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JANUARY TO DECEMBER 1901

[INCLUSIVE]

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, EDITOR

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RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

A Monthly Railway Journal.

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

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WALTER D. CROSMAN, Editor.

ALLEN R. COSGROVE, Manager.

Vol. XXV. CHICAGO, JANUARY, 1901. No. 1.

THE UNDERSIGNED wishes to state that he has severed his connection with The Railway Review and purchased outright from the Railway List Co. the Railway Master Mechanic, and that this property is now entirely independent of any connection whatever with any other railway publication.

Associated now with the undersigned in the conduct of the Railway Master Mechanic are: Mr. Walter D. Crosman, who has been its editor during practically its entire existence, and who will continue as manager of its editorial department; and Mr. Allen R. Cosgrove, formerly with the Railroad Gazette and for the past year with the Railway Review, and manager of the advertising department of The Contractor, and who will be manager of the advertising department of the Railway Master Mechanic.

The Railway Master Mechanic, under its new ownership, will take important steps to prove anew its worth as a monthly compendium of all that is of interest to the mechanical officials of our railways.

BRUCE V. CRANDALL.

THE DRAFT GEAR QUESTION—than which there are few more important—is to be taken up by the Master Car Builders' Association, and pushed to a finish. We understand that the association, through its executive committee, will provide funds for adequate tests of draft gears and that it has arranged with Mr. R. H. Soule to conduct these tests. This will be a good work, happily placed in apt hands.

IT IS RARELY that a paper is presented before any association that possesses the *practical* value that attaches to that given by Mr. H. H. Harvey to the Car Foremen's Association of Chicago at its last meeting. This paper is given in full elsewhere in this issue. The methods described of handling triple valve repairs have these distinct values—that they are the successful every day methods of one of our largest railway systems, that they produce fine results, that they permit (with all their thoroughness) of the perfect handling today, by one man, centrally located, of all the triple valve work formerly poorly (by comparison) done by five men who were scattered over the yards.

THE ILLINOIS CENTRAL RAILROAD has just turned out, at its Burnside, Ill., shops, a model 80,000-lbs. capacity box car. This car is pronounced, by several experts who have viewed it, a thoroughly modern car. The Illinois Central standard features for a car of this capacity are followed in general, but various details are strengthened, and in addition there are introduced some new features which are of decided interest. The general dimensions, etc., are Illinois Central standards strengthened in many details. The special features we will illustrate in a later issue. These new features are the designs of Mr. Joseph Buker, assistant superintendent of machinery of the Illinois Central. The end framing is novel and in the carlin design an innovation has been made which, while affording a surplus of strength, allows an increase of lading. Throughout the car are used the malleable iron post sockets, designed some time ago by Mr. Buker. These permit a construction which eliminates the greater part of the troubles encountered with the old designs of such connections. In a later issue we will give detail drawings of these new features, the original drawings not being available at this writing.

THE UNIVERSITY OF ILLINOIS dynamometer car on the Big Four R. R. is now doing work on the division between Indianapolis and Springfield, O. It is in charge of Mr. E. C. Schmidt and three or four students of the mechanical engineering department. Mr. Schmidt is now completing some water station tests on the eastern division, a work started some time ago, and which, when completed, will be of great benefit to the management of the road.

TRAIN TAKES ITS OWN PICTURE.—After repeated failures to secure a satisfactory negative of a train in motion, Ayrault Green, an expert Chicago photographer, recently made the Burlington's Denver Flyer take its own picture. This he accomplished by an electric switch which when connected with the rail closes the circuit as soon as it is struck by the engine. The switch communicates with a set of dry cells, and thence to a shutter release. When the successful test was made, the switch was put in place about six feet behind the spot where it was calculated that the front of the engine would appear when the shutter was released. When the engine struck the switch it closed the circuit, the high-speed shutter moved, and the picture was correctly registered on the center of the plate.

THE CONVENTIONS are to be held again at Saratoga—to the satisfaction of practically everybody concerned. The time to be occupied has been wisely lengthened. The master mechanics meet on Wednesday, June 19, and the Master Car Builders on Monday, June 24, meaning a fairer apportionment of time for the Master Mechanics.

The First Time Card on the Northern Pacific.

THROUGH the courtesy of Mr. Henry W Foster, of Aurora, Ill., who took, as conductor, the second regular train out on the Northern Pacific in 1871, running from Pacific Junction, near Duluth, to Brainerd Minn., we are enabled to give a fac simile of the time card that he first worked under on that road. Mr. Foster has long cherished this time card with a pardonable pride and interest. We exhibited this card to Mr. Geo. W. Cushing who was in charge of the mechanical department of the road at that time, as superintendent of machinery, and who also held the same position on the Lake Superior & Mississippi (St. Paul & Duluth) and the St. Paul Pacific, now a part of the Great Northern out of St. Paul. Mr. Cushing kindly gives us the following reminiscent notes concerning those early days, as follows:

The Early Days on the Northern Pacific

BY MR. GEO. W. CUSHING.

