemen, you must excuse me. I am overcome by your hospitality and your wine.

Various gentlemen were then called upon by the Chairman and others, and responded briefly as follows.

Col. Allan T. Brinsmade, City Solicitor of Cleveland:

Mr. President and Gentlemen—We are so unfortunate as to have the Mayor absent from your festivities this evening, and I was requested by one of the gentlemen connected with the Association to be present here and respond very briefly to some sentiment that might be proposed. My friend Mr. Hathaway has suggested that I respond for the city officials. I think my friend Mr. Logue, who is a member of the City Council, will respond for them. We are always glad to welcome to the city of Cleveland these conventions and associations which have their headquarters in the State of Ohio, and associations from any other State. This is a favorite city for conventions. We claim to have, and we have, a hospitable community. We have a beautiful city, although it doesn't show up very well in these November days, which some one has said, I believe, are the saddest of the year. Yet if you come to us in the spring time or in the summer time, you will say, I think, that this is a city where you would like to dwell, that our people should be your people. A quarter of a million of population is a pretty fair nucleus for a great city; and I venture to predict now that in the next decade—I say to our friends from Cincinnati—that in the next decade I predict that the city of Cleveland, in point of beauty, and of business enterprise, and of population, will be the first city in the State. (Applause.) And what has occasioned our present prosperity, to a great extent, is the eight or ten steam railroads that we have, and the seven or eight street railways, together with the beautiful lake with its commerce; all these have contributed to make our city what it is, and to the end of making it the largest city in the State. I said the street railways have accomplished a great deal towards building up this city, and this is patent to every man who is a resident of our city. I am glad to see these gentlemen connected with the street railroads here, and I notice from their good-natured countenances at the social board that everything is at least now at peace and harmony, and I should presume that no such trivial matters as injunctions had troubled any of them during the past year. If they have troubled them, they have simply said: "These injunctions are merely a matter of business, and do not interfere with our personal relations at all." Well, now, it is amusing to us to hear all the abuse that is heaped upon our street railroad friends. The last position in this busy world of ours that I would want or care for is that of being an officer of a street railroad company. They get more abuse and curses and kicks than any other class of men I know of—and some of it, I am inclined to think, is deserved to a certain extent, but the most of it is not. We must look upon the other side of this picture. The street railroads have done a great deal for the city. Look at our suburbs, upon all sides of the city of Cleveland, built up and well built up; and it is simply because they have street railroads. We can not all live in the central portion of the city; we can not afford to buy this property to build our houses upon; we can not afford to keep teams. But we have street railroads running seven or eight miles in the country on all the thoroughfares on which these streets come in. What is the result? The streets are built up in the suburbs. People can get out there and have their homes and estates. I say these railroad companies are doing a great deal for the city in that respect, and I apprehend that every house that goes up on a street here in the suburbs or in the city, brings in an income to the railroad companies of twenty-five dollars a year. Now, to illustrate the benefit that these railroads are to the city—you hear the grumbling, and we are said to be a nation of grumblers and kickers—why, if the presidents and managers should adopt all the suggestions as to how the roads should be managed, they would have either a perfect system or a very imperfect system, and I think an imperfect one. With all this grumbling that we have, a man came into the Board of Improvements a short time ago and said: "I am going to sue the city of Cleveland for $3,000 or $5,000 because they have permitted a certain railroad company to run on another street away from my property; it has damaged me; my tenants have left me; I can not rent my buildings." That illustrates that the street railroads are a benefit to the property upon every street where they are located. Now, gentlemen, a great many gentlemen are to follow me, and it is not the proper time or place to make a lengthy speech. I would say in conclusion that we are always glad to welcome to our hospitable and beautiful city the strangers and these various associations throughout the state and throughout the nation. They find that we are a hospitable people, that we do the thing up as these railroad gentlemen have done here to-night; it can't be done any better, and I think the gentlemen are entitled to a great deal of credit for the very fine banquet they have given the visiting gentlemen. We are glad to welcome you to the city, and hope you will come here often and will not regret your visits. (Applause.)

Mr. A. D. Rodgers: *Mr. Chairman*; I think it about time that the old stagers are retired in this business. This is the eighth annual meeting of these gatherings of our street railroad associations, and I think those of us who have been monopolizing the time all these years should now retire. I am, however, very glad, and I know all of you will join with me, to render heartiest thanks to our friends of Cleveland for the generous welcome they have given us; I know that I can not employ any terms that are sufficient to express the feelings of admiration that we all have for your beautiful streets, and I must confess that I am to-day more than ever impressed with the great advancement that has been made in the past few years in your railroad system here; I have been really astonished at the magnitude of the improvements that have been made. Now, gentlemen I have really nothing to say, and that is the best reason I have for not talking. I might say, however, that I had a compact with my friend from Cincinnati, Col. Kerper, on the other side of the room, that I should tell a story and he should make a speech.

Col. Kerper: *Mr. President and Gentlemen:* If I could make a speech I would make one. When I was in your city eight years ago, you gave us a lunch; to-day you give us a banquet, and that shows how progressive you are. I have been progressive, for my glass was filled so often that the man set the bottle before me, and then I stopped. I think your city has made great progress. I would be happy to speak if I could, but I have been exposed. I intended to preside at the national convention as president, and just in the midst of it Mr. Calvin F. Richards, of Boston, presented a letter which exposed me. He said he could not be present at the convention and he was very sorry, because myself, a poor simple cuss who had nothing, and couldn't even get the liquor which had made me what I was on that and on all other occasions—he had written every word I had said, he enclosed me my opening and closing speech at the banquet and also my speech to the convention, and he wanted to remind me not to be eloquent or graceful, because a cow might as well attempt to play on the bugle as for me to be graceful; that I should be silent and dignified and they would all know that I was drunk; that I shouldn't speak of my railroad which was going to the devil fast enough; that I should speak of the poor manner in which I presided over the convention, and of my getting the position after eight years of scuffling for it, and that when I got through I should send him back his full-dress coat. (Laughter.)

Mr. E. J. Estep, of Cleveland: *Mr. President:* I am taken a little by surprise on being called upon on an occasion of this kind. I expected nothing of the kind. I didn't know much when I came here to night, except that I was a little bit hungry; I don't know that I learned since, although I have acquired some information from my friend from Cincinnati, and the gentleman who represents the city. I don't think he has represented the mayor of this city very well. I don't think he has given the newspapers full credit for their estimate of the benefits which the street railroad companies have conferred upon this city; he rather praised these benefits, and ran off into the suburbs. Very well; they benefit the suburbs, if you please, but I don't understand by anything he said that it benefits these fellows inside. I am of the opinion that from my house to the square the horses brought me as quick as lightning does. That is not as fast as lightning used to work. But it is to be hoped that our railroad will improve in that respect; my own judgment is that you have got to improve upon it or go back to horses. I think you will improve upon it. I think the time is coming when our street railways will be moved by this electric power in a manner that will please everybody, that will take them along quick, take them up where they want to start and land them where they want to stop. I don't think it has arrived yet, but I think it will arrive. And in that respect our railroads are like everybody else—we are all to be educated, and as these improvements advance and we adopt them, and so to speak get into the high school instead of the common schools we have now along our streets, I think we will get to the point where everybody will be pleased with the service rendered them by our street railroads. I don't know as much about street railroading as my brother Stanley over the way. I think if any man in the city understands not only the conduct of the railroads that have been in operation for years, but also the nature of the extensions that all the world want to get both inside and outside of Cleveland, it is he. And that subject, if our worthy president should concur with me, I should be very glad to hear from brother Stanley.

Mr. Stanley: You must excuse me, gentlemen; I am no speaker.

Judge James M. Jones, of Cleveland: *Mr. President and Gentlemen:* I am one of the persons who believe that when a man has occasion to make a speech he ought to have something to say, and I have nothing particular to say in this presence to-night. I see around me men who have distinguished themselves in various departments of life — distinguished themselves as proprietors and constructors of roads, as engineers and managers, skillful gentlemen in various walks of life; and I know of no reason why mere lawyers should be called upon for conversation here this evening. Let us hear from the men who have achieved something, who know how to do something. If I could teach you some new way to make steel more enduring, to make the lives of horses last longer, to master the science of electricity, that new motor which is destined to play such a conspicious part in the history of the world; if I could enable you to solve the problem of the storage battery, if I could do any of these things, I have no doubt you would listen to me gratefully and appreciatively. But I have no message of that sort. I had no more idea of making a speech at this meeting than the delicious blue point oysters had an idea that they were to be served here to-night. Gentlemen, your profession is a noble one, and in spite of all the clamors and complaints that exist in the community, there is no class of people in the wide world that give back to the community a better price for what they get than the street railroad people. There is not a street railroad in the city of Cleveland that does not carry passengers for less than a cent a mile. The great emperors of old, Napoleon, Cæsar, Antony, all the great kings of the world, never rode in a finer palace car than the poorest laborer in the city of Cleveland may ride in from the Atwater block to the Garfield monument for five cents I hope they will go on improving. They are the carriages of the common people; they are the cheapest methods of communication from one portion of the city to another that anybody ever heard of. The laborer can ride from one end of the city to the other for five cents, as quickly as the millionaire for five dollars. I don't know but I ought to say a word about the beautiful city of Cleveland, which we have heard so much about. Brother Brinsmade is a very æsthetic gentleman, but I have got over the beauty of the city of Cleveland long ago, and I think I ought to apologize to the gentlemen abroad by saying that we have got into the habit of talking of the beauties of the city of Cleveland. I can remember when the air was pure and sweet, when the smoke of no furnace, no forge, no rolling mill rendered impure the air, when there was no Standard Oil company, no nothing, and a man could wash his face on Saturday night to remain clean a week; and now the smartest citizen can not keep clean more than twenty-five minutes. Though we have some beautiful streets, and all that, we are industrial people here, that earn money, that fabricate things. We have in this community hundreds of mills — iron mills, rolling mills, and all sorts of mills; their smoke ascends up in this community day and night, from one end of it to the other. There is no city on the continent that is more deeply interested in the manufacturing interests of the world than Cleveland. But, gentlemen, as I said before, there is no reason why I should be called upon here. I see a dozen gentlemen here who can give you insight into things in various ways. I am very grateful to you indeed for the invitation to banquet with you; but I have nothing whatever to say, and therefore apologize to you for saying nothing.

Mr. L. A. Russell, of Cleveland: *Gentlemen:* I think a man that addresses the street railway men of Ohio ought to have something to say. If you will be patient and come back with me a little way, I will satisfy you that I have something to say. I want you to come back out of the stage of civilization in which you are; not a long distance, but just out of the organic into the inorganic, which preceded the present condition of things.

Mr. Kerper: Only about ten years.

Mr. Russell: As Mr. Kerper truly says, it is only about ten years. And being back at the inorganic, let us look forward toward the present and begin to move; and then let me call your attention to the distinction that exists between the inorganic and the organic. You say at once that it is life. Yes, vegetable life. Come forward a little past vegetable life, and what is the distinction between vegetable life and animal life? Nothing at last but this—voluntary motion; that is all there is to it. Animal life is distinguished from vegetable life, as all life is distinguished from inorganic matter, by voluntary motion. And among animals man is chiefly distinguished for this—that he

(*Continued on page 209.*)

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Important Announcement.

Mr. W. L. Allen, Secretary of the Western Electric Railway Association, requests us to announce that the first annual convention of that body will be held at the Grand Pacific Hotel, Chicago, on Wednesday, January 29, 1890, at 10 a. m., and not in Des Moines, as previously arranged.

Late Issue.

By way of an apology to our subscribers, for the lateness of the present issue, we offer the explanation that the delay has been caused by the non-receipt (until a very late day) of important papers, which appear herein, and which were promised us in time for our regular closing date.

Upon the day of going to press with this issue, we were confronted with a strike among the pressmen in our printing office, which same, we believe, has since become general.

Subscribers can thus readily see under what difficulties the present issue of the Gazette sees the light.

Against Public Policy.

In the November issue of the Gazette we entered a vigorous protest against "misleading statements made by the dailies," and confirmation strong as holy writ that our editorial was based upon tangible grounds is demonstrated by the fact that the accident at Chattanooga, alleged to have been caused by contact with the current on the electric railway in that city; was nothing more or less than the capsizing of a kerosene lamp in the hands of a drowsy darkey, and the eventual decease of the Ethiopian by reason of burns sustained during the realization of his culpable ambition to fall asleep at the wrong moment. The Gazette was the first scientific or class journal to make any mention of the accident, and since it published the details, the calamity has received attention at the hands of the electric and technical press. We note with no little gratification that the handling of the subject without gloves, by the Gazette has been well endorsed, and its action in waging war against the senseless publication by the dailies, of alleged accidents through electric railways, has been well sustained and favorably commented upon.

In this rapid age, competition has reached such a point in modern journalism that representatives of rival journals sleep wide awake night after night, trying to secure "scoops" on their contemporaries, and that the editors of the leading dailies are frequently at their wit's end to supply the demand of an impatient and news-hungry public, is an open secret, but we submit, that the publication of sensational items regarding alleged accidents to life and limb, caused by the overhead wires used in the operation of electric railways, is a direct offense against public policy, inasmuch as it tends to retard the making of investments constantly sought for by capital. The construction and equipment of an electric railway entails no little amount of money changing hands, and what railway man, or capitalist, is going to risk his money in a venture that, according to these misleading statements by the dailies, may result—yes, does result they say, in the constant loss of human life, by reason thereof, and the jeopardizing of his investment by subsequent heavy suits for damages.

The *vox populi* to-day cries aloud for rapid transit. The dailies take up the cry and echo it broadcast from the Golden Gate to the Narrows; from Manitoba to the Gulf. The horse must go — the mule must resign his occupation as a street car motor — the immense cost of cable installation, except in cities of very large population, hardly justifies the investment of so vast an amount of capital:—ammonia motors have fallen far short of success:—gas motors have only recently approached perfection:—steam engines are not adapted for use on the public streets:—the storage battery, in spite of its successful operation in a few places, has hardly yet reached the point for general adoption:—the conduit system has not yet resolved itself into a commercial success:—the pneumatic system of street car propulsion is practically yet untried, but the overhead wire system has proved itself a practical, a commercial and a financial success in almost every case in which it has been put in operation. Yet, while in one column of the dailies we find a howl going up for rapid transit, from "A Constant Reader" "Veritas" "A Subscriber" "Pro bono Publico" etc.—*ad infinitim*, together with an editorial fanning the flame, we discover in another column a sensational item of an accident—with blue smoke, and other pyrotechnic and melodramatic effects—that never occurred, which, in itself, would withhold property owners from giving their consent to the building of the most practical, feasible and wholly satisfactory system of rapid transit known to us to-day.

Against the publication of the details of any *bona fide* accident that may occur through the medium of the electric current, we have not one word to urge, but we submit that the interests of the public demand that the closest technical investigation should be made prior to the reckless publication of such matters.

480 Volts Don't Kill.

An important, and exceedingly interesting, experiment was recently made by the East Cleveland street railroad company, to show the effect of passing a current from an overhead trolley wire through a horse. Dr. Everett, C. W. Wason, R. M. Fuller, Edwin Duty, Harry Fisher, G. E. Herrick, City Engineer Rice, Mr. Stumm of the electrical commission, Health Officer Ashmun, Humane Agent Parmelee, Profs. Whitman and Morley of Adelbert college, Prof. Reid and Messrs Neff and Saunders of Case school of applied science, J. B. Randall, George F. Hammond, C. W. Foote, F. F. Morrow and a representative of the Street Railway Gazette were present. They proceeded in one of the new motor cars to Murray Hill avenue, where the tests were made. The motor was supplied with a voltmeter, which was watched by Profs. Whitman and Reid, The meter registered from 460 to 480 volts during the trip and while the tests were being made.

Upon arriving at the destination Prof. Whitman and Mr. Wason remained in the car to watch the voltmeter while the others watched the tests. A wire to which a rope was attached near the lower end was hooked to the trolley wire and was then manipulated by means of the rope. It was first brought in contact with the track to show that there was a circuit. As soon as the wire and rail came in contact, the wire was fused at the end, leaving no doubt that there was a heavy electrical current. A pony weighing about 650 pounds was then brought under the trolley wire, three of his feet being in water, while one was resting on the track. The wire connected with the trolley wire was then pulled over the horse's back. He jumped a little, indicating that a shock had been received, but there was nothing to indicate that the shock was at all dangerous. This test was repeated time and again with slightly varying conditions, according to suggestions from those present. Dr. Everett repeatedly stated that if anyone had suggestions to make he would be glad to hear the suggestions as he wanted the test made with the greatest possible thoroughness. Some one suggested that an iron plate be thrown over the rails and the horse placed upon it, also that water be thrown over the horse, which was done. Upon being brought in contact with the wire no ill-effects were produced, the only difference being that it was, of course, evident that the shock was greater than in previous tests. Sparks were emitted from the iron shoes of the horse when it raised its feet. The gentlemen present watched the tests very closely and expressed themselves as satisfied that they were fairly made. Mr. Stumm also commended the methods adopted and said he thought they were as fair as tests could be made. He said he thought the results of such tests would depend largely upon the physical condition of the person or animal subjected to the tests.

After the current had been repeatedly applied to the horse, an effort was made to measure the animal's resistance by means of the galvanometer. The indications were that the resistance was very high, and that therefore a small amount of electricity passed through the horse, but Prof. Whitman was of the opinion that a larger amount passed through the animal than was indicated by the galvanometer, as it was impossible to make the contact the same while the galvanometer was being used as when the wire was placed in contact with the horse's body.

In view of the result of this crucial test we can not but express the opinion that we were amply justified in stating, on page 189 of our November issue, regarding "That Cleveland (O.) Accident,' the horse might have been saved had "ordinary common sense and coolness" been used. In that case the valuable animal undoubtedly died from the direct result of injuries inflicted at the hands of its owner, and *not* from contact with the trolley wire.

We do not doubt but that the result of this test will go a long way towards counteracting the the effect of the senseless and reckless publication of so many alleged deaths by the trolley wire.

In conclusion we will state that, according to all obtainable data, *no human being has ever yet succumbed to the influence of the trolley wire*, and if the reports regarding fatal results to dumb animals are to be credited, none of them have ever yet received sny serious injury when the voltage was not in excess of 500.