The copy of the first time table of the Northern Pacific road which is handed to me for examination, is recognized as one of a number which were written out by Mr. C. T. Hobart, the superintendent in charge, and issued, I believe, to train and track men only, it being preliminary to the printing of a regular up-to-date table, with such changes as its use might suggest. The writer, at the time, was in charge of the road's machinery department, hence knew about these matters.

Northern Pacific Rail Road

Temporary Time Table takes effect Augst 25th 1871 at 12 o'clock noon,

For train men only.

Trains going West No 1			Stations	Trains going East			No 2
6.30 P.M	0	0	Junction	10	113		1.50
7.15	10	10	Swains	12	104		1.06
8.20	12	22	Island Lake	1	92		12.09
8.25	1	23	Morrison & McRae's	9	91		12.05 A.M.
9.10	9	32	Picotts	6	82		11.20
9.40	6	38	Sandy River Tank	8	76		10.50
1020	8	46	McGregor	6	68		1010 [illegible]
10.55	6	52	Rice River	12	62		9.40
11.50	12	64	Mud River	14	50		8.50
1.07 A.M	14	78	Boarding Car Switch	14	36		7.40
2.11	14	92	Brainerd	21	21	Dep Arr	6.30 P.M. 5.53
3.56	21	113	Crow Wing River	0	0		4.25 A.M.

Rules and Regulations

No 1. The Clock in the Telegraph Office at Brainerd is the time by which trains will be run. Conductors & Engineers will compare their time daily, when practicable.

No 2. West bound trains will have the right of Way over East bound trains until said West bound trains are 25 minutes late, after which time West bound trains will keep entirely out of the Way of East bound trains, East bound trains will wait at meeting point until West bound trains are 30 minutes late, they will then proceed running 30 minutes behind Card time until expected train is met & passed,

No 3. Trains No 1 and 2 will lose all right of road after 6.30 in A.M. After which time they will become irregular & run avoiding all gravel & wood trains, Gravel & wood trains will keep entirely out of the Way of regular trains from 6.30 P.M until 6.30 in A.M. between these hours they will use main line regardless of all regular trains

No 4. No Construction or freight trains will be allowed to run over any portion of the road at a higher rate of speed than 12 miles per hour & will not exceed 6 miles per hour over any trestle Work or bridge

No 5. Engineers & Conductors of regular trains will keep themselves well informed of the exact ground on which gravel trains are at work and will approach all side tracks with great care & know that Switches are set for main line before attempting to pass.

No 6. Engineers of gravel trains will not Change their regular Working ground without written orders from the Train Dispatchers Office in Brainerd

No 7. When any train is following another train as an Extra train or Section, they will keep at least 10 minutes behind the preceding train & will approach all wood yards Water stations with great care,

No 8. Engineers will Exercise great care in handling their trains over Sunken banks high culverts & at points where the track is thrown out of line,

No 9. Engineers must close dampers to their ashpans while engines is crossing bridges & passing wood yards or where there is a large quantity of wood piled

No 10. Engineers will not start with their trains until directed so to do by the Conductor.

No 11. Conductors & Engineers will be at their trains at least 30 minutes before the schedule time for starting, Conductors will look over their trains & see that they are in good order & should any cars become disabled & set on siding ~~Conductor~~ will immediately report the case to Brainerd Office.

No 12. In any case of doubt as to the right of road or safety in proceeding from any cause adopt the safe course,

Night Signals

A light swung over the head is a signal to go ahead, when swung across or at right angles with the track is a signal to back up, & when moved up & down is a signal to stop

August 25th 1871

C T Hobart

Up to the date of issuing this first table, the construction and material trains had been handled by special orders, and such rules as then governed the construction train practice of roads. Passengers were taken on train cabooses on certain of the material trains, while later passenger cars were attached thereto. This business, however, became too important to be well cared for in this manner, and with the arrival of suitable equipment a regular passenger and freight service, and straight passenger trains, as indicated, were established, thus marking the time of regular train service, on that road.

There were no specially interesting or exciting incidents in this service worth relating—what was common to other Minnesota roads was experienced and train service was quite free of accidents; indicating careful train management and good train men.

The line was, from necessity, located through eastern Minnesota, a region where tamarac swamps were very numerous, and which had either to be avoided or overcome by the engineering forces. On occasions, however, swamp pockets developed beneath the road bed, with the passing of trains over them, causing a loss of time by the disappearance of roadbed and track in them. These sinks were anticipated by the engineering force, and carefully guarded against, hence no very serious loss ever resulted. One instance of this kind, however, is recalled as occurring soon after the date of this time card, the occasion being that of a visit of non-resident managers, directors, etc., who passed special over the road to a point west of Brainerd, where they camped for a time in business session. This, for the time and place, was quite a swell affair and the first of its kind for that region. The return trip of this party to Duluth was halted midway east of Brainerd, by one of these sink holes in which roadbed, track and some cars of iron from a passing material train went out of sight, temporarily. In this instance it was necessary to construct a new line around the swamp, and to locate it crossing a ravine, or dry sink hole, 10 feet or less deep. The guests meanwhile had crossed over afoot, apparently satisfied to wait on the safe side several hours.

By snowfall a new printed card was in operation, and regular train service well established; and with all swamp troubles eliminated by the advent of Jack Frost.

The first winter's operation with trains was made difficult by reason of very severe storms and low temperature, even for that locality. All the Minnesota roads suffered about equally. The new line was, of course, the least prepared, and its machinery department was kept busy with all available resources at St. Paul, in the construction and supply of snow appliances, plows and machinery. Snow service resulted in frequent damage to engines, snow plows, etc. The engines were very light, as was demanded by the track location, and several of them were, at times, coupled together, to give necessary speed and power to buck through snow banks and haul trains. There was very little let up to this business during the winter; but the road was practically kept open, to the limit of the time table. The line west of there was in the hands of engineers. In these operations the best known appliances and tools were used and very successfully handled by the employes, who rendered willing service, at times when hardship and exposure was anticipated and experienced.