(*Continued from page 207.*)

exercises voluntary motion oftener than any other animal he does more of it, in more directions, in longer distances and in less time. And which men of all the men on earth do chiefly minister to this highest characteristic of humanity? No men on earth so highly or so greatly as the street railroad men, and none more so than the street railroad men of Ohio. [Applause.] The men of forty years ago looked upon steam railroad transportation as the great problem of the day, as the great field for talent among men. To-day the street railroad system is the blossom and flower of the transportation systems of the world. The steamship companies that conduct transportation across the sea are very great; no man can inspect or ride upon their great steamships without admiration and respect for the genius of the men who have created them and now control them; the great trunk line railroad systems are very great things; they comprise within their management and operation some of the brightest and ablest minds that live, and they find in that operation and control full scope for all their powers? But what are they at last, compared with the street railroad systems that in the cities, the ganglia of civilization and population on the earth incessantly move back and forth the people on their errands of duty and business and pleasure, carrying no freight and no grosser stuff, but nothing less than mankind itself, the very quintessence of God's production, with lightning-like rapidity, with the very spirit itself of inorganic matter made the servant of mankind. When we look at street railroad men and street railroad performances from this kind of a stand-point we can still hear with patience that "the fare is still five cents;" we can still hear the wise newspaper man make his flings against this and that management or influence with patience, because we remember that at last we are all "pore critters." And when we look at the progress that has been made we can say proudly and truly that we have good reason to-night to be proud of our progress thus far. And if the next ten years can see as great a rate of progress as the past ten years, if the fare is then still five cents, the competition in the increase and cheapening of the facilities offered, it will be better than if we had stayed where we were and had reduced the fare to one cent; better for the real interests of the people, better in the interests of good government, in the interests of the advance of civilization and the carrying of man to the highest goal of his destiny than any cheapening of the fare at the expense of the facilities rendered. The masters of the steam railroad problem long ago knew that the time had ceased for competition in rates and had become solely a race of competition of facilities at the same rates. It is so with the street railroad business. I would give nine-tenths of Mr. Kerper's fortune if I had the ability to be funny, but I haven't; I am in dead, brown earnest about this street railroad business. I am in dead earnest when I say I do believe that the street railroad business is greater than the men in it. And it is only about this as about everything else: the sea is greater than the men that go down to the sea in ships; the earth is greater than the men that conduct transportation upon it. We are taught by ourselves, and educated still by the things we do; and it is as true in nature and in phi osophy as I am supposing it is true in religion, that those that do the will of God shall know of the doctrine; and the only way to learn the principles and the laws of nature is by doing nature's work. And the men who are engaged in that department of nature's work known as street railroading, I submit are doing their work as well and learning their lesson as rapidly as any class of our fellow citizens. (Applause.)

The Chairman: I will call on Col. Paine, of New York.

Col. Paine: *Mr. President and Gentlemen:* This is entirely unexpected, and I am not prepared to address you. But I will say one word; it is this that every different route, every different region to be reached, is a different problem, is a problem that has to be taken up by itself and so considered. And when we say take up a problem, we should not be confined to the the cable, nor to electricity, nor to the horse. That problem is to be considered by itself, with its surroundings, with its demands, and the methods of meeting that problem should be carefully studied. Electricity is advancing every day. The cable system is advancing. Our horse railroads are improving. Each one is fitted for a particular sphere; each one can fill its particular sphere better than the other. I would say that the cable can cope with steep grades, with large traffic, with straight lines; it can not cope with curved lines and crooked routes in a level region—give that up to electricity. And where there is heavy traffic, I think we will have to let horses go to grass. There is improvement before us; it is constant, steady and onward. We are meeting day by day new problems. The conscientious, careful engineer will meet those problems; and I will say this, that you can not make improvements as fast as the demand for them increases. That street railroad that will go to the farthest extent in making improvements will reap a reward in proportion to the facilities that they offer their passengers for traffic. Experience shows that if you can increase the speed of cars twenty-five per cent you will reap nearly that amount of increased traffic on that road; more people will ride. If you increase the number of cars more people will ride. If you improve the character of your cars you will reach another class of traffic. In Tenth avenue, in New York City, a road was built on the street, part of which was hardly passable. Very fine cars were put on the road, one or two of them the finest in the country. That road is so attractive that in hours when it is not crowded with laborers you will find the finest dressed people, the most wealthy people in New York City, riding on those cars for pleasure. A few years ago we had nine cars, and now we have eighty-seven grip cars, and it is not capable of doing the work. I might prolong my remarks in this direction, but I will simply say this—that the improvements that are before us, the room for improvement, is larger than the improvements we have already made. I believe that ten years from now will show us what we do not even dream of to-day. I believe that electricity is going to far outstrip the most sanguine expectations of those who are using it to-day. I believe that the cable is capable of improvements. I believe that the cars of the future will be far better than those of to-day. I believe there is opportunity for improvement, and that the traffic will increase to pay for all the improvements that any person or company is willing to put forward. I believe that a city gains a reputation by the character of its street management. (Applause.) I believe that the city is indebted to these street railroads. I might say more, but I think I have gone far enough to indicate that there is a vast field for improvement, which these people who own the street railroads will do well to take up and follow up and take advantage of, and I believe they will reap their full reward for all they expend in this direction. (Applause)

Mr. Richard Bacon, of Cleveland: *Mr. President:* It is hardly to be expected that the youngest perhaps of all the gentlemen present this evening should be called upon to say one word on behalf of the street railway system. But first let me define my position. I am not a corporation lawyer, but I do remember one fact, because I was present and must have known it—that I was borne into the world upon a bob tail cart; there was no conductor. We have heard many things spoken here to night which I would have been very glad to have heard in court. Could I have placed some of these speeches before the court in some cases with which perhaps I had a remote connection, I have no doubt of what the verdict would have been. But I am not prepared to talk upon the street railroad business. The street railroad business has been talked about to-night as it exists upon the surface of the earth. It existed long before. Electricity to-day seems to be the guiding power, but years before this world was born Jove drove his chariot in the same way, with Ganymede as the conductor. We have simply retrograded from electricity to the mule, and from the mule we ascend to the cable. All I have to say is that we meet to-night socially, upon a common level. Street railroad men to-day in Cleveland are as welcome as any other set of men. But I do wish to utter this thought as we gather here together, and that is that whether we are lawyers upon the one hand, representing one idea, whether we are conductors upon the other hand, running a street railroad; whether we drive a motor or whether we drive a horse, there is one sentiment common to us all, and that is the fellowship of the universal brotherhood of man. (Applause.)

Mr. John N. Stewart, of Ashtabula: Brother Hathaway, I didn't think you would perpetrate this sort of thing on me. I think it would be well for me to say nothing under the circumstances. I am too much of a soldier to undertake to make a speech to this convention, when my superior officers haven't done their part of it. It has been asked here this evening what the business of the Street Railroad Association of Ohio was. I don't know of any other object than to give brother Hathaway and brother Kerper both an opportunity to spout a little, and therefore I will relinquish the floor in their favor.

Mr. L. A. Russell: Mr. Chairman, I believe I voice the common feeling of every man in this room when I say I would like to hear from Dr. Everett.

Dr. Everett: Mr. Chairman, it is too late to make a speech; for that reason I have nothing to say. I will give way to our friend Mr. Logue, of the city council.

Mr. Logue, of the Cleveland city council: *Mr. Chairman:* It was agreed when I came here to-night that I should not be called upon to say anything, and like some of the other gentlemen who have spoken to-night, I have nothing to say. I am very glad, however, to meet the street railroad men of Ohio here to-night. They are a fine-looking set of men, and I have enjoyed meeting with them. Street railroad men are very sociable men. When I was nominated for the city council I don't think I knew a street railroad man in Cleveland; two weeks after I was elected I was acquainted with every street railroad man in Cleveland. They are noted for their sociability. Another thing, too, about street railroad men; they take a great interest in municipal legislation. I have thought that some of our citizens did not take the interest that they should in such matters, but I have noticed that the street railroad men of Cleveland, and I presume it is true of Cincinnati and the other cities of Ohio, take a great interest in them. There is hardly a meeting of a city council at which there are not one or more officers of some street railroad present. We are very glad to see them there. No doubt they exercise great influence on the city council towards good legislation. We have, I think, in the city of Cleveland a good system of street railroads. During the last year I have been in nearly all the larger cities in several of our northern states, and few if any of them have as good a system of street railroads as the city of Cleveland. And I have believed from what I hear that street railroad men are philanthropists, suffering for the public good. Street railroad men have proved before the council—Mr. Stanley, for instance, stated to me that he had been running that street railroad on Broadway for twenty years at a loss, and he was willing to bear the burden for twenty-five years more. I believed he was a philanthropist, and that it was our duty to throw the burden on him. And so with these other street railroad men; they are philanthropists, accommodating the people at a great loss to themselves. And we in Cleveland are gratified that we have such men among us. Gentlemen, I am glad to meet you. I hope when you are in the city you will come up to the council chamber; we will be glad to see you as well as the street railroad men of Cleveland. (Applause.)

Mr. John C. Keffer, editor *East End Signal,* was called upon and spoke as follows:

Mr. President and Gentlemen: I did not suppose you would want to hear from a back number of the press, as I am, who was helping to run newspapers before most of you were born. But it struck me a while ago, when brother Stanley said that he couldn't make a speech, and somebody told him to imagine that he wasn't there, that if he could only imagine that he was out on Broadway "cussing" some of those conductors that don't do right, he would make a most eloquent speech. I am sorry, as a member of the press of Cleveland, to acknowledge that a good many of our papers have been very unreasonable in what they have had to say in regard to the street railroads of this city. I live in a section where we appreciate perhaps more fully than our brethren of the press in the business parts of the town the value of street railroads to us in the old township of East Cleveland, now divided into four wards. When I built a house out there twelve years ago on what is now the extreme western limit of that territory, there were very few houses to the east beyond, except on Euclid avenue. I have seen the growth of those wards year after year, until the last year more than 1,300 new houses were built in those four wards, representing an addition to the population of those wards of over 6,500 people. And the serious problem to-day for our board of education is to build schoolhouses fast enough to take in the children that are brought into that territory. All those houses, and all that growth of the city of Cleveland, ranging up to nearly 7,000 a year, has been brought about by the operation of the East Cleveland railroad. I have been cursed and abused and have had scores and scores of letters sent to me by the kickers because I would not join in the cry of abuse of the East Cleveland railroad. I do not know how many times I have had statistics put on me of the hours that were lost a week because the cars did not run on schedule time, for the reason, as the street railroad men said, that some new-fangled thing was out of order and tearing things to pieces. But I feel amply justified in the position I have taken, that these new things were in an experimental state, and that our railroad friends were doing just the best they knew how to get out of that stage into the stage of assured success. Among the speeches that I have heard here to-night there is none that has given me the comfort and satisfaction that I have received in listening to my friend opposite here (Col. Paine), who knows what he is talking about. It is not a privilege accorded to us every day to listen to words of wisdom from a man who, ten years before there was any congressional legislation for the Pacific railroad, was making a survey across the Sierra Nevada range, and who has spent ten years in perfecting the Brooklyn bridge and the cable road over it. When the railway system of Cleveland is improved it will not be long before it will spread over the whole State of Ohio. When we have such gentlemen as we have here telling what will be accomplished by the managers of street railroads in the next ten years, it is not worth while for us to worry about the little inconveniences and the loss of fifteen minutes which occurs when a trolley gets off the wire. (Applause.)

Mr. Charles B. Clegg, of Dayton: *Mr. President:* I am not surprised at being called upon for a speech, because you announced in the beginning that you were going to introduce some of the best speakers in the national. (Applause.) Ordinarily I am the best speaker of the Ohio State Tramway Association. But the circumstances are not ordinary to-night, they are extraordinary. If I were attired in my dress suit I could make a speech, I think, but Col. Kerper quarrelled with me about who should wear that dress suit while we were coming on here. He said, "You know I am ex-president of the national association, and I will be a prominent figure at that convention." We quarrelled about it, and couldn't agree, and the result is we are both here in our traveling clothes and can't make a speech.

Mr. Bacon: Mr. *Chairman:* Although I am very young in this street railway business, I happen to know some people who are old. I was walking up street this afternoon, when a man who was not born in America said to me that he didn't expect to be called on for a speech, but he said, "I would like to be called on," and that is brother Stanley, the only man who never gives a pass. [Loud cries of Stanley.]

Mr. Stanley: *Mr. Chairman:* You will have to excuse me.

Mr. Kerper: *Mr. President:* I would like to say one or two words. I didn't say much before, but if this organization had been developed for the purpose of having you and me spout I am willing now to spout. I think, though, that this is an occasion where we should not spout, but where we should get railroad men together to get acquainted with one another. Brother Stewart said that this was a special occasion. I am happy to think that this organization was organized for the purpose of getting me acquainted with you. I want to say to the street railroad men of this country, when they are occupied with their business they have many things to set them back, and I for one am willing to retire and become a private citizen.

Mr. Clark: *Gentlemen:* I want to say to you that we have only one representative from Cincinnati, and he is generally pretty tired when he speaks once but when he speaks twice we generally yield the floor entirely to him. I don't live in Cincinnati myself, but fifteen miles out. I listened to Mr. Brinsmade's remarks about Cleveland; I rode out in the suburbs myself, and came near getting stuck in the mud, and I think Mr. Brinsmade showed an ignorance in regard to Cincinnati in speaking of the growth of Cleveland. He is not aware that we are very seriously thinking of taking in our whole county, and if it is necessary we will do it. I notice that Judge Jones here put it very frankly; he said that in Cleveland they fabricated things, a very pleasant and appropriate remark. I don't want to encroach at all upon my friend Kerper's time, and I think if you add my little mite to Kerper's all it will be enough for Cincinnati.

Judge W. E. Sherwood: I supposed, Mr. Chairman and gentlemen, that the object of inviting street railroad attorneys to meet with you this evening was to see that everything was done regularly and in order, and in conformity with sections 2501 and following. But I find that notwithstanding the instructions you have received at the hands of these attorneys you are guilty of an indiscretion at the outset, and all that was wanting was a little time to

enable us to draw up proper injunction suits to restrain you from the construction of an original speech without previous publication. It is perfectly legitimate and proper under the law for these railroad men to obtain extensions of their previous speeches on such occasions, for no such publication is required. I feel very much pleased and gratified at being permitted to be present at this meeting, and to behold how good and how pleasant it is for brethren to dwell together in harmony on an occasion of this kind, and especially to listen to the very proper remarks of my brother Russell, who is usually prancing around with a chip on his shoulder waiting for somebody to knock it off, and he gets it knocked off once in two years or oftener, as the council shall order. And we learn many things in association with street railroad men; I have learned something from my friend Russell, who, in the street railroad controversies that have arisen here, has frequently asserted the right of every man, every street railroad man especially, to treat the world as his oyster and go for it. And I also learned, in a suit that was in litigation a while ago, something about the deadness that comes over a defunct street railroad, in listening to the remarks of Judge Jones, who said it was like the deadness of a dog that died in the days of Julius Cæsar. I cannot add anything to the good things that have been said in reference to the street railroad business of the nation, state or city. I think that, taking it all in all, the street railroad company and the operation of their lines are probably as well conducted, if not better, than any other in the country. I attribute that, of course, to the sound legal direction which they get. And in connection with the profound legal wisdom that is showered upon them we inculcate a good deal of the æsthetic, as is evident from this beautiful banquet at which it has afforded me so much pleasure to be present.

Mr. W. S. Kerruish: *Gentlemen:* I must not be drawn into making a speech here to-night; but I am reminded by the efforts to bring out Mr. Stanley of the gentleman by the name of Campbell of Scotland, and the difficulty he had in getting information. He was pointed out to a certain man, much of the build of Mr. Stanley, I think, and it was said to him, "If you will give that man two drinks of whiskey he will tell you more yarns than you can find in all this island. I don't mean to intimate that Stanley will talk any better with two drinks of whiskey, but only that if you had the key to unlock him he would make a better speech than any man here. I was never aware until this morning that there was any such organization on the face of the earth as this association you have here to-night. I see that it is a well organised body, that its representative men are level headed men that mean business and understand what they are up to. And I can understand very well the propriety of having such an organization. But I am not to be betrayed into making a speech here to night; I have neither the tact nor the talent nor the ability. The only thing I know is the hard work connected with the efforts that the street railroads are compelled to make from time to time to defend themselves against people who imagine they are hurt. I could tell you some pretty pointed speeches Mr. Stanley has made; I will venture one. It was in a trial—you men in Cincinnati know all about it. Two cars were passing each other out towards Newburgh not long ago; there was a stone on the road, or something of the kind; the cars jumped up suddenly without any mechanical reason for it, and ran into one another. There happened to be a very respectable Irish woman on the car, with two big tusks of teeth, and as the cars dashed together the sudden momentum pushed her forward and the teeth struck the car and were knocked out by the blow. She brought suit for five thousand dollars, and her husband for an equal amount for taking care of her. And I remember a remark that was not offered in evidence, but it was made by Mr Stanley, that "she looked a damned sight better with those teeth out than she did with them in." I will state for the benefit of the legal gentlemen that we didn't make a counterclaim of that or ask any mitigation of damages on that. There a thousand incidents that come to my recollection. I remember one fellow—on one occasion they were sewering or making some improvements in the street, and the cars were pulled out and ran at the side of the track; one evening the car jumped the track and ran against a telegraph pole, and this fellow, a sort of dead beat that lives out that way, was violently projected into the lap of a woman. He wasn't hurt, but he concluded he had a good foundation for a lawsuit. We had a long trial; the fellow grew sick, his voice failed, he was a walking skeleton, emaciated, thin, consumptive. We exposed the thing pretty well, and the jury was not out more than five minutes before it rendered a verdict for the defendant. In two minutes afterwards that fellow had a voice like a fog horn. The amenities of the street railroad men with our brethren in the city council I know nothing about; all I know about it is the contests we have in the courts. But I didn't intend to be here for the purpose of making a speech.

Mr. Andrew Squire: *Mr. President and Gentlemen:* I made it a condition that I came here to-night for the purpose of eating and drinking and saying nothing. Nevertheless I can, it is a great pleasure for me to be here. If I have any spirit at all, if I have any desire at all, it is the spirit of progression, it is the desire to be one of the builders in my own generation so far as I can. I believe in building up a community. I believe in building up its industries. I have no condemnation for a man who starts an enterprise, makes it a success, and makes a fortune. I have nothing to say against a body of men that organize themselves to fill a want in society, and reap the benefit because they do fill the want. I believe that this is an age and a generation when we all should welcome every enterprise that tends to the growth of our country, to the growth of the cities and the communities in which we live. I have been in Cleveland for the past seventeen years, have seen it more than double in population, so that, though yet considering myself a young man I am in fact an old man in the city of Cleveland, older than the majority in residence here. I have seen it grow by our manufacturing institutions, by our institutions of various kinds, and Cleveland is but one of the cities of the state which is doing the same way. I know of no series of enterprises that have helped it more, that are helping our various communities and cities more in their growth, in their upbuilding, in the work of the people, in making their work easier for them, than this system of intercommunication between one portion of the city and another portion. And so I say that the street railroad men, in my judgment are in the front rank of the men who are building up our cities; as such they are to be welcomed and encouraged, and I have no sympathy with that which pulls them down, which harrasses them at every move they may make. On the contrary, I say give the street railroad companies an equal chance with every other enterprise. Welcome combinations, because combinations will not come unless they fill a want that is felt; they can not be a success unless the public needs them. When you give, as the street railroad people give their patrons in this city, a ride of eight miles or more for five cents, it is the cheapest riding of any character that I know of; and as we grow and increase this increases and grows apace with it. And so I say, an association that brings you men together as this association does can not but be beneficial to all of you. And if any of us who happen to be more or less in the employ of street railroads as attorneys are invited to be present as we are this evening, we certainly appreciate the honor, and if we can add anything by what we may say to the interest of the occasion I know we are all glad to do it. (Applause.)

The Chairman: I see the *Cleveland Leader* is represented here to night, and I would like to hear from it.

Mr. Holmes, of the *Cleveland Leader*: *Gentlemen*: A reporter can never represent a newspaper, that is, he can not by expressing his own views be sure that he is expressing the views of the paper itself. But I am sure that in my private capacity at least I can express the pleasure which I have at seeing this gathering and enjoying this occasion. I know that in my capacity as reporter I have occasionally to write in as lurid a style as possible of the dangers from the trolley wire; but personally I feel that the trolley wire is in the line of progress, and I wish to say to the street railroad men, go on, improve it all that you can, perfect the storage battery system, if possible, and never mind the dangers—they will take care of themselves.

Prof. Sidney H. Clark: *Gentlemen*: It is with pleasure that I have the opportunity to be with you to night, and it was with great pleasure that we had the association come up to our works to-day and look them over. I think the next time you meet in Cleveland we will be able to show you something very much better. Electric railroading is just in its infancy, I believe, and in the near future we will have a power for propelling street cars, which is very much better than anything you have ever seen or heard of or dreamed of. Electricity is going to come, and is going to be the surest and the cheapest thing for operating street cars, and the most satisfactory thing to you and your patrons. And I must extend the thanks of our company to you for your kind courtesy to us since you have been here, and we hope that we will be able to repsat it in the future.

Mr. G. G. Mulhern, Cleveland: *Gentlemen*: You must excuse me; I am no speech maker; I never made a speech in my life, and can't do it here to night. But if you would come out on the street I could probably show you something, and that is all I can do.

Mr. John Harris Cincinnati: Well, Mr. President, I was to sign a written agreement when I left home, with my fare paid, if I wouldn't have anything to say, but leave it all to Mr. Kerper.

Col. Kerper: The agreement is off.

The Chairman: We will excuse Mr. Harris. We were present to-day when we had a conversation with a certain banker. He says, "Any fool knows when to take hold, but it takes a smart man to know when to let go." I think that is the reason we don't get a speech from him.

Mr. Howard Burgess, City Clerk, Cleveland: *Mr. President*: I simply represent the clerical end of city legislation, or perhaps I might more properly say street railway legislation. We seldom have any council meeting of any importance without more or less street railroad legislation, and if we have no street railroad legislation we generally adjourn about fifteen minutes after we meet. In the office which I represent we have ten or a dozen assistants devoted to copying and holding the archives of street railroad legislation. The street railroad men have a room almost entirely devoted to their interests in this office, and a table and a clerk to assist them in certifying copies of council resolutions, ordinances and extensions of franchises. And I might add in connection with that, that the street railroads furnish nearly all the cigars we use in that office; that is about the only thing the office has had out of the street railroads that I know of. However, if I should endeavor to make a speech I would not get back to the office in time to attend to these matters.

Mr. J. Stanley was again called for, but excused himself.

Mr. John N. Stewart, of Ashtabula: Before this assemblage adjourns, I wish to say, and I think I voice the sentiments of this association, that I desire to thank the legal fraternity for their presence here to-night; they have thanked us, and I think we ought to thank them, for the rea on that the association and its members have thought for some time that they were public benefactors; but from the abuse from the people and the abuse by the press, it became almost a question in our minds whether we really occupied the position in the community that we had assigned to ourselves. From these legal gentlemen we learn, and I think they voice the sentiment of the best elements of the community, that our efforts to perfect a system of street railroads, and to add to the facilities of cities and villages, thereby adding to the commercial values of both, are fully appreciated; that our arduous labors in that direction have been without sufficient remuneration, and that for many years many of our street railroad enterprises in Ohio, as well as throughout the states of this Union have been conducted at a loss. And as other business enterprises are entered into for the purpose of earning dividends in time, why not place the street railroad men in the attitude of philanthropists? But as soon as it is apparent to the people of a city or village that the roads are accomplishing the purposes for which they were built, that they are profitable enterprises, then begins the hue and cry that they are usurpers, taking from the people the rights they possess. We have heard very generous words of encouragement from the legal fraternity here, and I think every member of the association can leave, feeling in his own mind that at least in certain channels his labors are appreciated. Therefore I feel like thanking the members of the legal profession who are with us to night.

Mr. Clegg: Our festivities are about to close, and I want to say that as I have attended every meeting of the Ohio Tramway Association and every meeting of the national association, and I believe there are several others here who have done the same, I speak for myself and I believe for them, when I say that we have been very handsomely entertained here to-night. Somebody is responsible for all this beautiful display, these beautiful flowers, these beautiful menu cards, which we are going to take home and show to our friends. Therefore I move you, Mr. Chairman, that a vote of thanks be extended to the committee who have entertained us so handsomely on this occasion.

The motion was seconded, and carried unanimously.

Mr. Joseph Stanley, of the Broadway & Newburgh Street Railroad company, after excusing himself on repeated calls to speak, finally rose of his own motion, when there was vociferous and long continued applause.

Mr. Stanley said: This is a hard place to put me in after so many of our attorneys have spoken. But I have lived in Cleveland sixty years or more. Before there was any railroad built I heard a good deal said about the "franchise" and the "monopoly" of this thing and that thing. But our road was built by the property owners on the line of the road, and especially for their benefit. My worthy friend, Dr. Everett, once said to me: "Stanley, your road is nothing but a real estate road anyway." I said to him: "We will try to take care of it." I am a large property owner of the city of Cleveland, as well as interested in street railroading, and if I have made any money at all, it is out of real estate. When I have made it for myself I have made it for other parties along the line of our road, and I think the property owners of the city of Cleveland have really made more money out of the street railroad system than the street railroad men themselves, by a great deal. I have heard some of our brethren in the city council say sometimes, "Your valuable franchise that you have got." I have said to them time and time again, "Gentlemen, we don't reap the benefit of the franchise; the people reap the benefit." The steam railroad gets three cents a mile for carrying passengers; we get three-quarters of a cent; most of our travel comes from Newburgh to Cleveland, six miles, for four and a half cents. And I think that the people have reaped the benefit, and it is the people that you really give the franchise to, and not to the street railroad companies. The working man, and every man that rides on the street railroad, certainly reaps the benefit far more than the man who has his money at stake. I have had my money (and a large amount of it) in the Broadway & Newburgh road for sixteen years. I have had a compensation to the present time of three per cent for one year—not for sixteen years. Of course I keep on putting money in continually, and I put it in like every other business man would, with the expectation of realizing something from it some day, and I think I am entitled, as any other man that puts his money into any other enterprise, to some compensation. When I came to Cleveland the hue and cry was, "We have a lot of old fogies in the city, with no enterprise." Now the hue and cry is, as a general thing, "The damned monopoly." I say, if we have got to have a monopoly, let us have it in Cleveland, where we will reap some of the benefits. I have heard them curse the Standard Oil company, the Cleveland Rolling Mill company, etc. I say, take out the Cleveland Rolling Mill company, the Standard Oil company, and our street railroads, and what would we amount to? Not a row of pins; we would be an overgrown village. I have said to a great many people who have come to the city of Cleveland, "We look like an overgrown village, but if you will stand at the public square for an hour, between five and six in the evening, you will begin to think we have some population somewhere." Our street railroad system is not equalled from New York to San Francisco, and I have been from stem to stern. But the great trouble is with the people of the city of Cleveland. It is my impression that the more you try to accommodate a certain portion of them, the further you get behind. (Applause.)

Mr. J. B. Hanna, Cleveland: *Gentlemen:* After working so hard to get Mr. Stanley on his feet, I think there is no excuse for any one to say that he couldn't make a speech. But it is in the province of the secretary to record, and not to do the talking; some can break over that rule, but I am not one of them. We always have obliging attorneys who can help us out on such occasions, and they have responded nobly here to night.

Mr. Doty, of the *Daily Grip*: *Mr. President:* I believe that nowadays there is a syndicate that is discussing the question as to who it was that was guilty of the remark that "reading makes a full man" and "talking makes a ready man." But it is a dead certainty that it is something else than reading that makes a full man. But I know there is one man here who is not ready—and I have nothing more to say.

On motion of Col. Kerper, the meeting adjourned at 12 o'clock.

Western Electric Railway Association.

[At the urgent request of a number of our subscribers, we publish below a *verbatim* report of the Minneapolis meeting, and believe that it is the only report of its kind that has yet appeared.—Ed.]

The President: As there are some of the officers absent, as well as a portion of the committees that were selected to make reports, and may possibly turn up between this and noon, I would suggest that we take up the question of annoyances of electric railways to telephone companies and the complications liable to occur owing to legislation in certain States, and what action is necessary to be taken in order to avert trouble. Mr. Wise, counsel of the Sprague Electric company, is with us, and I will ask him to address the meeting.

Mr. John S. Wise: Mr. Chairman and Gentlemen:—I am not a member of the association, and I have just reached Minneapolis, and have not even had a chance to wash my face and put on clean clothes; but I am very glad to add my mite to your investigations. I am the general counsel of the Sprague Electric company, which has put in some seventy or seventy-five roads throughout the country; and naturally when these troubles arise they appeal to us to know the solution of them. I think I may say without egotism that all phases of these troubles have come under my knowledge. The first controversy that arose with our company and a telephone company was in Akron, Ohio. They boldly started out with the proposition that they had used the grounded telephone for some time, and that by virtue of prior occupancy they were not only entitled to the use of the earth, but to have an injunction against any electric railway company that came in and used the earth. There was a very amusing episode between General Casement, the owner of the electric railway at Akron, and the telephone company. They first went to him and told him they were suffering from induction. He is apt to be rather profane at times and he said, "Damn the induction; you may have all of it." They next proposed to him that his road should put up guard wires above its lines, to prevent the telephone wires from falling on them. He looked at them pretty seriously, and told them that he had always heard that wires fell down and not up, and that as their wires were above his and likely to fall upon him, they should put up their own guard wires.

They then filed a bill for an injunction. The claim set up was that we should be stopped from operating unless we could do something that would prevent our interference with their telephones. The answer to that bill was twofold. The first answer was, that an injunction can not be granted for an anticipated injury, unless the same is irreparable or the damages can not be computed. We claimed in the case at bar it was not irreparable, because, upon their own confession, if they put up a metallic circuit instead of having a grounded circuit, the damage would be repaired. We further showed that they could give a better service to their patrons with a metallic circuit than they were then giving them with a grounded circuit. In the next place we contended that the damage was not such as could not be computed, because the exact damage suffered by them would be the cost of putting up the metallic circuit, if we were at all responsible. In that case the injunction was refused, and the court dismissed the bill. The denial was, however, put upon peculiar grounds, not satisfactory, dodging the real point, by reason of the fact that it was held that the electric road was put in first and not the telephone wires.

The next controversy we had was in Chattanooga, Tenn., where they filed a bill setting forth that they *apprehended* these disturbances. That injunction was refused, and still the decision was unsatisfactory, for the court refused the injunction simply because the damage had not occurred, and it held that it could not grant an injunction for a damage which was merely apprehended, but which had not occurred, when it was not plain to the court that it would ever occur.

The next case was in Salt Lake City, where the telephone company attempted to obtain an injunction, and there the court went much further. The court said, in substance, "This is not a case for an injunction. It is perfectly plain that the road is solvent, and if you are damaged you can recover in an action at law, if the road is liable at all, and on that question we will not now pass."

The next suit was in Harrisburg, Pa., where certain lawyers drew up a bill for an injunction, which they took to distinguished counsel, Judge Hall, and he very properly told them not to apply for an injunction, but that they had better test the question by an action at law for damages. We hoped in that suit, which would have been tried in Pennsylvania, a State whose decisions are very much respected all through the country, that we could have a fair and square fight upon this issue, and we went to work and prepared ourselves for battle royal, to test the question whether electric railway companies using the earth for the return circuit were liable to telephone companies for any disturbance of their grounded wires. We took a great volume of testimony. Mr. Sprague, Mr. Greene and a number of others were examined. The Thomson-Houston company, being equally interested with ourselves in the question, and always ready to lend us assistance in this controversy, agreed to have Mr. Mansfield, one of their electricians, and their own lawyer, present; but before the fight came on the telephone companies came forward and agreed to put in metallic circuits, and to obviate all the disturbances upon the electric railway bearing a certain portion of the expense, and to grant a release for past, present or future disturbances. The sum proposed was a great deal less than it would have cost to carry the controversy to the court of appeals, and so that suit was compromised.

There is a litigation pending now in Cincinnati, and I hope it will come to a final decision. The telephone people think they can get an injunction; failing in that, they will no doubt test our liability in an action at law for damages. I hope the proceedings will be had, and that we may reach a final decision. As to the result, I have not the slightest doubt. Of course, lawyers differ, and no man's judgment is infallible,

Not to detain you too long, my opinion about this whole question is this. In the first place, the earth is the natural dumping ground of electricity. God Almighty never hurls a bolt of lightning that he does not deposit it in the earth to end its dangerous career.

The crust of the earth, according to all electricians, is filled with electrical currents, natural and artificial, traveling back and forth, and I hold it to be the natural dumping ground of every artificial current of electricity, as well as natural currents. The "infinite conductivity" of the earth is such that all currents of electricity dumped into it disperse over the boundless surface of its conductors and cease to be dangerous. The fact that the earth furnishes a return conductor for electric currents was discovered as early as 1838; the discovery was not patented, and the earth has been so used ever since by all electrical enterprises desiring to use it. Yet the telephone, which has only been in use since 1878, now comes and says: "While we use the earth for our return currents, if you send your return current of electricity through the earth it will come on our wires and disturb them, and you shall not use the earth."

Now why do we disturb them? It is because the telephone, on its own confession, is a delicate and complicated mechanism which is extremely sensitive. So much so as to be called a jealous detective. In order to be efficient, it must have a very light and a very sensitive induced current of electricity for the transmission of the human voice. Yet, delicate, sensitive and complicated as it is, its owners claim the right to ground its wires, with a full knowledge that if there was no artificial electricity generated near where its wires are grounded, the natural electricity of the earth and many other natural influences would disturb the wires and interfere with the best efficiency of the service. The more robust electrical enterprises are not injured by the return currents of each other. The return currents of light and power circuits and electric railway companies traverse each other's wires without disturbance. It is only the puny and infinitesimal current of the telephone that can not stand the shock. It may be called the electric baby, so delicate that it must be kept wrapt up and cradled if it is to be kept alive. Yet its cruel parents insist, with full knowledge of its weakness and helplessness and inability to take care of itself, upon sending it unattended into the public streets, and demand that men and business shall stop and leave the neighborhood while baby walks. Our answer is, If you don't want baby hurt, keep it out of the streets, or give it a metallic circuit nurse to take care of it. There is not an expert among the telephone people who does not come on the stand and testify that they only use grounded wires because they are cheaper than any other kind of service. There is not one who does not admit that there are two methods of constructing a metallic circuit, both of which will give their patrons a much better service. One of the methods is a complete metallic circuit, which carried the current by a wire to the phone from the central office, and brings it back by a parallel wire; and thereby, with a complete metallic circuit, the result of the outgoing and returning wires being close to each other, is to create around the two an "electrical field" which excludes entirely these influences of conduction, leakage and induction, of which they complain. All of them admit that by resorting to this metallic circuit they could give their patrons the best of service obtainable. All of them admit another thing. In the City of Richmond, when the electric road was first put in, there was this great disturbance to the telephone wires. Mr. McCluer, Superintendent of the Richmond Bell Telephone Company, devised a system whereby he carried from his central office a trunk wire, and instead of grounding his phones to earth, instead of carrying his telephone wires to gas pipes or water mains, he carried his return wire to this trunk wire, and forms a common return, which obviates all the troubles arising from the grounded wires. Now these men acknowledge the delicate and sensitive character of their invention. Yet they come and claim that electric railways are to be driven out of the use of the earth for return circuits in order to let their telephones use grounded circuits, when grounded telephones are not efficient, and they would not obtain substantial relief even if the electric railways were stopped.