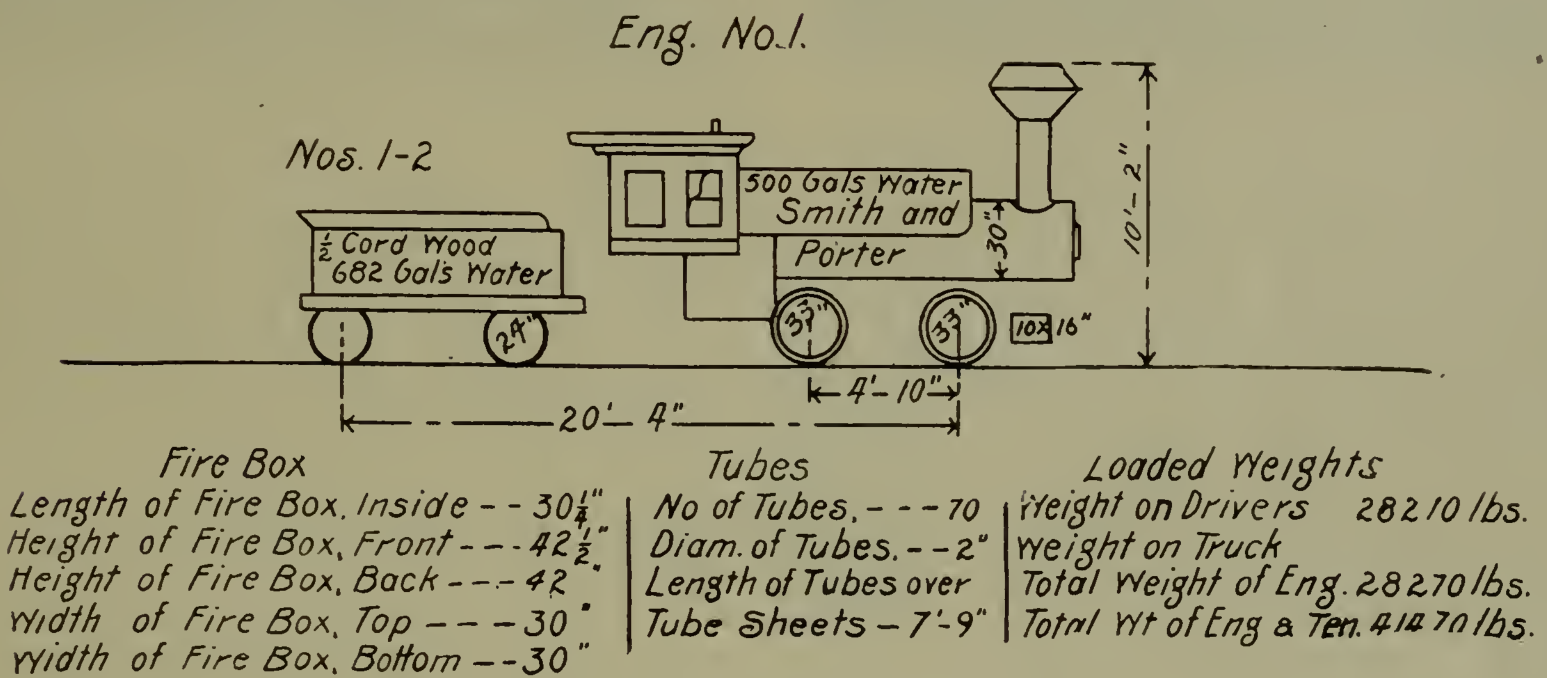


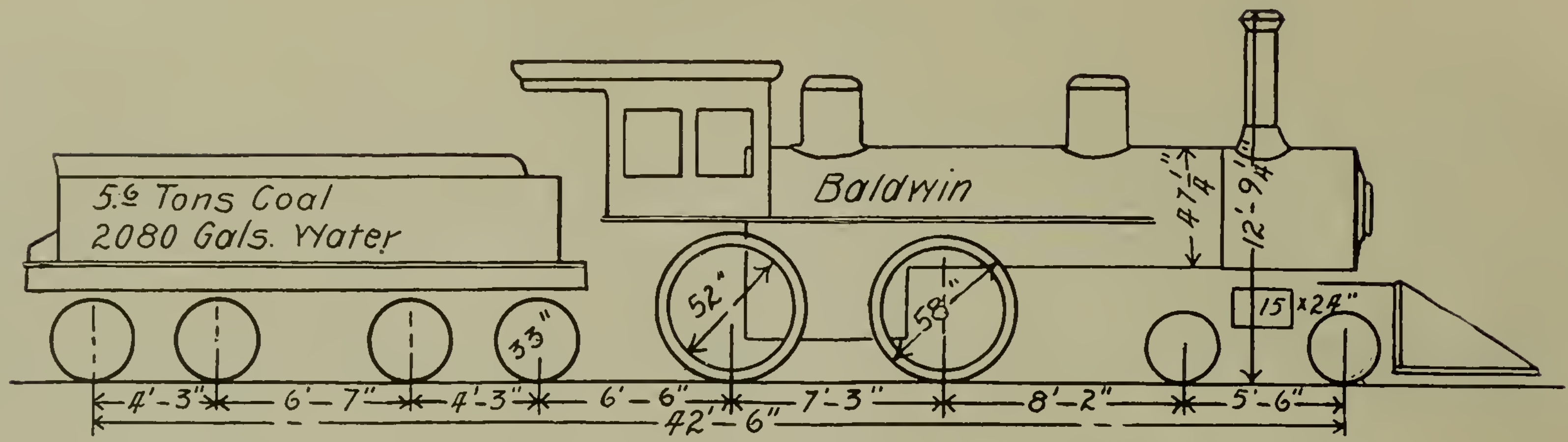
Diagram of First Northern Pacific Engine.

Such were some incidents in the early construction of roads in Minnesota. Essentially it was the beginning of things; as indicated by the time table which you print.

The year following this card's date was very busy in construction. A general manager was in charge of operations. Bismarck "the beautiful," for location, on the east bank of Missouri river was reached before snow had seriously impeded progress.

Possibly a department record diagram of engines, the first used, may be interesting. That of engine No. 1, herewith (of which there were two engines), is of a Smith & Porter build, four wheels, saddle tank with 10x16 inch cylinders, and 33 inch drivers and weighing 2,827 pounds. The added weight of the saddle tank was a factor in the engine's efficiency. A total water capacity of 1,182 gallons was a much more generous supply than was that of wood fuel; but then wood was plenty everywhere. The original use of these engines was in the material yards at Pacific Junction and as helpers out of there to material trains. They, however, did a portion of the first track

Class A.1.



Fire Box	Tubes	Loaded Weights
Length of Fire Box, Inside-57"	No of Tubes 142	Weight on Drivers-40250 lbs.
Height of Fire Box, Front--62"	Diam. of Tubes 2"	Weight on Truck 25150 lbs.
Height of Fire Box, Back--62"	Length of Tubes over	Total Wt. of Eng. 65400 lbs.
Width of Fire Box, Top--42½"	Tube Sheets 10'-9"	Total Wt. of Eng. & Ten. 119040 lbs.
Width of Fire Box, Bottom-34¼"		

First Northern Pacific "Standard" Engine.

laying and general work at the front. Mr. Chas. Wiley was first in charge, as master mechanic, at Pacific Junction, and later at the Brainerd shops. Mr. Adam Brown was, I believe, the first locomotive engineer.

The diagram of Class A-1 locomotive is that of what was considered the standard construction engine, to the Missouri. These were eight-wheelers, and had 15x24-inch cylinders and 58-inch drivers, with 40,250 pounds weight on same. With a large number of these there also was some 16-inch cylinder engines of the same general style, with 62-inch wheels, and weighing 44,350 pounds and used later as passenger engines.