Let us see what they are claiming. In the first place, what is the source and what is the extent of their claim? I insist that they fail to show either the one or the other. Every man who claims a right to real estate, whether it is in the form of a title to the soil, or to an easement or a servitude thereon, must be able to state the origin and the extent or limits of his claims. Who can state the territorial limits of the claim to the use of the earth set up by the telephone companies? A telephone company puts up a telephone in this room, and the telephone is grounded to that gas pipe, the pipe runs to a main, the main runs you do not know where, and it may be two miles away that an electric line will cross it, and its discharged return current of electricity will, pursuing the best return conductors to its source, follow the main, run up the gas pipe, thence go on the telephone wire and disturb the telephone. On the other hand, it may be that the telephone wire is grounded near the point where it is attached to the phone, and the electrical conductors in the adjacent earth are such that the return currents from other electric lines are carried past it or away from it and do not touch it, or it may be that the natural electrical conductors in the earth's surface lead other electrical currents from a great distance right to the spot where the telephone wire is grounded. This was best illustrated by Mr. McCluer's own testimony. He showed that where telephone wires and electric railway wires were placed on the same poles, and very near to each other, there was no disturbance at all; and yet a wire which left his central office and ran directly away from the electric road, but which was grounded two miles away, was very much disturbed because the electric railway current passed to earth somewhere near the point where the telephone wire was grounded and by earth currents reached the wire. Therefore I say that, as the location and direction of the electrical conductors under the surface of the earth, and the character of such electrical conductors under the surface of the earth are unknown and unascertainable, and the telephone company do not know them, their claim that they are to have the exclusive right to the use of the earth for their grounded circuits will and must fail for the necessary vagueness of their demand. In the next place, it will fail for the lack of a grant of any kind. There is not a telephone company in the United States that can show a grant of the right to use the *grounded* circuit. They can show that they have the right to put up a telephone; but the grant of a general or exclusive right to build this particular kind of a telephone has never been given by any legislative or municipal body to any telephone company. They say, we came here first and used the earth and you must not disturb us. My answer is this: You may have been first upon the ground, but others used the ground thus before you were invented, and you are claiming the exclusive rights to use something to which you have not even a general title, and the use of which by you exclusively will operate as an unjustifiable hardship upon other people having equal rights therein with yourselves. For example, a man may claim to have the right to sell milk through the street. Everybody knows milk is a delicate article. It is easy to obtain and proper to give such a general right. Does it follow because this man has the general right to sell milk in the street, that he may claim the privilege of carrying his milk in uncovered tubs, when he knows it is liable, if carried that way, to become dirty, and that dirty milk will not sell; and does it follow that if he arbitrarily and recklessly carries his milk through the streets in this manner, nobody else must drive along the streets while he is selling milk, for fear of putting dust on his milk? And if it becomes dirty, and nobody buys it, thus exposed, has he a right to complain of his neighbors and sue them for the dust they stirred up while attending to their own affairs? There is a way by which his rights may be substantially enjoyed without destroying the rights of others. Knowing the delicate character of his commodity and its liability to injury, he should carry his milk in covered cans and draw it from a spigot and sell it in good shape. Then he may pursue his lawful occupation without depriving others of a like right. The argument of the telephone companies is that they have the first title to consideration by right of prior occupancy. It is true in many instances that their lines were first constructed. But they must build them in such a way as not to exclude anybody else from the enjoyment of lawful rights and franchises. That idea was discussed in the Salt Lake City case. The Judge said substantially: "This is no case for an injunction. I do not pass upon the question of liability in an action at law for damages. I do say this, however: in some places they have a fence law, and in some places they do not. In some places if a man has cattle, he must keep them fenced in; in some other places they do not require you to have fences; but a man must build a fence if he does not want to have his particular field trampled upon by his neighbor's stock." The Judge said he would reserve the point until it was necessary to decide it in the action at law for damages whether the telephone company must protect its own wires from outside disturbances, or other electrical enterprises must keep their current from disturbing the telephone wires, and remarked that it was an open question.

There is another point if this contention be good Today Mr. Reiss, an engineer of Baltimore, is experimenting with locomotive engines. He sends an electric current through their wheels into the track upon heavy grades. He thinks he has demonstrated satisfactorily that with this electric current running through the wheels on to the track, a locomotive engine, with no other electrical appliance, can climb a much heavier grade than it could without the benefit of the electrical traction. In our company, this subject of the electrical grip or traction has always been considered as possibly a valuable adjunct of the system of return circuit by way of the rails. It is contended that the grip of the wheels upon the track, by virtue of the discharge of electricity through the wheels on to the track, enables cars to ascend grades easily. To grant the contention of these telephone people would be to deprive the development of electrical railways of the whole benefit of that traction. It would only enable them to resort to the cheap and inefficient method of using grounded circuits, while it would ruin us and that, too, when on their own confession, they can give a better service and put up a better line by resort to a pure or mixed metallic circuit. They can not get the relief they pray for, even if electric railways were enjoined or sued; because, exclude from them every artificial current of electricity, forbid everybody from dumping their electricity into the earth, and these people are still troubled and annoyed by all the natural electrical disturbances from earth currents which every scientific man knows about as affecting grounded telephone wires. They are compelled to resort to other methods than the grounded circuit to get good service. Take, for example, New York and Chicago, and the large cities. The telephone companies started out with open phones. They experienced all kinds of disturbances, and no one knew where they came from. They were compelled to have glass boxes to get the perfect seclusion that is necessary around their transmitters. They did not try to make people take off their shoes and walk around in their stocking feet when they came within a certain distance of the telephone. They can not tie up the whole neighborhood. They have been compelled in many places to resort to metallic circuits. When we show you the delicate mechanism and sensitiveness of the grounded telephone, the absurdity of its claim of exclusive use of the grounded circuit is apparent.

When we tried the Akron case, it was shown that there was a long distance telephone from Akron to Cleveland, and that a telegraph wire ran parallel on the opposite side

of a canal, and the wires were thirty feet apart. Yet so sensitive is the grounded telephone wire, and so subject to disturbances and extraneous influences, that one could take up the phone of that long distance telephone, put it to his ear, and read the messages on the telegraph wire thirty feet away. They themselves admit the liability of their grounded wires to all kinds of disturbances. We showed them that their real interest was to put up either the McCluer device or the metallic circuit; yet with the knowledge that they have and can have no really efficient service from grounded wires, they come in and ask the electric railway companies to bear the expense of putting up wire circuits.

I have great confidence in the ultimate result of the controversy. We have won so far in every fight. No telephone company has ever succeeded in getting an injunction against an electric railway, except on *ex parte* application, which leaves the injunction liable to be dissolved on motion, nor have they succeeded in any suit for damages. I believe that the result of the litigation will be that the courts will say to the telephone people: Gentlemen, it is true that it is a maxim of law that every man shall so use his own as not to interfere with another; but that means that the other shall have a plain, well-defined right, a reasonable and exclusive right and title, which is being infringed. It does not mean that one may set up an unfounded or an undefined right, or insist on exercising its rights in an unreasonable way. It is perfectly apparent to us that by resorting to another method of construction, as the telephone company can easily do, it can give its patrons better service for a small outlay, put up a better instrument than it has now, and live in peace and harmony with another industry which is just as important to the people, and just as valuable to its owners as the telephone. Therefore, it should so use its own as not to injure and destroy the electric railway.

I have been on all occasions ready to contribute my humble services to making up these issues wherever the telephone companies have instituted suits against electric railways, whether our company had built and equipped the railway or not. The Thomson-Houston company has lent us its assistance whenever called upon to make these fights, because it is a subject in which all the electrical equipment companies are interested as well as the railway companies. The whole trouble lies in the fact that the telephone companies of the United States unreasonably claim the sole, indisputable title to the exclusive use of the earth for return circuits. If they were to succeed in obtaining injunctions against the electric railways, and against the electric lighting people, they would still have to get an injunction against the Lord or the Devil, whichever manufactures and handles natural electrical currents, to make the injunction effectual; because natural electricity is in the earth when no mortal generates it, and the disturbances of that electricity are just as fatal to the grounded telephone as anything we can do.

MR. GEO. F. WRIGHT: I would like to ask a question. The telephone company in our city has a line running along Broadway, between the two cities. On the next avenue on the north, Avenue A, the electric railway line runs. The telephone company's people come to the electric railway company and say, you are so interfering with the operation of our telephone line along Broadway and on the adjoining streets in Council Bluffs and in Omaha that our patrons are throwing out their instruments.

MR. WISE: That is the old complaint.

MR. WRIGHT: They say it was all right till you put up and operated your line. As soon as you commenced to operate your electric railway our customers along the line have threatened to sue the electric company; and in order to find out something about what they did claim, the electric railway company proposed that the electrician of their company and the telephone electrician should go over the line and make an examination and see how much and to what extent these disturbances existed. Our electrician had to admit, of course, that there was a disturbance, an active disturbance, and many of the phones were affected materially by it.

MR. WISE: They certainly are; it plays the mischief with them.

MR. WRIGHT: Then they said, Your electrician admits that you interfere with us. We were here first, and we claim that you should so use your rights and property as not to interfere with ours. Our use was prior and we were established, and there is nobody to interfere with us; and we will get an injunction and prevent you from operating your line. You can not say that you have not damaged us. Now we want you to pay us what it will cost to obviate these troubles by putting up a metallic circuit, or to put up such precautions yourselves, at your own expense, as will relieve us from these inconveniences. Now I would like to know what answer you would advise in such a case.

MR. WISE: I will give you my answer. Of course, it is always desirable if a friendly adjustment can be made between the parties to have it. It is always better for the electric railway and the telephone company to agree, if possible. In many instances the stockholders in the telephone and electric railway companies are nearly identical, and they have no interest in fighting themselves; in all such cases it is desirable to come to an adjustment of the matter by which each party bears a portion of the expense of remedying the difficulty. That was done in Harrisburg. A similar arrangement was accomplished at Davenport, Iowa. Mr. Cleminshaw, from Troy, is in very much the same position; and we have been discussing that matter this morning. The trouble may be adjusted between the companies, and a plan adopted by which satisfactory and harmonious working of the two may be accomplished.

In such cases the only question is one of the expense to be borne by each. But when you come down to the legal question, is the electric railway company liable to the telephone company for these disturbances? I say it is not. The question of liability in this case is analogous to the question which arose in a case which I will cite you from Pennsylvania, and which puzzled our friends on the other side very considerably when I produced it.

There are two cases in Pennsylvania which I consider important — Penn. R. R. Co. *v.* Marchant, 119 Pa. State Reports, p. 541; Penn. Coal Co. *v.* Sanderson, 113 Pa. State Rep., p. 141. The first case is the well-known controversy between the Pennsylvania Railroad and a property owner, who claimed to be injured by the way it ran its railroad on its own property in Philadelphia. The case is too long to dwell upon, but the Court held that although the plaintiff was injured the company was not liable, malice and negligence on the part of the railroad not being shown.

In the latter case there was a beautiful stream just above Scranton, pellucid and attractive in every way. The beauty of the stream, as she alleged, induced a Mrs. Sanderson and a number of others to build handsome houses along its banks. A year or two after they settled there, the purity and beauty of the stream being one of the chief attractions, a coal company bought some land on the side of the mountain up stream, some distance above the residences. The coal company excavated and dug out a lot of coal and a great deal of filth, and immediately after it had got its mine opened the percolating water collected in the mine, and they had to have a pump to clean it out. They put the pump in and pumped the dirty water on their own soil. Obedient to the law of gravitation, the water ran off over their soil down to the stream, and converted it into one of the nastiest, muddiest, filthiest places imaginable.

Mrs. Sanderson brought suit against the coal company for polluting the stream The Supreme Court of Pennsylvania said in substance: It is true that the result of this will be and is very annoying; but these people owning that coal land had a right to pump the water out of their mine. They had a right to mine their coal, and pumping out this water was a necessary incident to the right to mine, and they had a right to dump that water on the earth, for the earth is a natural receptacle for waste water. It is also true that by the formation of the ground that water ran down the hill and into this stream; but it was because that hill was made slanting by nature, and because water will seek its level, and in its natural course it was bound to seek the sea. While the stream may be polluted, the pollution is in consequence of a necessary conflict between the coal mining interests and the interests of the riparian proprietors. In case of such necessary conflict the lesser interest must yield to the greater, and the coal mining interest is in our judgment the the most important. Therefore, the men who pumped that water in the pursuit of their legitimate business of coal mining, if they did it without neglect and without malice, are not liable for incidental damages for the injury done to the riparian proprietors of that stream. Now, then, I maintain that by the same line of reasoning, if an electric railway on a public highway discharges its electric current when it has used it into the earth, the natural receptacle of electricity, and the point at which electricity becomes harmless, the point which all electricity seeks, whether natural or artificial; if they, in the course of their business, discharge their current into the earth, without malice or negligence, the telephone people can not set up the claim that we are bound to pay them damages, for our interest is the more important, and the earth is ours for such purpose as much as it is theirs. Besides, our employment is the natural and primary employment to which the public highways are dedicated, and their use of the highway is of subsidiary and secondary importance.

Mr. Thomas in the trial of one of our cases talked about mother earth; he claimed that the telephone companies had the right to use mother earth. I asked him on what reasoning he claimed her as mother earth if she was not our mother earth also, and told him he talked as if she was their mother and our mother-in-law. There is no exclusive title in the earth of that kind to any claimant. You might as well say a man can go out on the sea and claim the exclusive right to the use of the sea. They can not show that the disturbances which arise to them are sent to their territory by us. It is as likely that they are disturbed by voluntarily attaching to conductors which reach into our territory. For example, suppose your electric line runs out by the Chicago, Milwaukee and St. Paul Depot, and up streets upon which you have the right to use the electric railway, but upon which there are no telephone wires; and the telephone line, we will say, runs parallel to your electric line but on another street, why does your electricity on this street disturb them on that? For the plainest reason in the world. This in all probability because they have grounded their wires to gas pipes and water mains or other ground conductors which extend off their territory and on to yours. They clearly run off their reservation. By voluntarily attaching to far-reaching ground conductors they go beyond the territory upon which they have any rights and the disturbance is caused because the electrical currents are invited on their lines, and probably reach the lines because they are attached to these far-reaching electrical conductors. It is as if a passenger riding in a train reached out the window as far as he could and by his own act was struck by a telegraph pole, and then complained of an act which would never have occurred if he had closed the window. There is no telling what are the limits of their claim. A court would say, How far do you go? The answer must be, We do not know; because we do not know how far these pipes go underground, to which our wires are attached, and, when they stop underground, we do not know what kind of electrical conductors they strike or whence those conductors lead or from how far. That is true, undeniably true; and when they admit this, as they must, the Court will say, We can not sustain a claim that is so vague. You must state your title and its boundaries in order for us to enter judgment If you claim the right to go over a piece of land you must say where it is. If you claim the right to the use of electricity within limits you must define the limits of your claim with reasonable certainty. They can not do it, and their claim will be thrown out for vagueness.

MR. WRIGHT: They argue that, granting the question of your company having the right to the use of the earth, these disturbances would be obviated by taking the return current away in some other way than by putting it in the earth. The question really is, who shall bear that expense? They claim the electrical railway company shall be at the expense of making this metallic return circuit to dispose of the electricity; while we claim we have no part or lot in that business. They say, But we came here first, and we were not disturbed at all until you came. Both companies claim equal rights to the use of the earth to get rid of electricity, and they say that, If we do it, the disturbance occurs, and that we can obviate it by constructing a metallic current to take the electricity away; but the question is who is going to bear the expense? They say the railway company should do it; of course, we deny it. We admit that we do, in the use of our line, interfere with their phones, and that is a damage to them. Then the question comes, can it be obviated? Yes, put up metallic circuits. We say, We do not want to go to that expense. In some cases, we understand, they have divided it. We are not compelled to do it, and do not want to do it. We have no idea of compromising with them or giving them one cent. It is just a square question who is going to pay for the metallic current

MR. WISE: I will give you another illustration. The damage to them, if there be any, is what is known as *damnum absque injuria*. It is illustrated best in the following case—a case which I used very successfully in several cases.

In the English case of Wood against Sutcliffe, reported in 2d Simons' Reports, new series, p. 163, and 16th Jurist, p. 75, a man named Wood had established a wool washing establishment upon a little stream in England. At the time the plaintiff went there it was perfectly limpid and pure, flowing through the meadows and country above, which were then unoccupied, and he used the stream for a long while to wash his wool. Gradually a town was built above, and people began to live on the river bank, and from time to time the wool man claimed damages from sundry persons who polluted the stream, and adjusted the question with this man, and that by their paying him damages. So many persons used the stream above the wool works that in time the water flowing down the stream became polluted. Under these circumstances the wool washer found it necessary to establish a tank by which he drew off the water and allowed it to settle for washing purposes. Eventually the defendant came and erected his dye factory on the river bank, and began dumping his dye stuffs into the water and made it foul. Wood sued him. The jury having given him one cent damages, it being true that the water was unfit for use by reason of the dye, the Court said, in substance, on a motion for an injunction in support of the verdict at law, undoubtedly there was a time when the water flowed down to the plaintiff's wool works in an absolutely pure state; but gradually men have settled upon the river bank above, and the natural result of the population and the settlement above has been to render the water really and substantially unfit for the purposes for which it was originally used; so that when the dyeing establishment came there, and added its disturbance, the wool works were not really injured, but only technically, because the water was by other causes rendered unfit for the use they had put it to in the first instance. The jury said, we will give him one cent damages, because the heaviest sort of a verdict against the dyeing concern would not have grven the relief sought. And the Court, considering an injunction would give him no substantial relief, refused it. That is exactly the case between the electric railway and the telephone companies. If you admit their right to the use of the earth as against everybody or thing in particular, the different disturbing causes are so numerous and so manifold, taking away the particular disturbances of the electric railways, that they could not under any circumstances recover more than nominal damages, and an injunction against any one disturbing influence would be of no avail. Even though they be damaged by us, it is not an injury to them for which we are responsible, because it occurs to them where both of us are excising our common rights, where one has as much right to the thing used as has the other. A strong answer to their claims is that they invite these damages by the way in which they have used the earth. If they do not want to be damaged, they should not try to come in with their delicate and complicated mechanism to bump up and jostle against other people who are not disturbed, and whose mechanism is not as delicate as theirs. There is a method of using their inventions which protects them and gives the seclusion necessary for them to live in peace. They should resort to that and not blame others if they are damaged by going into a place where they know they will be damaged. I have been over this controversy in a half dozen different cases, and studied it from every standpoint. To grant the prayer of the telephone companies would be a decision in restraint of business, it would be the most absolutely absurd thing in the world to admit the claim of these people that they have the right to construct their lines in the cheapest and most inferior manner, and then when other people, in the exercise of their lawful rights, interfere with them and create disturbances to them, they shall be held responsible therefor. It would break up the whole business of the community, and be a fatal blow to the development of electricity as applied to all sorts of industries present and prospective, for there is no doubt that electrical science so applied is still in its infancy. It is contrary to the policy of the courts and in restraint of trade and business and a direct blow at the spirit of progress to maintain any such pretensions.

MR. WRIGHT: You would not advise us as to a compromise?

MR. WISE: I never advise against a compromise. The peace of mind in getting out of a lawsuit amounts to considerable money; and then lawsuits at times are apt to be rather expensive, even if you succeed in your claim. If you ask as to the strict legal right, I have no doubt in the world that in a fairly joined issue, between the telephone and railway companies, on this question of our liability to them for these disturbances, we would prevail. That is the opinion of the best lawyers with whom I have conferred. I will take great pleasure, if the controversy comes up, in sending you these cases, arguments and decisions, and lending you all the assistance possible.

MR. WRIGHT: I should be very glad to get them. Judge Woolworth, of Omaha, has been retained by the telephone company to bring a suit. The Thomson-Houston company have given me the data they have.

MR. WISE: I have all the cases referred to, and will give them to you.

MR. WRIGHT: I gave them to Judge Woolworth, and he said he was not quite so ready and anxious to commence the suit as he was.

MR. WISE: I think your counsel will find the Pennsylvania decisions very convincing.

DR. ALLEN: We had a great deal of trouble at the start, when we were first about to operate. We had two cars ready and started with them; and it kept the telephone girls busy putting up the drops. We ran about one car a day for the first week; and it kept the telephone people very busy; in fact, they said they were going to lose all their business, and they made a great fuss about it. The telephone people went to the agents of the Sprague company, and the telephone man came from Chicago, and in some way they fixed it up. What they did I do not know, as regards who was to pay for it. They tried first grounding our wire in a number of places, digging quite deep, and putting in copper plates, but without effect; and then they next put in return wires on certain of their lines, but that did not do any good. They finally came to the conclusion that they would put in a complete metallic circuit. We ran north a mile and then east a mile. They have fifteen subscribers in the far west portion of Davenport, who were not affected; but people who lived six or eight blocks away from the end of the east line were affected just the same as those within two or three doors; and they were all relieved by this metallic circuit. The whole thing came up just as Mr. Wise has stated about the grounding of their wires to the gas-pipes and water pipes; but we had no conflict with them. We simply knew that the matter was settled in some way. Whether the telephone people were to be paid or not, I do not know; it certainly looks as if they did not think they had much of a case. The same manager has charge; and the Moline road was recently started, and there was no complaint except as to this leakage and ground controversy.

MR. CLEMINSHAW: Do they claim induction as well as conduction?

DR. ALLEN: They did not claim any induction at all. We know they had a terrible time in the telephone office. They came to me and said, "What are you going to do about it? We said it was not our affair; and I do not know as to what settlement was made.

MR. CLEMINSHAW: How many motors are you running?

DR. ALLEN: Five.

MR. WISE: It is absurd for them to claim that there is any system that is not going to have some leakage. I have seen the little boys in Richmond, on rainy days, stick their knife blades into the poles along the route and receive a slight shock. On dry days they could not do this. Of course, as long as the insulation is complete, there is no leakage; but when the rain comes it drops down from the wire and runs underneath it, and, passing around the insulator to the pole, it makes an electrical connection with the wood, by means of water, and thence leaks to the earth. Water is a good conductor, and the wet on the wire and around the insulator to the pole will, of course, make a little leakage. All electricity seeks the earth. All this talk about induction is, in my opinion, ridiculous, unless the wires are brought a great deal closer than they are ordinarily.

MR. ALLEN: There are a good many such troubles on the arc circuit.

MR. WISE: An arc circuit has two thousand volts on it. There is more trouble from them than all the others put together. I was referring to the arc light wires that pass on these poles from which the little boys get shocks in Richmond. An arc wire has two thousand volts. The running of rain or water over the wire to the pole will carry a current down to the earth, from leakage or conduction, but it is not induction. It is impossible for any man to attempt to say what percentage of these disturbances are from induction, conduction and leakage. It is perfect nonsense. You can not tell anything about the per cent to be distributed between these influences. The fact is conceded that the greater part by far is due to conduction.

MR. ALLEN: Two or three banks had telephones, and there was no disturbance.

MR. WISE: If they will remove their grounds to a point where our currents do not interfere with them (they can find them with very little difficulty), there would be no trouble. They invite these disturbances by attaching themselves to whole systems of metallic conductors, like gas pipes and water mains, and the like.

MR. JAMES F. PEAVY, of Sioux City: Do I understand rightly that you mean by a grounded circuit that the ends of the rail are attached together by a wire?

MR. WISE: I will tell you what a grounded circuit is. In order for any current of electricity to be started at all, you must have a complete circuit from your generator and back. The current is generated at your positive pole and normally seeks your negative pole. When you conduct it away it seeks to return to the negative pole as soon as released, and this return of the current to the negative pole completes the "circuit." The earth is the best return circuit; and if you will attach your wire to the positive pole and carry it out any distance, and stick the wire into the ground, the current will come back to the negative pole. It will take the best electrical conductors under the ground. The course it will travel on its return depends upon the electrical conditions of the earth, such as the moisture of the ground, the metallic substances it strikes, etc., etc. Its course depends upon what it finds to be the best conductor in the earth through which it is seeking the generator. If you take a straight wire from here across the street, and have it connected here to the positive pole of your electrical apparatus, until you ground it or return the current by wire to the negative pole, you can not establish your electric circuit or current. The metallic circuit is where you carry the electricity out on the positive wire to the point where you want to use it, and bring it back from that point on another wire to the generator. These two wires running parallel one with the other from what is called the simple metallic circuit, and the effect of the adjacent positive and negative wires parallel to each other is to create around the two what is known as the "electrical fields," the result of which is to repel and exclude all foreign interference from any other electrical currents. It is just as if the two were wrapped around with some non-conducting substance. It prevents the effect upon the wires of leakage and induction as well as conduction; induction being the influence of a neighboring electric wire upon another wire. In a word, an electric current is "induced" by the sympathetic influence of a neighboring wire, although there be no actual contact. The metallic circuit effectively protects the wires from this. The next device resorted to to accomplish this was that instead of having a return wire from each phone, a trunk or common wire was used. This is the McCluer device. Say your battery is half a mile up the street, you bring your wires down to the different phones, and then have a trunk wire from the negative pole of your generator, through the middle of the street, and carry your return wire out to the trunk wire. The currents travel back by the

common return wire. Suppose you are using the ground wire. Your central station is half a mile up the street; you bring your wire in and attach it to the phone; then, wanting to get your current back as cheaply as you can, you attach your return wire to the gas pipe or water pipe, and fasten it there, and you thus establish an electric connection with the earth. You know the pipe runs to the main, and the main goes to the earth; and as soon as your current gets to the earth you get your return and your completed circuit. The disturbance happens thus: Suppose an electric railway line is running on the same street. The electric car has an overhead wire which brings out its current to the trolley wheel, upon which the current is sent down to the motors. The trolley wheel rests against and under the wire and takes off the current to the pole, which is wired, and the current runs down the pole to the motors, performs its propulsive function, and thence goes through the wheels on to the tracks, and starts on its homeward course. To facilitate the return of that current we connect the different rails with wires. Formerly, to facilitate that return, we ran wires from the rails to large metallic plates, called earth plates, so as to diffuse the current in the earth and give it as many "shunt paths" home as possible. We found that these earth plates did very effectually scatter it, but it cause the telephones trouble, and now we try to get as much of the current back along the rails as we can. In order to make the return current as little diffused as possible, we have abandoned the earth plates, and connect the rails with wires, and at the end of the rails we carry back the current by wires to the negative pole of the generator. The object is to conduct the return current with as little diffusion as possible. Electricity likes to play, it came from the earth and lives there, and even when these connecting wires are laid on the earth a great deal runs out and takes different paths back to its source. These are called "shunt paths," *i. e.*, the best electrical conductors it finds.

An electric current will sometimes find a vein of mineral or a strip of moist earth going at zigzag to its course home, and will follow such good conductors, even though they do not lie in the direct line it wants to travel. In the course of its return it will follow the best conductors, even though its return trip takes it a long way out of its most direct route home. Thus it is that going along it strikes one of these gas mains or water mains to which the telephone may be grounded, and it will run along on these until it comes to the telephone wires, and following them it gets into the telephone office and knocks down the annunciators or burns out a phone, and that is what the telephone people complain of. Our return circuit of electricity runs on their wires, and they have invited it to do so by grounding their wires, that is the whole thing in a nutshell. Our reply to their complaint is, if you do not want your wires ridden on, do not put them into the ground.

MR. CLEMINSHAW, of Troy: Mr. President and Gentlemen — While a stranger to you all, and not a member of your Association, through your kindness I am here. There are a number of us who have come here to attend the street railway association meeting to-morrow; some of us have come from fifteen to eighteen hundred miles. We have come not so much to attend the meeting of the street railway association as to get some information connected with electric roads. In our State (New York) we are behind you here in the West as to electric roads. You have gone ahead of us in many respects. I believed there would be here, as I find, parties like yourselves, who represent this new system; what we all want, and upon which idea we started the street railway association nine years ago, is to get together, compare notes and receive inside information connected with the management of electric roads, as we have been working in the other association in regard to horse railroads. On the road I have the honor to represent, we have started an electric line, and have been running commercially about three weeks. This telephone matter, which has been discussed, is upon us. While it has not yet got into the courts, it is coming very close to it. In our State, the law, as amended last winter, is that any street railroad company that desires to change its motive power from horses to electricity is required to get the consent of a majority of the property owners on the proposed line, according to assessed value. We are then required to go to the Railroad Commissioners, and obtain their consent to the change. When these two requirements are covered, there is no occasion to apply to the local authorities. Our road runs two and a half miles. We got the grant and built this road under the old law. We afterwards, under the new law, got the consent of the City of Troy, and applied to two other villages, though not obliged to, as before stated. One refused through political reasons; the other gave their approval. We got the consent of the property owners on all the proposed new lines, and went the Railroad Commissioners. There we met with the telephone people, who were ready to fight us. In the meantime we had got our short road running, and the troubles you speak of here were found to exist. I merely refer to the matter as it stands with us. The Railroad Commissioners have granted permission to a road in the City of Utica, it being the first under the new law, to change their motive power, with the restriction that the railroad company shall not interfere with the telegraph, telephone or electric light wires more than may be necessary, or shall protect them to the best of their ability. We had Mr. Sprague at the last hearing of our matter before the Railroad Commissioners. He cross-examined the expert that the telephone people had from Boston. The latter claimed that induction was equal to conduction. Mr. Sprague took the contrary view. It was quite a long hearing, and was adjourned until yesterday, which was supposed would be the final hearing on the subject, and I expect to learn in a few hours what the result was. But this telephone trouble with us is a new thing; there are other electric roads in our State, but they have been very quietly built and have had no serious contest with the telephone companies, that we can learn of. We know about the legal points and their bearings; but we want to know if there is any practicable way out of the difficulty. I was hopeful of getting from Dr. Allen an idea as to how it was done in Davenport; and above all, whether anybody has practically tested the McCluer system, of which we hear a good deal. Is there anything in it? Has anybody tried it outside of Richmond?

MR. WISE: In Richmond they are operating very successfully with it.

MR. ALLEN: They are having trouble in Richmond.

MR. CLEMINSHAW: As Mr. Wise said, it is a trunk line, with the wires running to the telephones, and running the line over to the exchange, and then running it to the dumping or grounding point off from the railroad.

MR. ALLEN: It does not do. They tried it at Davenport, taking their return wires, and instead of putting in a complete metallic circuit, running the wires out and having in part a metallic circuit and then grounding it in different parts. They tried to ground the entire west end, and never had a cessation of the difficulties.

MR. WISE: Mr. McCluer was prepared to endorse the result of his experiments as entirely satisfactory; that they were relieved from the troubles. He hesitated to give the testimony, and would not do it until I summoned him.

MR. CLEMINSHAW: We are all practical men; theory we do not care a snap for. We want to talk this matter over just as it is. Is there a remedy? If so, what is the remedy? If the McCluer system is good for nothing, practically, we want to know it. I was in hopes, in accepting your kind invitation to come here to-day, that some of you would have made some test of it, and told us all about it. The Doctor says he has tried it, and it is a failure. I have made a small test of it on our road and it was a failure; amounted to nothing. On the other hand, if that will not answer, what will answer?

MR. WISE: Nobody denies that the continuous metallic circuit will answer.

MR. CLEMINSHAW: The question then is, what is the expense? Our main street is very narrow, and there is only one main street. The telephone lines are on that street, and our railroad is on that street, and the river runs along to one side. We have got to come together, and can not get away from it. If there is anything in this metallic circuit, or in a return wire, within a reasonable amount, we do not propose to fight; we propose to compromise. If it is going to be a large expense, we have got to fight. If the cost is what the Doctor states, say in the neighborhood of ten or eleven hundred dollars, it is a mere bagatelle.

MR. ALLEN: That is what it is, about four hundred subscribers.

MR. WISE: They could make the complete change from the ground to the metallic circuit for about twenty-five hundred dollars.

MR. ALLEN: How many subscribers?

MR. WISE: Two hundred and eighty.

MR. ALLEN: That is too much.

MR. WISE: They will, no doubt, try to make it as expensive as possible.

MR. ALLEN: When you wrote to me I went to our general manager and said, there may be something behind this communication, but I do not think there is. He said he could not say anything about it, but he could tell me that the expense of changing the wires was to be borne by both parties.

MR. WISE: I got the bill, and they say it was seventeen hundred dollars.

MR. ALLEN: They said you were to pay for the wire and materials and they would do the work. I know they did the work in about ten days. They changed all these wires, and they did not overcome the troubles until they had the last one changed. They tried some of the wires changed, and then grounding them off at quite a distance, four blocks away; and also passed another line from another direction, and the return wire went to that. But it would not be fair to say that the system was not right. They might have left out wires at the far end that gave the trouble afterwards. We found that a wire was left out six blocks away, and they had as many as a dozen shocks before that wire was changed. The current got on the gas pipe and got into the exchange, and ran up on to the drops.

MR. CLEMINSHAW: Did they cable the wires — bunch them together?

MR. ALLEN: Only on the main street.

MR. CLEMINSHAW: We had some of our wires carried out to our barn and grounded near the river, and there was no relief whatever.

MR. WISE: Water is the best kind of conductor.

MR. CLEMINSHAW: That is why I question about the induction; for I can not understand how it is overcome by these wires, if induction is as powerful as conduction.

MR. WISE: You overlook the fact that by parallel wires an electrical field is created, which utterly destroys the influence of induction, and renders the wires just as impenetrable as a lead pipe.

MR. ALLEN: The wires ought to be together.

MR. WISE: Where they are parallel, one wire furnishes the incoming and the other the outgoing field, the extent of which we can not distinguish, and within which extraneous disturbances do not penetrate at all.

MR. EVANS: I had the opportunity and pleasure of making a crucial test at Ottawa some time ago. The Methodist Conference was in session, and I invited them to take a ride over the line. Our line there has a great many curves and switches. I brought down eight motor cars and four trail cars, twelve in all. Part of them were connected, and part were not. I loaded from eight hundred to eight hundred and thirty people on the train and moved to an extent of four and one-half miles from the generator. The greater part of the Ottawa Electric Railway is built with girder rails, by using continuous metallic circuit consisting of two No. 2 copper wires, riveted twice to each rail. The outer portion of the city of this railway is built of "Tee" rail, with tie bands connecting the rails together of No. 2 copper wire soldered on to three eighths of an inch rivet. Now, while we were propelling this train or trains of cars over the girder continuous return circuit of copper wire, we could maintain a speed of fifteen miles per hour, but soon as we came to the "Tee" rail road, connected with the tie bands only, thereby having only a partial return circuit, our speed was diminished to seven and one-half to eight miles an hour. The labor of the generator seemed to be thirty-three and one-third per cent. greater hauling the cars dur-

ing the time we were on the partial circuit track than the time we were on the track that had a continuous circuit. I had arranged with the telephone manager to take notice in his office of the movement of these trains, and when they were moving on the continuous circuit, the drops in his office were but slightly affected, but as soon as we reached the change in rails and the underground circuit, the effect in the telephone office was marked. As many as twenty to forty drops came down at once.

Laying aside the telephone trouble by imperfect and partial return wire circuits connecting with the rails, there is a great economy in fuel and traction in favor of the continuous ground circuit. There is much less flashing and sparking between the wheels and the rails, and we can ascend the same grades with the continuous circuit with more ease and less power, than we can on the rails where there is only a partial circuit

We had one instance where we affected a telephone a mile and one half distant from our line, where the telephone wires crossed our line at least ten feet above us, where there were no perceptible groundings of any kind that would show a connection from one to the other; still at this point the telephone was almost rendered useless, and not until it was supplied with a metallic circuit could it be used. I make it a rule to use groundings wherever I can, but am very careful not to ground to water mains, gas pipes or anything that the telephone people use, and am satisfied that the better the metallic circuit, the better the service, whether railroad or telephone.

My first lessons in electric railway were at Richmond a year ago last June. I was satisfied the road was not mechanically what it should be; I was satisfied the motors were not sufficient to do the work that was required of them, and there were many engineering and mechanical difficulties that could be overcome and electric railway propulsion be made a success. I returned home and constructed the Omaha & Council Bluffs line, trying to obviate the defects, largely in the construction, that I found at Richmond, at Scranton, at Allegheny City, and many other places, and to a great extent succeeded, and built a line that has been in operation continuously on schedule time since the 10th day of last December without losing a train.

MR. CLEMINSHAW: Yours was the Thomson-Houston system?

MR. EVANS: Yes, sir.

MR. CLEMINSHAW: If you make a good joint with a steel rail, tightly bolted together and using tie bands, does that not give you a circuit and do away with your trouble?

MR. EVANS: You can not rely upon the steel rail joints, no matter how perfect they may be made for your return current, for when the rails, splices and bolts become corroded with rust and the joints are loosened, there is great resistance and loss. I dare say if you would go to Richmond to-day, where their road has been pronounced a failure and it has been publicly stated by their President that they must go back to horse power, that you would find the difficulty more largely in the road bed and imperfect return circuits than from any electrical cause.

MR. CLEMINSHAW: It is not fair to the Sprague Company to set this road up as an example. It is in just such a condition as you mention.

MR. EVANS: It is not the fault of the Sprague people that this road is a failure, but it is a fault of the engincering that was done in its construction. They undertook to operate a very difficult piece of road with motors one-half as large as they should have been, with a most inferior road bed and only a partial return circuit. I would not hesitate to undertake to rebuild that road, and use Sprague machinery and guarantee perfect satisfaction.

MR. CLEMINSHAW: It could very soon be made to run all right.

MR. EVANS: It is damaging to us as railroad men, it is damaging to those interested in electrical manufacturing, to have such information telegraphed broadcast over the country — that the Richmond Union Electric Railway is a failure — when the whole fault was in the construction and operation of the road. I know that electrical railway propulsion is not a failure, from actual experience in operating the Omaha & Council Bluffs road, and in operating the Ottawa Electric Street Railway, and by observing other railways perhaps equally as successful.