The pioneer power was, in weight, made to conform to the wishes of the constructing engineers, who wisely foresaw the necessity for it. All the first engines were supplied with appliances to siphon water, wherever found and wanted; also with large steam pipe attachments to tenders for water heating in winter, to facilitate the melting of snow for water supply, when this became a necessity, as proved to be the case in snow fighting. These engines did wonderfully good work in construction, and in the harder snow season service and the early freight business of the road.

Cutting Old Ties with a Bulldozer, C., B. & Q. Ry.

AT the Western Avenue (Chicago) shops of the Chicago, Burlington & Quincy Railroad a part of the duties of the master mechanic is to cut up old ties for fuel. Large numbers of ties have been so worked up at this point, but the methods employed became unsatisfactory to the master mechanic in charge—Mr. R. D. Smith. Mr. Smith had for a long while cut the ties with a circular saw, and split them with a pneumatic splitter. But he wanted a better method, and accordingly worked out a scheme to use a bulldozer for the purpose. He designed a new bed plate for the ordinary bulldozer and, to accompany the same, new attachments. These attachments consisted of vertical knives at one side, for cutting off, and a horizontal knife extending over the bed plate for splitting. Our photographic views show the device in all needed fullness. The new bulldozer was built by Williams, White & Co., of Moline, Ill., according to Mr. Smith's designs, and has for some time been doing its work most admirably.

The power for the bulldozer is derived from a small

Figure 1.

Figure 2.

FIGURE 3.

FIGURE 4.

vertical engine which develops about 15 horse power when running at 225 revolutions per minute, with 75 pounds of steam. The gearing is such that the bulldozer makes about 8 strokes per minute.

In operation two men can handle this work, but the best results are obtained by using five men, when the ties are taken from a flat car within 10 or 15 feet of the machine. One man unloads the ties and two men place them in the machine, while the other two remove the wood in wheelbarrows and pile it up for future use. An average total of one hour per day is required for oiling, clearing away the splinters and dirt, and doing other incidental work.

The total cost of unloading, cutting and splitting, and stacking, when using this machine, is 37½ cts. per cord. Previous to installing the bulldozer the ties were, as previously stated, sawed on a circular saw and split with a pneumatic splitter, and according to this method the cost, including stacking, was 78½ cts. per cord, or 41 cts. greater than by the present method.

In large terminal yards the economical disposition of old ties becomes a matter of considerable importance. As they cannot be burned where removed, or thrown to one side, it becomes necessary to load them on cars for transportation. When loaded it is usually good policy to utilize them for fuel, and the bulldozer accomplishes the cutting and splitting at a minimum cost.

This machine has done such good work at the Chicago terminals that there is in contemplation a plan to place a duplicate plant on a flat car and send it over the system wherever needed to work up accumulated stocks of ties.

The Steam Turbine.

IN a lengthy paper presented at the New York meeting (December, 1900) of the American Society of Mechanical Engineers, Mr. Robert H. Thurston covers quite thoroughly the field of the steam turbine. In opening his paper, Mr. Thurston says, in substance:

"The steam engine of maximum simplicity and of ideal thermal efficiency would presumably be defined, by one familiar with the general principles of science—even if entirely ignorant of its applications of contemporary date in the heat-motors, mechanically—as a machine having a minimum number of moving parts and thermodynamically free from other wastes than those of the ideal thermodynamic machine. Such a machine has never been produced, and it is not to be expected that it will ever be constructed in perfection. Yet the close of the nineteenth century sees a remarkably close approximation to this ideal; and that, curiously enough, by reversion to an ancient type and by the reproduction, in refined form and proportions, of the 'Greek idea of the steam engine,' as illustrated by Hero in his 'Pneumatica,' 120 B. C., and in better type, though no better form, by Branca, in his 'Machine deverse,' of 1629.

"The ideal construction is certainly reached in a machine in which there exists but a single moving element; and the ideal thermodynamic machine is approximated in a motor in which adiabatic expansion is secured, and friction and heat waste may be made sources of comparatively small loss. The elements of waste, conduction and radiation, and incomplete expansion, are probably capable of large reduction, with improved construction and continued experience in the apportionment of the apparatus to its work. The main purpose of this discussion is to summarize the work of the steam turbine to date—as well as may be—and to study the sources of loss as it is now constructed and operated, and to deduce, if possible, the principles involved in its correct design, construction and operation —meantime bringing out into relief facts indicating the essential importance of employing superheated steam in a machine in which it has seemingly no other than the modynamic value, and of the use of condensation to enable the engineer to evade a loss and accomplish a purpose which have no counterparts in the case of the piston engine."

Then follows a careful study of turbine forms of power giving facts from the earliest history to date.

In closing his paper, Mr. Thurston gives the following conclusions, which bear directly, and in an important manner, upon the principles of design of the steam turbine and its operation as a source of power:

"1. The steam turbine thermodynamically approximates in its real form more closely to the ideal than does any other type of heat-motor. Its cycle lacks only the introduction of the Carnot compression.