MR. JOHNSON: When we put in our line down at Lafayette, I received a request one day to come down to the office of some attorneys who represented the Western Union Telegraph company and the telephone in our town. They had a great many questions to ask me about this same trouble. In the course of conversation I told them I had been at Richmond and had examined that road, and we talked considerably about it. One of the attorneys said, "I know the manager of that road, and will write to him, and find out all about it." About two weeks afterward I saw him, and he said, "By the way, I have heard from Richmond, and everything seems to be working satisfactorily; they had some trouble at the start, but the telephone system is all right." We were going to put our wires on the telephone poles on the main street. Our telephone, and the Brush electric light and the Thomson-Houston electric light poles, which are all on the same street, have span wires; and our main feed wires run on the telephone poles. In putting in the ground connection we connected each rail together, and ran the wire alongside the rail, and that wire returns to the station. We have had very little trouble at all with the telephone company. After we had been running a while, they sent an expert, who made an exhaustive examination, without our knowing anything about it, and he went over the whole matter with a Dr. Bell, professor of electricity at Perdue University; and it was through him that we learned of it. They have never called on us for anything, and have not made any complaint against us.

MR. CLEMINSHAW: Do you get any buzz on the telephone?

MR. JOHNSON: A little, if it is raining and everything is wet. I remember, in the telephone business, when we had a rainstorm, our instructions were to disconnect the 'phone, as it was dangerous to use it during lightning storms. We have that buzz sometimes, especially during a storm; but no complaints otherwise.

MR. CLEMINSHAW: What kind of a rail do you use?

MR. JOHNSON: Some old time rail; some 52-pound Johnson rail; but much is T rail.

MR. CLEMINSHAW: How many cars?

MR. JOHNSON: Six regular, eight altogether. The line is about five miles, and the station tolerably centrally located.

MR. CLEMINSHAW: Are the telephone wires on the same street?

MR. JOHNSON: Yes. It is not a wide street; it is so narrow that we can not have a double track on some parts of it. I counted sixty-three telephone wires on one pole; a pole to which we had three wires (two span wires and one feed wire). We use the Sprague system.

MR. CLEMINSHAW: You have a continuous wire alongside of the rail, attached to every rail?

MR. JOHNSON: Yes, sir. The size of the wire is about the same as the overhead. (Mr. Evans had been telling about his putting in a ground wire.) I was thinking, when Mr. Evans was telling about the heavy wire that you have connected on the Johnson rail, that it is like having a good, free flow of water away from a water-wheel, which is a good result; when you got out on your T rail you disconnected the return wire, which is like having the water back up on the wheel. The telephone company and we have got along without any trouble.

I did not understand from Mr. Evans that there is any difference in the rail; but it is the wire. The T rail would have done just as well if he had continued the wire.

MR. ALLEN: When they first put in these connections, they had a continuous wire the entire length; and they put in these little rivets from the outer side. In less than two months nearly all of them were knocked off. For the hill, this spring, the Sprague Equipment company, of Chicago, sent us some of their new rail bonds, and our cars are doing very much better on the hillside. Their speed had dropped nearly two miles an hour going up the hill. We tore up the track and put in the new rail bonds, and at the same time coupled them to the side wire. It has made a great difference in the speed of our cars on the hill. It seems to me that might have been of some benefit in Stillwater. I do not think we ought to give it out in this meeting that we consider we must ever make a complete metallic circuit. If we had a half dozen of these copper return wires, it is going to give us great help. It will overcome the resistance, but perhaps not overcome all the leakage.

MR. CLEMINSHAW: Were the rivets countersunk?

MR. ALLEN: No; they stood right out. The wire was so small, that many of them broke off from the movement of the rail.

MR. EVANS: Tram rails are not practical and are not to be recommended in building electrical railroads of to-day. They are not provided with splices or chairs and it is impossible to maintain a track without the joints coming down, and that has a tendency to break the copper tie connections, thereby losing your circuit; and here permit me to suggest a form of a tie wire to be used to connect the rails where that system is to be used, instead of the present No. 2 and No. 4 copper wire bent and soldered to copper rivets, viz.: Use a one ought copper wire, turn a square elbow at the ends sufficient in length to pass through the rail and rivet, thereby making a solid connection instead of depending upon inferior solder to hold the small copper wire to the large rivet, giving the same transmitting power in the wire, being full size of the rivet. I find that it does not cost any more money and makes more perfect connection.

MR. CLEMINSHAW: With us they we just putting the rivets in, and had not got many done before the superintendent called my attention to what they were doing. They were doing it without counter-sinking them. We required them not only counter-sink, but to counter-sink so that the rivet is well away from the wagons, there has got to be a good deal of wear over the rail before they reach the head of the rivet. The burr would be worn off in a very short time if they did not do this.

MR. JOHNSON: My line is crooked; thirteen curves. First one here, and then another. The curving seems to give the current more opportunity to get off from the rail and take the shortest or as good a conductor as it can find back to the station. We make our returns, but do not get the insulation, with two wires, positive and negative, running alongside of each other. I think that unless we have got an absolutely straight line, with our power-house located on the line, we will find that the telephone companies will have to put in a double metallic circuit. Dr. Bell wrote that he believed the only effectual remedy was going to be a metallic circuit for the telephone, because we are not the only ones who are giving them trouble. They get it from other electrical currents. There are seventy-eight wires on our main street, and they run down to a ground. There is no doubt that the electric light companies in our town and the street railroad currents are going right in there; and everything will be all right till they interfere. They have eventually got to come to the metallic circuit. They need not expect to be able to provide themselves with a circuit that will do away with these troubles in any other manner.

EQUIPMENT AND REPAIRS.

MR. ALLEN: I made a report at the last meeting, and there was considerable exception taken to the report, on account of the number of commutators being used up, copper brushes and gearing. Most of our wear was on those very items; very little trouble with fields and scarcely any with armatures. Only one armature had been sent back to the company. Just about that time they commenced using carbon brushes; I think it was in June, the time of the last meeting. Since then we have had no trouble with wear on the commutators. Of course, they wear to a certain extent, but the wear has been very much diminished; while we have had more trouble with the armatures since then. I think it is due to the fact that the insulation between the copper bars of the commutators is imperfect, and the carbon dust gets in and it appears as if it was eaten by a mouse, and there is then a short circuit. We have had a number of these commutators made, and they were not as perfect as those we had make in New York. Certainly the carbon brush has been a great thing with us; they have done away with all difficulty to the brush. Before we averaged at the rate of one copper brush or forty cents per car per day in the cost of these brushes, which was quite an expense. We have had a little more trouble with the armatures. They have had to go over the commutators, oftener and very frequently dust would get behind the head of the armatures. Apparently, more wires get loose, but whether they have been burned off, we are sometimes unable to ascertain. As regards the gear, we did use the

fiber; have not used any hide for a long while. The gear is expensive, but we have succeeded in buying some in Cleveland at about half price. We have some at home for four dollars; cast gearing. The result has been we have a good deal of noise on the cars. No one has yet complained; but if you were to inspect that car, with the idea putting it in, you would hesitate on the ground of the noise, which we do not have with the fiber gear. The difference is very great, however, between twenty-two dollars, something like that amount, I think, for the fiber gear, and four dollars for the cast gear; especially as the latter will outlast the former. With the fiber gear, if you should break two or three cogs, of course, it is useless; the same way with pinion. They have offered to make us this gear, with brass bushings, for six dollars; but these we have are simply cast gear, without brass bushings. It seems that the cast iron, until it breaks through the bearing surface will wear for a very long time; as soon as that comes, it wears very quickly. I do not think there has been anything that we have had to deal with just now on the subject of repairs that is so important as the subject of gear. It is not so much the amount of money involved, as having the car laid up when you want to use it. You lose the entire day's earnings of your car, as well as the inconvenience and interruption to traffic. We have gone over a year now, and have been pretty well satisfied as to be about what it costs for repairs, and what they should be and have been for the past year. We had to renew all our commutators on account of the copper brushes. The renewal expenses were less than two thousand dollars for five cars for the year.

MR. CLEMINSHAW: You have been running the road yourselves for about a year?

MR. ALLEN: Yes; a little over a year.

MR. CLEMINSHAW: What is the nature of the trouble with the armatures?

MR. ALLEN: No trouble with the armatures at all. We had a little trouble at Stillwater, but have not ascertained what the trouble was.

MR. CLEMINSHAW: You were able to repair them?

MR. ALLEN: Yes, sir; in Davenport we repair them. We have a man we pay sixty dollars a month. He has always about three armatures he is working on. He may have them a month before he gets them in shape, because he is working on other things as well.

MR. CLEMINSHAW: What kind of motors have you?

MR. ALLEN: The Sprague. It is the old style, 7½ horse power motors.

MR. CLEMINSHAW: Do you think your expenses will be reduced the coming year?

MR. ALLEN: I think they will be reduced, including twenty-four commutators, at thirty-five dollars each, entirely new.

MR. CLEMINSHAW: What is your mileage?

MR. ALLEN: Our car miles are eighty-six. Our road is a very difficult road on account of the traffic; we get all our passengers in three blocks at the foot of the hill, and every one is carried up.

MR. CLEMINSHAW: What is the length of the hill and grade?

MR. ALLEN: The grade is 7.30 for fifteen hundred and fifty feet. It is nothing like the line in Stillwater, but the travel is greater. Our experience was it costs 2.7 cents per passenger for electricity, as against 3.6 cents in the former year with horses. The electrical people have figured in always the cost for operating for power, one thing and another, and that seems to mix people up. It depends a good deal on the number of cars what the power costs. Our power would cost us very little more if we had ten cars running, very little except for fuel.

MR JOHNSON: Does that include interest?

MR. ALLEN: Yes; just as much now as it was before.

MR. CLEMINSHAW: Could you give us the mileage?

MR. ALLEN: I could estimate it, but it would not be exact. We commenced on fifteen minutes' headway and got down to twelve. We carried five hundred and twenty thousand passengers with electricity, being about 2.7 cents per passenger, as against three hundred and forty thousand with horses, being about 3 6 cents per passenger.

MR. CLEMINSHAW: Would not the line be likely to grow?

MR. ALLEN: Yes; but it simply shows that on four or five cars, apparently, all our expenses were increased, our taxes, insurance, renewals and all our operating expenses increased over the previous year; but our receipts were very much larger, mileage greater, cars greater in size and running on faster time, so that not figuring these things in, our expenses apparently were increased.

MR. CLEMINSHAW: Take it by passengers. Did you increase the number of passengers? You would get the price per passenger.

MR. ALLEN: We ran eighty-six miles as against sixty-four.

MR. EVANS: 2.7 as against 3.6.

MR. EVANS: Just for the propulsion?

MR. ALLEN: No; this takes in everything; of course, we get about one-third more mileage from our men than we did before. In other words, we are paying them the same for more trips.

MR. JOHNSON: They do not work more hours, but make more trips.

MR. CLEMINSHAW: We are cut down to twelve hours by law; but where we did sixty-five miles with horses, we do one hundred and five with the motor. We get just that increase of labor from the employes, which is quite an item. It results in considerable in running a railroad.

MR. ALLEN: We have no charges against our light and power business, which is paying considerable. It pays almost the entire expenses of the plant. Our fuel costs us just the same this September as it did last September.

MR. CLEMINSHAW: What you make on the light goes to the benefit of the road?

MR. ALLEN: No charge made or allowed for fuel used by power and light circuit.

MR. JOHNSON: Are rentals over three hundred dollars a month?

MR. ALLEN: Over that now. You ask about the increase. One thing we know: the yearly increase with our horse cars was six per cent. This September we increased fourteen per cent. over last September, although that month had shown an increase of fifty per cent. over horse cars.

MR. CLEMINSHAW: That is no doubt a legitimate increase; the novelty is wearing off.

MR. EVANS: It is my observation that what is a novelty to-day is a necessity to-morrow. The increase is continued right along.

MR. CLEMINSHAW: The novelty draws a great many people to ride once or twice, and they then drop off.

MR. JOHNSON: We had a little practical experience of that on our line. We sold six hard rubber tickets for twenty-five cents. We had plenty of hard rubber tickets when we ran with horses. After using electricity we began to increase our sale of tickets; and I think in four months after we ran regularly the thing got so that we had to tap the cars once and twice and sometimes three times a day, to get the rubber tickets out. We use fare boxes, no conductors. We had to buy two or three thousand extra tickets They are used principally by our regular customers, which proves that what is a novelty to-day is a necessity to-morrow. We look to that as the best test of the permanence of the increase. I am away from LaFayette considerably, but since coming here there have been so many questions about mileage, etc., that I have just figured out the mileage on our road. It was a little short of eight cents per car per mile, including *all* charges and taxes and interest. It includes every expense.

MR. GEO. F. WRIGHT, of Council Bluffs: Have you any revenue from station power?

MR. JOHNSON: Yes, but we do not enter any charge against that; we take it in clean. The expense is about two cents per car mile for power.

MR. CLEMINSHAW: How was it a year ago?

MR. JOHNSON: I do not know what it was per car mile then, as I did not figure up anything of the kind. My mileage is a great deal more than it was with horses; and my expenses for power are less than half what my expenses for power were with horses. In my expenses for power with horses were included the cost of feeding the horses and the barn attendants; and my expenses for power with electricity are all my station expenses, including fuel, water, waste, oil, wages, etc.; every expense connected with the station.

MR. WRIGHT: How many miles a day?

MR. JOHNSON: Main line, ninety-five miles; branch line, forty-two miles.

MR. EVANS: What do you pay your men?

MR. JOHNSON: Eight dollars a week. (This is not a fair answer without explanations, which make $8.00 equal $9.50 to the men.)

MR. CLEMINSHAW: How many cars?

MR. JOHNSON: Six. When we have a big day we use all our motor cars and all our trailers, and the expense is not increased enough at the station to notice it. The additional expense when they are all out is not noticeable.

MR. CLEMINSHAW: What have been your troubles in running the road? What have the repairs amounted to?

MR. JOHNSON: I can only give them to you for the last three months; our fiscal year ends with June 30th. The superintendent wrote me that they had charged to repair account this year so far three hundred and ninety-one dollars; and he said that during that time they had put on an entirely new set of intermediate gears on seven cars.

MR. EVANS: The total expense outside of the gears is about one hundred and ten dollars.

MR. CLEMINSHAW: What special trouble have you had with your motors?

MR. JOHNSON: Since getting rid of the copper brushes we have not had any. With the copper brushes we were bothered all the time. With the carbon we find the carbon sifts. My operator has time during each trip to open his trucks and brush off the motor. He brushes off the commutators, which prevents the carbon from getting down and cutting the insulation. Since we started we have bought only one set of commutators.

MR. CLEMINSHAW: Where does the carbon show itself; on the end of the commutator?

MR. JOHNSON: On the end of the commutator. It has a tendency to cut the insulation, so that we have to brush everything off clean at the end of the trip.

MR. CLEMINSHAW: The sifting of the carbon cuts them?

MR. JOHNSON: I think it grinds in.

MR. CLEMINSHAW: On the end of the armature, where the wires come in, there is a screw put in that fastens it?

MR. JOHNSON: Yes, sir; they are making some without screws and some with.

MR. CLEMINSHAW: To a considerable extent they are discarding the screws and soldering it. Is it at that point?

MR. JOHNSON: The commutator is made of pieces of metal, and they form a circle, and between them is an insulation, and the carbon brush presses down on the commutator, and as the carbon grinds off, the tendency is to grind into the insulation; and, of course, if you get that cut much, you will get a short circuit between the commutator bars. We thoroughly brush it off after each trip, and keep it clean. We put a man on the car and make him responsible; one of our oldest operators there will have it so clean that you can almost wipe it with your handkerchief and see no dirt or soil upon it.

MR. EVANS: They are soldering the brasses instead of putting in the screws.

MR. CLEMINSHAW: Have you had any trouble with them?

MR. EVANS: There has been no trouble to speak of; nothing more than you have heard.

MR. CLEMINSHAW: How often are the motors oiled?

MR. JOHNSON: I have a man who is a cleaner. He cleans the cars at night and oils them, and there is very little oiling to be done; and a motor, like any other machine, will vary. One will want more oil than another. The operator who runs the car takes care of his own machine, as may be required, carrying an oil can for that purpose.

MR. CLEMINSHAW: Your system is the Sprague?

MR. JOHNSON: Yes, sir; we took out the oil cups, and put in wooden plugs when we gave the oil cans to the operators.

(*Adjournment.*)

Verbum sap.

In some of the smaller towns, says the "Electrical World," retired merchants lie awake at night wondering how best to invest their capital so as to secure the highest returns with the least risk. In the same town a sleepy one horse street car system is allowed to vegetate, the running expenses of which are light, and frequently the receipts are lighter, for the local capitalist will not ride at such a slow gait, and wonders that any one else does. Buy the line and introduce a system of rapid transit? Not much. Like a

sensible man he invests in corner lots in far off Boomville. Suddenly this old capitalist is shocked by the news that a syndicate of Chicago capitalists have actually bought up the road and all thereto pertaining; have contracted for the installation of an electric system of rapid transit; have increased the capital stock, bonded the road and sold the bonds; all before he recovered from his surprise at his own stupidity in allowing such a golden opportunity to slip from his grasp for the investment of his entire capital at his own hearthstone. George H. Bliss, of Chicago, recently visited a western town and endeavored to persuade local capital to take hold of a railway line, and finally had to secure outside capital. Now that it is too late, all the local capital is at his command, and parties from neighboring towns are ready to aid Mr. Bliss in every way. "What fools these mortals be," is an appropriate quotation.

Another Strike Failure.

An attempt to organize a strike on the lines of the Atlantic Avenue Railroad company of Brooklyn, was made on the morning of Tuesday, November 19, 1889. The movement was disconnected and without plan, and as a result proved very short-lived. The first car, which should have gone out at 4:30 A. M., was delayed until nearly seven o'clock. Cars were thereafter run out on the respective lines as promptly as sufficient police were afforded to properly protect the property of the company, and those in charge of it; and by the early afternoon the ten lines of the company were in regular schedule operation. It is hard to understand what was the apparent cause of the outbreak; but it seems to have been formulated by about fifty of the drivers and conductors of the company, some of whom had been conspicuous in previous troubles, who met at one o'clock the morning of the strike, and under the influence of a proper amount of "enthusiasm" voted to tie up the road. There were no disturbances of a serious nature, and the only persons who were in any way annoyed by the trouble were those who had to walk in the drizzling rain of the morning.

Correspondence.

FROM MINNEAPOLIS.

There has been a wonderful change in the status of street car affairs in the Twin Cities within a month. After President Lowry had overcome the opposition of Messrs. Anderson & Douglas in Minneapolis, by giving bonds to build three trunk cable lines and electric lines, he was confronted with still stronger opposition in St. Paul. Franchises were granted to three or four local opposing companies and Presldent Lowry was forced to commence proceedings in the courts to defend his rights and protect his franchise, which he held to be exclusive. The result will be that St. Paul will get about thirty-two miles of cable and electric roads, to be built this fall and next year. The more important provisions of the grant in St. Paul are as follows:

All lines and extensions, comprising thirty-two miles, to be completed on or about Nov. 1 of next year, and all within two years, when a system of transfer checks shall go into vogue. The company may operate by cable, electric, pneumatic or gas power, but prohibits steam, etc. The conditions of the ordinance so far as practicable, apply to the cable lines. The council may regulate the speed of running cars, so far as to conform to the speed generally permitted for similar cars in other cities. The company shall keep the streets unobstructed by snow within 24 hours of a snowfall. The streets exempted from street railway use are: Dayton avenue, Nelson avenue, Western avenue from Nelson to Summit avenue, Sixth street, Minnesota street, Cedar street, Sibley street Eighth street, Central avenue from Robert to Wabasha street, Sherburn avenue from Robert street to Park avenue, Summit avenue and East Summit avenue from Rice to Robert streets, and Aurora avenue from Robert to Wabasha streets, Forbes avenue from Exchange to Douglass street.

The company is to pay $10 license on each car annually, and also 3 per cent of the gross earnings of the company as a tax, except during years when the 3 per cent of the gross earnings do not exceed the general and ordinary tax The company is to file a verified statement of its earnings with the city treasurer each year. If the company fails or neglects to complete, equip and operate all its lines designated in the ordinance by the time specified, the company forfeits its franchise. The company is also required to file a bond in the sum of $100,000 to perform the provisions of the grant, and the grant has a life of 50 years. The ordinance grants electric privileges on all the existing horse car lines in addition to the proposed new lines, which are as follows:

First—On Como avenue to Front street at its junction with Dale, to be completed by Nov. 1, 1890. This line will be extended to Como Park when the streets are sewered or the lake in the park restored, but not sooner than Jan. 1, 1891. Thence from the park the line will be carried to St. Anthony Park during the year 1891, provided the streets are all sewered prior to Jan. 1, 1891.

Second—On Maria avenue, from Seventh to Plum; Plum to Hastings avenue and thence to Earl street, to be built in 1890. In 1891 the line will be carried to Indian Mound Park.

Third—On Fifth street, beginning at the corner of Wacouta, to Broadway, to Mississippi, to York, to Westminster, to Case, to Arkwright, to Maryland street, all to be built in 1890.

Fourth—Jackson street line to be extended via Jackson and Fairview streets across the railroad tracks to Cortland, and on Cortland to Maryland avenue to be completed before September, 1891. Cortland street has not been graded, and that work will be done next year.

Fifth—The University avenue line to be extended to the west city limits in 1890. This is to be a through rapid transit line between St. Paul and Minneapolis and is to be completed in three months.

Sixth—On West Seventh street to Fort Snelling bridge. This extension is to be built under an arrangement with the property owners along the route, whereby they will pay the operating expenses of the line during a term of five years and in return take the gross earnings.

Seventh—Three lines in West St. Paul, all to be built in 1890. First, an extension of the Concord street line to the Concord street railway station; second, a line from the corner of Concord and State streets to South Robert, to Annapolis street; third, an extension of the Winifred street line on Ohio to George street, to Smith avenue, to Annapolis street.

Eighth—On Winifred street in West St. Paul, from Stryker avenue to Annapolis street, to be built in 1891. Preparatory to the construction of this line, much heavy grading will have to be done next year.

In addition to building all these lines, Mr. Lowry will also build the Cochran Ireland electric lines, one on Grand avenue to the Mississippi river, the other from the junction of Randolph and Seventh streets to the Mississippi. In all, therefore, there will be four rapid transit lines across the city to the Mississippi.

Mr. Lowry has already filed his bonds and has gone to work in earnest in both cities. In Minneapolis the poles are set on the Fourth avenue line and the Thomson Houston company has entered into a contract to equip the line for electricity by Nov. 1. This and the Grand Avenue line also being built in St. Paul are looked upon as experimental. It is proposed to give them a thorough test during the cold and snow of a Minnesota winter, and if successful, electricity will probably supercede horses on all lines other than cable power next summer.

In order to provide funds for the extensive improvements under way Mr. Lowry has filed two mortgage bonds in favor of the Farmers' Loan and Trust company, of New York City, for an aggregate sum of $1,620,000. The bonds cover the property of the Minneapolis Street Railway company and the Minneapolis, Lyndale & Minnetonka railway.

This amount covers the $1,000,000 mortgage of the street railway company, of which $400,000 in corporate bonds bears date of Nov. 1, 1880, maturing in 30 years, with privilege of paying $10,000 a year from 1890 to 1897, both inclusive, and $20,000 a year thereafter until and including the year 1909, and bear interest at 7 per cent. payable semi-annually. Six hundred thousand dollars' worth of the bonds date Nov 1, 1883, and mature in 30 years, at 6 per cent., payable semi-annually. The mortgage of the Minneapolis, Lyndale & Minnetonka railway is for $620,000, the bonds bearing date of April 1, 1887, and also maturing in thirty years, but the rate of interest is 5 per cent. per annum, payable semi-annually. The deed records that these bonds are issued for improvements now in progress and for which the roads have contracted an unsecured indebtedness—the street railway for $400,000 and the Lyndale for $180,000. The bonds are to be issued in $1,000 denomination, not exceeding 10,000 in any one issue, dated Jan. 15, 1889, and bearing interest at 6 per cent. per annum. Among other things the recorded instrument covers the amount of money to be used in making the improvements, that for single track horse street railway not to exceed $10,000 par value per mile, not including side tracks and turnouts, and that for cable lines $60,000 per mile, par value.

The question of rapid and cheap transit between Minneapolis and St. Paul has also been settled. Franchises have been secured for an electric line from First Avenue south, Minneapolis down Third street to 15th avenue south, thence to Washington avenue, across the Washington avenue bridge, down Cambridge street to University avenue, and from University avenue direct to the heart of St. Paul via the present University avenue line. The distance will be about nine miles and the fare ten cents each way with transfers in either city. The company is to pay a tax of $25 per year per car on the average number of cars operated on said line. The tax is to be paid on the first Monday in January, and is to be for the preceding year. The present fare by the short line trains between the two cities is 30 or 50 cents for the round trip.

The electric cars will make the trip in 18 minutes and will break the monopoly in rates that has been worth millions to the regular railroads. It will also help to build up the interurban district and make the two cities one. A power house is to be established at a point equi-distant between the two cities, and the contract will be given to the Thomson-Houston company. Beside the Washington, First avenue and Bloomington avenue cable lines that the Minneapolis Street Railway company built by resolution of the city council, the company has petitioned for the privilege of running a cable line from the corner of Washington and Cedar avenues to Riverside, thence to Twenty sixth avenue south, thence to Twenty-fifth or Twenty-sixth street. This was granted, as was also the privilege of building a "loop" on First avenue south, from Washington avenue to High street, thence to Hennepin avenue and thence to Washington avenue.

Six car loads of yokes and other material have already arrived, and it is the intention to put in the curves and loop this fall, leaving the main lines until spring. At the sites for the power houses all the men who can be crowded on are working day and night on the excavating. It is proposed to get the power houses enclosed before winter, and to put the ponderous engines and driving machinery in position during the cold weather.

Five hundred men are at work laying temporary tracks on Third Street north, for about two miles. These will be used in the spring, while the Washington avenue cable line is being built. Contracts have been closed for slot and girder rails for the cable lines, aggregating in weight about three thousand tons, with Johnson Company of Johnstown, Pa. The C. H. Ruddock Company of Minneapolis secured the contract for the 600,000 feet of oak lumber for the construction of the First avenue south and Washington conduits. George Poole, of Baltimore, the representative of Robert Poole & Son (Limited) Company, was a successful bidder for the machinery necessary for the actual operation of the cable. Bids for the cable lines other than those of First avenue south and Washington will not be advertised for for some time yet.

The council of North St. Paul has granted a franchise to Stone & Morton, of St. Paul, to use the streets of the village for railway purposes. They will build a line to be operated by steam or gas power, to connect with the West 7th street St. Paul cable line at its terminus. The distance of 12 miles will be made in 38 minutes for a ten cent fare.

The large cable has arrived for the Incline road at Duluth.

Bids for constructing a street car line from Broadway to the State institution for the deaf and dumb, at Omaha, have been solicited.

The contracts for the yokes and castings for the Selby avenue, St. Paul, cable line extension have been let by Col. Barr to the St. Paul foundry.

The answer of the Winona, Minn., City Railway company has been filed in the injunction proceedings brought by the minority stockholders to prevent the introduction of the proposed electric plant. The answer avers that the election held in June last was in all respects fair and legal, and that the proposed improvement is for the more efficient operation of the road.

James Clements, the Bay City, Mich., street car magnate says that his company will propel cars by electricity as soon as the change can be made.

Eighty teams are at work grading for the street car extension at Pierre, the temporary capital of South Dakota. All arrangements have been made to put in a motor power next spring, to be run by storage batteries.

The petition of the Omaha Street Railway

company to put up overhead wires on the various new electric lines projected has been granted, and work is to commence immediately. The first work will be done on Thirteenth street line, which commences at Syndicate park in South Omaha, will run north on Twentieth street to Vinton, then take in the Thirteenth and Cuming street line, running west on Cuming to Thirty-sixth street. It is the intention to have this line running by January 1. The new fair grounds electric line will probably be the next line to be built, which will start at Sixteenth and Cuming, run north one block, west two blocks and extend north on Eighteenth street to the fair grounds. The Farnam street line, which will also be an electric line, will extend west on Farnam to Spring street, instead of Lowe avenue, as first projected, as the latter thoroughfare will not make as solid a road for trackage as is desired. Work will be carried on all winter on these lines, and employment will be given to a large force of laborers.

Wm. Wharton, Jr., & Co. (Limited), of Philadelphia have contracted to furnish 12,000 feet of track, curves, switches, etc, for the Dubuque, Iowa, street railway.

The young city of Spokane Falls, Washington, has over 13 miles of street railways, operated by cable, electric, horse and steam power.

The Omaha motor company has completed its double track from Twelfth and Howard, east to Eleventh, and south on Eleventh over the viaduct to Vinton street. The motor company will, within the next two months, have a through line from Fort Omaha to the South Omaha stock yards.

When the Eleventh street line is completed the Walnut Hill cars will be run across the Eleventh street viaduct, south to Vinton and back to Walnut Hill. Superintendent McConnell of the motor company has received instructions to arrange for the transfer of all passengers from one line to another as they may desire.

The proposed substitution of electricity for other power at Winona, Minn., will cost $30,000. The Thomson-Houston proposition was on a basis of 19,370 feet of street with single track, 800 feet of street with double track, making a total of 20,170 feet of track, not including side track. It will furnish 8 car-tracks complete, fully equipped with electric motors, etc., for $20,000; generators and station equipments for $5,500; total, $25,500 The Sprague Electric Equipment company will furnish a very complete equipment for $29,850 and will supervise the operation of the road until the system is in complete working order from the time the first car is started.

The Sioux City, Iowa, cable line company has received an invoice of cars from St. Louis. These will swell the rolling stock of the line to 22 cars.

The Selby avenue cable line extension at St. Paul cost the property owners a bonus of $100,000, but it is well worth the expenditure. Taxable property will be increased several millions in value.

The Highland Improvement company of Duluth has obtained possession of 1,200 acres and 100 lots in Third Division of Duluth and will build an incline plane cable road. The tracks will be elevated above Seventh avenue, except at Fourth street, where there will be a station on ground level. The cars to be used will be large enough to hold two heavily loaded wagons, or street cars with horses, besides accommodation for foot passengers. They will be something in the form of a right angled triangle, with its hypothenuse the bottom on the track and its base a flat surface for the passengers. This will be run by two wire cables attached to drums, while a third cable will pass under it and to another car. There is no wear on the cable by grips, slipping or otherwise, there is no trouble from frost, and the method is the safest known. The road will run from Superior street to the top of the hill, connecting at each end and at Fourth street with street car lines to the various parts of the city and to the country back. The incorporators of the company are: Marcus Simpson and E. S. Huston, Burlington, Ia.; John A. Willard, Mankato; James Barton, Superior; and A. W. Bradley, E. L. Bradley, John H. Harris, Charles M. Gray, George A. Elder, Albert S. Chase, Charles E. Shannon, W. K. Rogers, C. Markell and H. W. Coffin, of Duluth. The directors are Messrs. Harris, Rogers, A. W. Bradley, Shannon, Markell, Chase, Bardon, Simpson and Willard. Besides the incorporators a number of Duluthians are stockholders in the concern, among them G. G. Hartley, B. R. Randall and A. S. Walker. Capital stock is fixed at $2,000,000, of which a large share is already paid in, and the limit of indebtedness is $1,000,000.

The present stables of the company will be changed to a power-house, in which will be two 80-horse-power engines.

Two of the cars formerly used by the Butte, Mont., Street Railway company are being overhauled at the Montana Union shops for A. B. Hammonds, who intends to use them at Missoula.

Aberdeen, South Dakota, is to have a street railway line.

At a recent meeting of the council in Kansas City, Kan., an ordinance was introduced granting to A. Mardis and Norton Thayer a franchise to construct and operate a single or double track electric, cable or steam motor street railway in Armourdale. The route of the proposed line is as follows: Beginning at the Argentine boulevard and Miami avenue, east to St. Paul street, north to Osage avenue, east to the Kaw river. The provisions of the franchise compel the company to accept it within sixty days and begin work within six months thereafter. The line is to be completed within two years.

The first three miles of the Yankton, South Dakota, street railway have been built, and it is probable that no more track will be laid this fall.

Mr. J. W. Howard, superintendent of the Davenport, Iowa, street railway when operated by horse power, is authority for the statement that the street car business in Davenport during the last year, or since electricity was substituted for horse power, has increased just eighty per cent. the line covering the same territory as heretofore.

The Sioux City, Iowa, city council will grant no more street car franchises that propose to use animal power, within the limit bounded by Centre street on the west, Division street on the east, and Eighteenth street on the north. It must be either electricity or cable power.

The Stillwater, Minn., Street Car company is selling 100 tickets for $4 or twelve for 50 cents.

Cedar Falls, Iowa, is agitating for an electric line to Waterloo, its down-river neighbor.

The Sioux City, Iowa, Cable Line company has practically decided to begin an extension of the track east on Twenty-ninth street from Jackson to Court street, as early in the spring as the ground will permit. Extensions on Court street will be south to Third and north to Thirty-ninth, where a connection will be made with the line now being built on Jackson north of Twenty-ninth. The north Jackson extension is being pushed as rapidly as possible and the winding drums and other machinery necessary for its operation are being put in place. The company originally planned to build fifty miles as a system, and the favor with which the established portion has been received has caused them to hasten somewhat the completion of the system

The power for a Spokane Falls, Wash, cable line is water, and it is not in the stock.

The Omaha Motor Railway company now issues transfer checks to all parts of its lines To prevent parsimonious patrons from getting two rides for a nickel, different colored checks are used for the forenoon and afternoon.

Sioux City is to build an elevated road. It will begin the ascent from the present terminus of the Rapid Transit line on Leech street, and be built north to the intersection of Third street, where it will turn west and be constructed to the intersection of Third and Jackson streets, to connect with the cable line. This much of the road is assured, and plans for its extension to other points at an early day are under consideration.

The $700,000 additional capital will be used in constructing the electric road between Duluth and West Duluth, the line on Fourth street already ordered, lines at the East End and a cable road a long distance up Lake avenue from the canal.

The material is on the ground at Yankton, South Dakota, for a street car line on Douglas avenue from Third street to the northern city limits.

A damage suit for $30,000 against the Butte Street Railroad company has been filed in the district court by Wm. Verran, brother of Samuel Verran, who was killed by a motor on the fourth day of last July.

M. H. Keefe, of Helena, Mont., in one day after the ordinance was passed had a gang of men at work putting down a street car line on Broadway.

The new street car and omnibus factory of Robinson & Moan, the erection of which was begun several weeks ago at Parker's station, in North Minneapolis, is progressing finely. The main building—300 by 60 feet—is up two stories and about ready for the roof. An order for two omnibuses was received several days ago and a bid has been made for building 20 street cars for Milwaukee. Five hundred men will be employed.

The Minneapolis herdic line, started soon after the street car strike, has not paid expenses during any month except September. A chattel mortgage has been placed on the vehicles.

Bids are to be let for the grading of five more miles of street car track at Pierre, South Dakota. The material for construction has commenced to arrive and will soon all be on the ground. The entire five miles will be constructed and in operation this fall.

The Duluth, Minn., Street Railway company has filed with the register of deeds amended articles of incorporation, by which it increases its capital stock from $300,000 to $1,000,000.

Five years ago the Kansas City street railways carried less than 15,000 passengers per day, and the receipts were less than $275,000 per annum. Now they carry 125,000 passengers per day, and receipts are over $2,000,000 per annum.

The Mankato, Minn., Street Railway company have ordered an open car to seat 40 passengers.

Madison, Dakota, is building a street car line to the lake, which is becoming a popular summer resort.

I. C. U.

Street Car Gear for Modern Speeds—The Coming Self-Propelled Car.

Students of current industries, familiar with the beginnings of invention and enterprise as well as with their business control and direction, lack faith in some of the popular superstitions.

They often meet, for instance, the manufacturer, who is too busy in the details of his business to learn its principles,—who has not time to read technical journals, or reports of society proceedings and experiments in his specialty. While perhaps, specifically intelligent, he is in a general sense ignorant; and is the veriest slave to the moss-grown usage of his business instead of holding the princely control and leadership thereof with which the reportorial obituaries will endow him.

This case is even more frequent in the mechanical management of some of our greatest concerns and industries than in that of their commercial and social, or labor departments. The descendants of the youth who carried the grist to mill in one end of the bag, balanced by a stone in the other end, — "because grandsire did so"— have increased to the point of overflowing from theology, law, and medicine into mechanics — with special tendency to railroading in some form. The most frequent expression of the master mechanic of one of our great transcontinental railroads, during a visit of inspection by the writer some years ago was,—"We adopted that device in the airly days, sorr,— and we've nivver changed it!"

A like slavish adherence to precedent and deference to reputation, seem to be co-operating with the ignorance too common among inventors and company officials — and perhaps with the natural conservatism of manufacturers,— to produce some street railway practice curiously similar, and causelessly parallel to that of the larger railroads in which the parallel rods and counter balances of the modern locomotive embody the ideal of mechanism. One of our leading electrical companies recently had for a motto,—"No inventors need apply"; and an employee's suggestion for a much needed improvement was rewarded by a sarcastic rebuke, and threat of discharge.