"2. It is entirely free from that waste which in the real steam engine of common type constitutes usually, if not invariably, the most important of its extra thermodynamic losses.

"3. It is peculiarly well fitted for use with those very high steam pressures as we now regard them, which must ultimately probably be resorted to by the engineer designing heat engines in his endeavor to further improve the efficiency of that class of motors.

"4. It is only limited in speed of rotation by the strength of its materials of construction.

"5. It is especially suitable for use with superheated steam, it having no rubbing parts on which lubrication may be difficult, in presence of superheated steam, and the limit to the superheat, so far as the motor is concerned, being only found at that point at which increased temperature of metal produces reduction of tenacity in objectionable amount. That limit, not as in earlier days of lubrication with animal oils, and still with other engines, is fixed with this machine at the boiler.

"6. As to its operation, it is obvious that friction is peculiarly active for evil in this motor, and that small diameters of journal, freedom from contact of part with part, except as absolutely required by the construction, and minimizing fluid friction by superheating steam, and be securing as complete removal of the atmosphere, air, or vapor from about the revolving wheel as practicable, must be carefully sought in order that the mechanical efficiency of the machine shall be made a maximum.

"7. The wastes of the steam turbine are all extra thermodynamic; the loss due the absence of adiabatic recompression excepted. They consist of (1) journal-friction, which is made a minimum by the use of a flooded bearing and a light unguent; (2) fluid friction between disk and leakage, steam or suspended moisture in the jet, which may be made a minimum by superheating, and between the disk and its enclosing atmosphere of vapor, which may be minimized by the employment of a good condenser; (3) loss of heat and of steam by leakage, which may be reduced to a minimum by durable material, fine workmanship and close fits; (4) waste by incomplete expansion, which may be reduced to a limit determined by the finance of the case, by the resultant increase of friction and of cost due the necessary enlargement of the turbine; and, finally (5), thermodynamic waste by failure to secure that complete adiabatic recompression of the fluid which is necessary to convert the Rankine-Clausius' cycle into that of Carnot. The latter is a peculiarly difficult matter with the steam turbine, since it probably necessarily involves the employment of a separate vapor-compression pump of special character, and an amount of added work and cost which may introduce losses more than compensating its gains."

Train Lighting as Viewed Abroad.

AT the International Railway Congress held in Paris last summer two exhaustive reports on car lighting were submitted, one by M. Chaperon, engineer and chief of a division of the Paris, Lyons & Mediterranean Railway Co., in collaboration with M. Herard, assistant chief of transportation of the Orleans Railway Co. This report embraced all the countries of the Continent and the United Kingdom, except Austria, Hungaria, Roumania, the Netherlands, Luxembourg and Germany. The above named countries not embraced in the first report were included in the second report, which was prepared by Cajetan Banovits, a ministerial councillor and director of rolling stock and locomotives of the Hungarian State Railways.

The reports, as stated, are quite exhaustive, but nevertheless little information was obtained from the United States and Germany by the reporters.

The early methods of lighting by means of candles and oil—animal, vegetable and mineral—some of which still obtain on some of the smaller lines on the Continent—are reviewed exhaustively and their merits and defects are fully set forth, statements being made in detail with respect to gas and electric lighting—the two great systems now competing for favor in this country as well as abroad—including under the former gas from petroleum, and other mineral oils, pure acetylene and gas mixed with acetylene, and under the latter the systems of electric lighting from storage batteries alone and from storage batteries in connection with dynamos.

The first report, in comparing the various systems, says: "The railway companies have aimed at a result, if not perfect, at least very satisfactory, by different methods, either in perfecting the apparatus for using oil or petroleum, or in multiplying their number—or by recourse to new and altogether different systems, viz., gas or electricity.

"With oil lighting the expense of installation is comparatively low, but it requires a numerous staff for cleaning, filling and maintaining the lamps. It is requisite that this work should be carefully done, as the quality of the light and the economy of the system depend absolutely on the manner in which it is done; finally, the quality of oil, wicks, etc., have first importance. All these necessary conditions required in good oil or petroleum lighting bringing the cost per lamp-hour to quite a high figure.

"In gas lighting the cost of installation for the manufacture and supply of the gas is quite considerable. The expense of labor is reduced to the minimum, the services of the staff being limited to wiping the cups and chimneys of the lamps, the examination of the burners and supplying the reserves or tanks of the carriages. The advantages of the system are principally in the quality of the lights, the facility of modifying the intensity as well as the simplicity of the labor in maintenance and cleaning and in the activity in filling the supply tanks.

"The lighting power of the gas may be still improved by mixing it with highly carburetted products. Several of these have been made use of, among others naphthaline (albo-carbon), which has not given very good results; acetylene mixed with gas in the proportion of 25 to 30 per cent gives the flame a very considerable intensity and fixity.

"Electric lighting is, without contradiction, that which is presented under the most attractive form. Incandescent electric lamps have, in fact, an incontestable superiority over all the other methods of lighting, as much from the point of view of comfort as that of facility of installation of luminous centers, which may be as intense as desired and which can be placed at the most convenient points for the passengers. They produce no, or next to no, heat, and there is no occasion to provide for the products of combustion being carried outside. The electric lighting of the carriages produced by means of a dynamo driven by the axle during the run of the train realizes, in priniciple, a complete and rational system of lighting."

This report concludes with a query for discussion as to whether the equipment provided to assure constancy of voltage will be likely to deteriorate in service, and whether its maintenance will be expensive. Also whether regular inspections of the parts will tend to cause too great a degree of immobility of the rolling stock. The report gives a table as follows of the electric car lighting in different countries: United States of America, 74 cars (?); France, 1830; Great Britain, 112; India and British colonies, 600; Italy, 160; Switzerland, 697, making a total of 3483 carriages. Apparently methods of axle driving are gaining everywhere in popularity and success.

The second report—that of Banovits—passes in review the systems of candle lighting and oil lighting which are still maintained by quite a number of the railways for at least a portion of their equipment, alongside of systems of a more up-to-date character. In regard to oil lighting Mr. Banovits says that notwithstanding some of the inconveniences attending its use, there are some advantages, such as relatively great security against the dangers of fire and explosions, relative cheapness, the independence of each light, and as an auxiliary in case of necessity. In view of this it is not astonishing, he says, that this mode of lighting should still be used by administrations, who maintain it upon their principal lines, as well as by others, who, using more perfect methods for trains of the first order, for trains of the second order still adhere to oil lighting.

Referring to electric lighting, he cites a system used by the Austrian railways where the dynamo furnishes 60 per cent and the storage batteries 40 per cent of the current for lighting the train; the cost is placed in round numbers at $2.60 for 10,000 lamp-hours. The advantages of electricity compared with other methods of lighting may, he says, be summed up as follows: Absolutely fixed light; exemption from atmospheric influences, such as wind and cold; facility of being placed according to needs and wishes; possibility of great economy in the lighting by ability to reduce the period of the lighting to the minimum of time consistent with effective need; its great cleanliness and simplicity of maintenance, as facility in lighting, lowering or extinguishing the lamps. He says, further, in substance: Another advantage not less important but also extremely valuable is that the danger of fire, which, generally speaking, is not absent from the other methods of lighting, is here entirely excluded. With this method of lighting disappears, in fact, one of the possibilities of danger to which a railway train is exposed, hence an increase of security in train movement. All of the inconveniences to which reference has been made are largely compensated for by the advantages cited, and will be more so as the application of this method of lighting is made upon a larger scale and as the progress in the manufacture of the accumulators and of the lamp is secured.

In closing, M. Banovits says: "In fact, it cannot be concealed that between the methods of lighting by candle and oil on the one side and electric lighting and mixed gas lighting on the other, the difference is immense. The luminous intensity which has been secured (and which may yet be surpassed by these two last methods of lighting) is such that it unites perfectly all the requirements; and finally electricity presents a complete security against dangers of fire and explosion. Electric lighting has for itself the immense advantage of perfect security against the dangers of fire and explosion. This advantage compensates largely for all the inconveniences in the system—in fact, to-day, in any instance of a particularly delicate nature, such as in the trains of the royal families, the transportation of objects of great value, etc., preference is rightfully given to electric lighting.

"If, in the special cases just enumerated, the taking into consideration of the greatest security is justified, it is proper to examine also into the question of running if it would not also be proper to take it into account from the general view of the passenger service. It cannot be denied that in spite of all the precautions taken by the railway managements, it is scarcely possibly to arrive at absolute security against railway accidents. The possibility of such accidents being granted, it requires only the combination of unfavorable circumstances that the catastrophe should be of the largest proportions.

"Finally, it should be noted that the method of electric lighting generally made use of—by storage batteries exclusively—is not the only method of applying this light. It is not denied that the experiments actually in course of trial by some of the lines of the German Union system, either by means of a moving vehicle producing the current for the whole train or by the production of the current required for each particular carriage, partly by a dynamo driven by the motion of the carriage itself and partly by storage batteries—may be crowned with success; nor that the results obtained either under the item of expense as under that of simplification of the maintenance, may be more favorable than those realized in the exclusive use of storage batteries upon a large scale, that is to say, under normal conditions."