During the writer's residence in an interior Mexican state capital of some thirty thousand inhabitants, a native street railway company was

organized and road built (3-ft. gauge). The cars came by wagon from the railroad station nearly two hundred miles distant,—at a total cost for freight of about five cents per pound. They bore the mark of perhaps the best known maker in the world,—whose reputation seemed to have made unnecessary such old formalities as shop inspection before shipment. They had apparently been hastily altered from a wider gauge by the simple means of pressing the wheels closer together on the axles, which were of the "cold rolled" type,—without moving in the sills or journal boxes. This method left some ten inches clear axles outside of wheel hub at each end and between that support and the bearing which was to carry the load,—say three or four times in excess of good practice! The writer's suggestion, to cut off the axles and move the sills and journals in to correspond with the narrow gauge, was met with a child-like trust in the manufacturing "house" and the fear of lessening the stability of the cars by thus narrowing their support! The (Mexican) foreman went so far as to say he had himself seen a railroad (Mexican Central) and its entire equipment was of this identical construction.

I need scarcely add that those axles "cranked" to a permanent set on the first ensuing holiday or that a sorry lot of wheeled imitations of crippled cattle are to this day sustaining the reputation of the "house" in that vicinity.

The science of the Mexican foreman is equaled in the recent advertisement in a great technical journal,—descriptive of a device for adding to the longitudinal stability (decreasing the "rocking motion") of a street car *without* increasing its "wheel base," or distance between axles,—which plan is mentioned only to be avoided by the genius of this inventor as impracticable! A brief inspection of the simplest diagram of the "angle of stability" would evidently be a revelation to this expert; and in view of their respective opportunities, the Mexican seems the best informed. Since the angle of stability must have for its apex the center of gravity of the load and for its base the distance between the wheel contacts which furnish the ultimate supports of that load, it is not an exhausting effort of the intellect to perceive that all devices which fail to lower the center of gravity *or* increase the distance between wheel contacts (laterally or longitudinally as the case may be), are useless.

The present increase in street railway construction has greatly increased the percentage of uninformed buyers and made a harvest for all and every class of builders of street cars, who have with one accord exhausted their resources upon the car bodies, which are "seen of all men." Thus we find that the two best out of three leading street car gears are made by concerns which do not build cars. Now the gear *is* the car,—as the legs and feet are the *horse;* and its neglect by manufacturers is emphasized by the severe requirements of modern speed and mileage,—doubling and trebling former practice as they do,—a daily mileage per car of one hundred and fifty miles and more, at a rate of ten to fifteen miles per hour being already common.

These points are especially marked in electric railway service where variations in speed are not only excessive, compared with horses or cable, but the problem is often that of *self-propulsion.* The rigidity of old gear constructions, for instance, is almost prohibitory of "self-propulsion." Those managers of electric "systems" whose worship of the subtle fluid did not entirely dwarf their estimate of the mechanical problems involved, have attained their brightest success by discriminating adaptation of devices long tried and proven on the larger railroads and it is in this direction that we look for future progress.

Though not in the scope of this paper, the permanent way is so closely related to the rolling stock that improvement in the last pre-supposes change in the first; and it is noted in passing that general recognition is already given by equipping companies and their patrons to the need of heavier rails, of stiffer section, better alignment and surface, etc., also that the best practice dictates grooved rails on all curves and the elevation of the outer rail wherever allowed by grade of street. The utility of the last, for street-car speeds, was gravely questioned by a conservative engineer of an electrical company, but he has been unable to obtain any suspension of the forces of gravitation and momentum in support of his objection, or his derailed cars.

With a fit road bed, the remedy for most of the discomforts due to faulty rolling stock is so simple and easy that the public will demand it as fast as informed. Allowing that the usual diameter of wheels and height of springs are to remain unchanged, we have only to place the supports further apart (lengthen the wheel base) and the rocking or "gallop," on undulating track, also the swaying or "wag," on leaving or entering curves, disappear together if the gear is of the suspension or other flexible type. Without desire to provoke discussion from any one who holds to the impracticability of this plan, I note that for cars longer than 20 feet, probably the best way to reach this end is that already adopted by some cable and electric roads, of using two four wheel pivoted trucks under each end of the car, a close imitation of railroad practice. For short cars up to 18 feet, however, two axles and four wheels will continue to be the maximum, and is to this class which we are here limited. By the adaptation of the suspension or other systems long "standard," in railroad service the wheel base of ordinary four wheeled street cars may readily be increased 50 or 60 per cent over present practice, with all the corresponding good results and *without* encountering even the smallest dragon of "impracticability" so much dreaded. Not only so, but traction on curves can thus be lightened instead of increased, so great is the resistance of the rectangular rigidity of old style gear. It is a fact, that cars of 9 feet wheel base have been running successfully for ten years on both horse and cable roads, on curves as sharp as 35 feet radius and with unapproached economy of power and lubricant, and unexcelled comfort, and ease of riding. The writer knows of one case where such trucks (four wheeled) are carrying 30 feet cars through curves of 45 feet radius, but considers this an evident case for 8 wheels, as it is safe to say that no car can ride easily with two or three times as much of its load and length *outside* of, as that *between* wheel supports. Indeed he would make the rule that at least as much of the car length must be between as that outside of supports, *i. e.*, only one fourth of the entire length must be allowed to project at each end, over and past the axles. Thus a better distribution of load on bearings would be secured and neither axle would have the whole load to carry, with risk of breaking springs or wheels. A glance at the Thielsen or other suspension trucks of the ordinary passenger coach and many freight lines will show how much the suspension principle of construction must reduce flange wear and resistance. Other methods for securing flexibility are not wanting, but present limits do not permit description of them.

With sufficiently flexible gear and independent wheels it is believed that present wheel base practice (6 feet maximum), can be more than doubled and lighter draft on curves secured. Independent wheels need not be of the "loose" type common in mines, etc., but may entirely avoid the many faults of that construction. There are many practicable forms of them which have stood severe tests in railroad service, and only failed of introduction by reason of devotion to standards and precedents and the exigencies of the "car-exchange" system and various other limitations from which street car service is and should be free.

More powerful brakes are necessary for the heavier and faster running cars of the power systems. The efficiency of the track brake has been demonstrated for years on the Pacific coast and only an attempt to dodge the patent office by use of wooden, instead of iron shoes, has delayed their adoption here. With them the greatest economy of wheels is secured. They should be applied by power, however. This is accomplished in a western electric system by the use of compressed air maintained by a pump geared to the axles. The car momentum may be conveniently used for the same purpose.

From even this superficial consideration of the subject its extent and importance are apparent with the fact that there are many good points in the application of power to street car propulsion which are omitted in each of the systems now before the public. An electric system chosen and adapted from these and railroad practice, would, if practicable under present commercial and legal conditions,—probably cover the ground better. A modern system, for instance, which is confessedly imperfect in many points, excels all others I have seen in one particular,—that of attachment to axles. This is on the differential principle, and admits not only of several changes in relative speed and "purchase" between motor and axles, but of entire disconnection on down grades to rest the motor. A friction gear was used so as to give the desired changes by the movement of the operating lever.

The coming street car will probably comprise flexible gear with long wheel base, independent wheels on (preferably) tubular axles and power track brakes. Its motors will be differentially connected. It will not only excel old practice in ease of riding and comfort, but will double the life of wheels with great economy in track, truck and motor repairs as well as in power, lubricant, etc. This and more at schedule speeds of ten to twenty miles per hour and without sacrifice of safety,—is now in sight. The public taste and demand will become more exacting as the horse car recedes from view, and managers will more and more appreciate the fact that only the best is cheap when bidding for the good-will and patronage of intelligent people

Married.

Mr. Wm. Hazelton, of Philadelphia, was married on December 3d, to Miss Frances Lodge Stadelman, of Bala, Pa. The wedding took place at St. Asaph's Church, in Bala, and was largely attended, a great number of friends of the bride and groom traveling a considerable distance to witness the ceremony. The presents were very numerous, many of them being of a most beautiful description.

It gives us sincere pleasure to offer our hearty congratulations to Mr. Hazelton, and THE GAZETTE, in extending its best wishes to the newly married couple, trusts that their lives may prove one long and joyous honeymoon.

Business Notes.

The American Car & Equipment Co., who advertise second hand street railway cars quite extensively, originally purchased 100 of these cars and immediately put a large force of men at work, to paint, repair and put the cars in order, and in condition for all purposes of use equal to new.

The deliveries that have been made to various purchasers have proven to them entirely satisfactory. In some instances this business has been carried out on the "Car Trust Plan," which plan is, a payment of a small amount in cash at the time of delivery of the equipment and the balance extending over a time, payable monthly, which costs the company employing the cars about 33⅓ cents per day. In other words, it is put on a basis that will allow any street car company, no matter how poor, to purchase cars from the American Car & Equipment Co. and have them earn their own living, the charge fixed by this company being at such an exceedingly low rate. The following companies have purchased cars of the lot advertised and pronounced themselves as thoroughly released with their purchase: Court St. & East End, Binghamton, N. Y.; A. D. Barber, Utica, N. Y; North Side St. Ry. Co., Fort Worth, Tex.; Park City St. Ry., Parkersburg, W. Va.; Wilmington St. Ry., Wilmington, N. C.; H. C. Higgins, Neenah, Wis.; N. L. Osborn, Binghamton, N. Y; Fremont St. Ry., Fremont, O.; Corsicana St. Ry. Co., Corsicana, Tex.; Spokane St. Ry., Spokane Falls, Wash. Ter.; Met. St. Ry., Portland, Ore.

The Pond Engineering Co. will furnish and erect a two hundred-horse power compound condensing, Armington & Sims engine, at the New Omaha Thomson-Houston company's station, in Omaha, Neb. Rope transmission will be used.

It is now furnishing the Missouri Pacific railway with a vertical submerged flue boiler, the Shotwell Mining Co. with a large Blake mining pump, and the Gay Building, St. Louis, Mo., with a one hundred-horse power heater. They have the contract for a complete eighty-horse power

plant to be erected in Murphysboro, Ill. The plant includes, Armington & Sims engine, boiler, heater, pump, etc, all turned over under steam.

It will also furnish and erect a complete steam plant of seventy-five-horse power, for Murphysboro, Ill. They have shipped a one hundred and fifty-horse power, Armington & Sims engine to the Edison Electric Illuminating company of New Orleans, making the sixth engine furnished them.

Also a fifty-horse power boiler for the ice factory at Corpus Christi, Tex., an automatic feed pump and receiver in Kansas City, and leather link belt to the Holden, Mo., Electric Plant, and the St. Louis Smelting & Refining company.

It will also furnish the Vancouver Electric Street Railway company, of Vancouver, B. C., with two one hundred-horse power, Armington & Sims engines, and the Electric Light company of Dixon, Ill., with one engine of the same power.

It recently shipped four eighty-horse power boilers, two boiler feed pumps, and two Blake condensers to Mexico, and will furnish and erect a fifty-horse power, Armington & Sims engine for the Holden, Mo., Water Works company. The Pond Engineering company is selling a number of small vertical boilers throughout the Southwest, and will erect one in the car-house of the Peoples' Cable railway of St. Louis.

During December local companies have been formed in the following states to operate the patents owned by the Judson Pneumatic Street Railway Co., viz: New York, Pennsylvania, Indiana, Missouri, Nebraska, and also a company headed by Mr. R. W. Chapin, president of the Ingersoll-Sergeant Rock Drill Co., of New York has been organized with a capital of $500,000, to operate the Judson patents as applicable to mining tramways. The Judson company by action of its board of directors has withdrawn all further territory from sale until after the completion of the line which the company is building in Washington, D. C.

The J. G. Brill Company, of Philadelphia, sends us a very handsome catalogue of electric, cable, suburban and other cars built by them, as also of electric and cable trucks. No less than 74 illustrations adorn its 151 pages. Every kind of car is fully shown and described — cable motor cars, suburban double-deck open excursion cars, baggage and passenger cars, cars for steam railway service, baggage cars, combinaion cars, cars built for California, for South America, for all over the United States, etc. Snow brooms, plows, etc., are also shown and described, and the catalogue, which is bound in black flexible leather, with gilt lettering, is about the handsomest one of its kind that we have ever seen. It is an ornament to any desk, and a valuable aid to any contemplating the purchase of cars for any purpose.

Messrs. Pierce & Thomas, Constructing Engineers and Agents, 42 Cortlandt Street, New York, will gladly furnish full information relative to the engine illustrated and described on front page of this issue and will furnish estimates for engines and boilers, or for complete steam plants, large or small.

Personals.

Dr. W. L. Allen, secretary of the Western Electric Railway Association, favored the GAZETTE office with a call during this month.

Mr. J. L. Barclay, of the Sprague Electric Equipment Co., of Chicago, recently returned from New York, where he made a contract for a mild attack of "La Grippe"—a contract which he has now carried out.

Mr. Charles Cleminshaw, president Troy & Lansingburgh R. R. Co., was met in New York early in the month.

Mr. Wm. Hazelton and his charming bride were in Pittsburgh, Pa., a week or two ago.

Mr. Charles A. Benton, of New York, recently made a flying trip to Rochester, etc., in the interests of his company (Sprague). As a judge of horse flesh and "caninity," few men can equal Mr. Benton, while his knowledge of the intricacies of the electric railway business and his versatility will undoubtedly carry him, before very long, up to the head of his adopted profession.

Mr. and Mrs. W. A. Stadelman, and Mr. and Mrs A. H. Chadbourne, were in Reading, Pa., early in the month.

Mr. Bernard H. Schmidt, western selling agent of the J. G. Brill Co., is away from his headquarters in Chicago on a business trip.

Mr. Frank J. Sprague was down South early in the month.

Mr. Wm Bracken, managing director of the Julien Electric Traction Company, was met in Philadelphia a week or two ago.

Col. Thomas Lowry returned from Europe and was met "down the street" in New York early in December.

Mr. E. Peckham, of the Peckham Car Wheel Co., New York, recently made a flying trip to Syracuse.

Mr. J. N. Pratt, treasurer and general manager of the Jarvis Engineering Co., of Boston, was recently a guest at the Tremont House, Chicago.

C. B. Fairchild, of New York, favored us with a call since our last issue.

Mr. Higgins, of Buffalo and Albany, was recently met in New York.

Mr. Delamater, of the John Stephenson Co., was quite sick early in the month, but has now fully recovered.

Mr. Edwin S. Thayer, treasurer of Steam Storage Power company, of Boston, has been on a western trip, and registered at the Hotel Florence, Pullman, Ills.

Unique Business Calendar.

The most convenient, valuable, and unique business calendar, for 1890, is in the Columbia Bicycle Calendar and Stand, issued by the Pope Mfg. Co., of Boston, Mass. It is in the form of a pad of 366 leaves, 5⅛x2¾ in., one for each day of the year, and one for the entire year. A good portion of each leaf is blank for memoranda. The leaves are sewed at the end, enabling one to turn to any leaf desired, and by an ingenious device the leaves tear off independently, leaving no stub. The portable stand, which holds the pad, contains pen rack and pencil holder, and is made of solid wood, brass mounted. Upon each slip appear quotations pertaining to cycling and typewriting, and although this is the fifth year of the calendar, the quotations are fresh and new, containing an amount of information, which, if placed in book type, would make a fair-sized volume.

Street Transit and the World's Fair.

In the *N. Y. World* (weekly) of November 20, appeared the following:

"The greatest drawback to the success of the Paris Exposition was the lack of transit conveniences The great mass of the visitors were thrown upon the mercy of the cabmen, and were ruthlessly fleeced. Evidently such a state of affairs must not recur here in 1892. There is only one way to avoid the trouble. To build another elevated road is impossible in the time intervening, and the existing lines will afford no relief, as they are at present worked beyond their capacity. Evidently the remedy will be to grant temporary surface-car franchises on streets that admit of the laying of additional tracks. In addition, the existing companies will be able to largely increase their rolling stock. It is a comfort to think that New York will have no difficulty in building the additional cars required, for this city is the very centre and originator of the industry.

"Not a great many years ago no one ever spoke of a horse car without calling it stuffy. Who ever hears of 'those stuffy cars' now. The phrase is dead and drifted over. Broad windows of plate-glass, interiors richly carved in handsome woods. upholstery in perfect taste, jarless springs, comfortable seats, signal bell pulls for passengers' use, all combine to make a trip in a street-car a pleasure instead of the horror it formerly was. How smoothly the cars roll over the rails, how snugly the cushions fit into the curves of one's body, resting every part of it, but still yielding with any unusual motion. And when you rise to go out you walk as fearlessly and firmly as if on the sidewalk, instead of feeling as though you were at sea in a storm, wondering what would strike you next.

"But there was a time when cars were not light and roomy, but narrow and gloomy; when to ride in them was to be stifled for air, to be shaken up as much as in a buckboard drive over a corduroy road. That time was not so long ago, either. How grateful we would be for the change if we only stopped to reflect. We should revere the author of these additions to our comforts as a public benefactor. How many know even who he is? Yet this is knowledge easy of attainment. Next time you enter a car that strikes you as being particularly luxurious and handsome look up over the door and you will see that the builders are the John Stephenson company, Limited Mr. Stephenson is the man who has evolved the palace street car out of the old, dingy, noisy, stuffy, altogether comfortless abomination which is associated in our minds with our first impressions of the street-car.

"A wealth of inventiveness and ingenuity has been lavished on the evolution by this man who guided it. As far back as 1878 the jury of judges who awarded him the great gold medal at the Paris Exposition of that date for his exhibits of street-cars conceded his manufactures to have the following advantages over those of all competitors: 1. The door of small cars operated by the driver; 2, reflector above the face of the driver, showing movements of passengers; 3, system of signal bells allowing seated passengers to communicate with the driver; 4, powerful brakes, stopping the car quickly, without agitation; 5, life-guards before the wheels to prevent any person or large substance falling under them; 6, system of springs and India-rubber insulators, affording the ease of motion; 7, construction and ornamentation, combining elegance, economy and durability.

"Since then the improvements made have still kept this company well at the head of the trade. They not only supply the rolling stock for all the best-equipped lines in the United States, they also do an immense export trade. It is impossible to visit a large city anywhere in the world without coming across one of their cars Foreign makers have copied their work, but faster than they have done so the Stephenson company, inspired by their founder, have come out with new improvements protecting these by patents, where possible, and still maintaining their great lead. Horses are giving away to cables and electricity, but the Stephenson company still builds the cars best adapted to the new modes of traction and most attractive and comfortable to passengers. The green bay tree does not begin to flourish alongside of the Stephenson company.'