M. Banovits sums up as follows: "Of all the modes of lighting adopted up to the present time for the lighting of trains, that which seems to us to answer the best to the conditions of a perfect light is electric lighting, for besides offering the greatest security against the danger of fire, it possesses a proper luminous intensity, assures a light, clean, fixed, exempt from atmospheric influences, and permits a simple and economical dimming for the night. This mode of lighting has, moreover, the advantage of a simple maintenance, and as soon as its application is made upon a large scale, a service will be assured by proper installations, which will be regular and rapid, even in cases of the densest train movement. Everything, in short, invites to the belief that from the pecuniary point of view this method of lighting will permit more favorable economical results than have hitherto been attained; and under this head it may pertinently be remarked that the advantages which at the moment other methods of lighting may appear to present over the electric lighting are largely offset by the superiority of safety conditions and by the other inherent advantages of the method."

Compensating Throttle Valve.

Central Railroad of New Jersey.

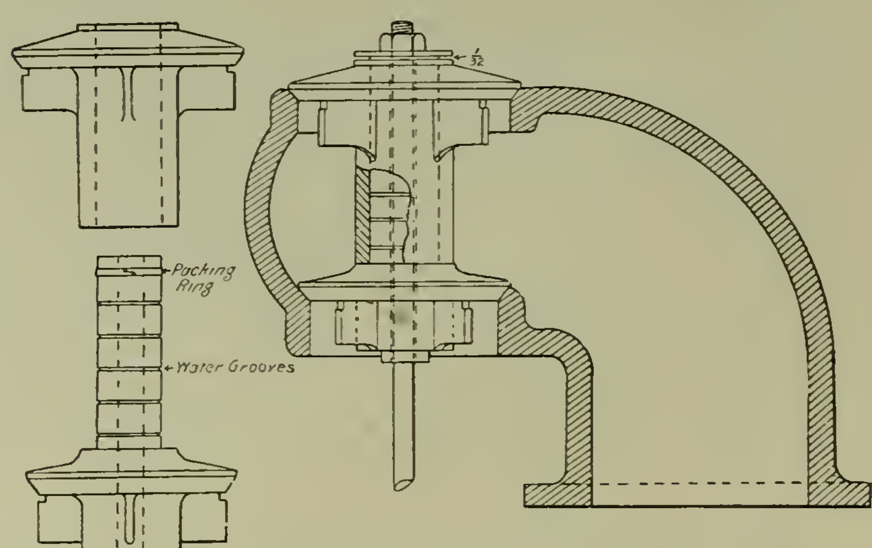
THE compensating throttle valve shown in our engraving has been adopted as a standard on the Central Railroad of New Jersey. It was designed by Mr. J. S. Chambers, division master mechanic of that road, and has been patented by him.

The device is designed to provide for automatic adjustment of the disks of the throttle, to provide for differences in the expansion of the throttle casing and the valve itself. With the usual construction and the valve made in one piece, considerable difficulty is experienced in keeping the valves tight. To overcome this, Mr. Chambers has made the valve in two parts, shown in the detail views. The upper disk has a sleeve which surrounds a corresponding sleeve on the lower disk. The spindle passes through both, and, under the washer at the top, a space of 1-32 in. is provided for automatic adjustment of the distance between the disks. The inner sleeve has water grooves, and it may also have a packing ring at the top to guard against leakage of steam between the sleeves.

The valve is ground to the seats as usual, and when the expansion and contraction of the valve and the casing are the same the valve acts like an ordinary throttle, but if the casing expands more than the valve, the automatic adjustment takes care of the difference which at all times must be very small, and experience shows that the valve remains tight. These valves will remain tight between the periods of general repairs to engines.

Considerable saving can be effected by this device, as it costs considerable to grind a leaking throttle valve, and many times an engine is allowed to run some time before it can be held in for this work. This necessitates a large waste of fuel and oil during the time the engine is running with leaking throttle valve. The cost of operation of grinding throttle will be greatly reduced, which effects considerable saving over the old style throttle valve.

The lower throttle valve is held to the seat after expansion takes place by a film of water between the



joints; and a small water groove provided in the face of the lower disk, where the two lower valves come together, prevents the lower disk from raising off the seat after expansion takes place.

This valve can be appled to any throttle box of standard design, without making any change in the construction. It has been in satisfactory service about one year on the Central Railroad of New Jersey, and we are assured that no repairs have been made to same.

A New Fuel Gas.

A product of petroleum known as Acme fuel gas has, in the past few years, quietly made a remarkable record. It is scarcely known to the general public, yet it is to-day used in practically all the United States government navy yards for heating iron and steel during their various manipulations. It is especially adaptable to work in railway shops—large and small forge work, light and heavy welding, tool making, bolt and rivet work, annealing, etc.

Practically the first complete plant was an experimental plant installed in the forge shop connected with the naval gun factory, in the United States Navy Yard, at Washington, D. C. This shop had been using coal for heating purposes up to the time this plant was installed, but after continuous experiment, covering a period of eight months, the authorities pronounced the newprocess most satisfactory, and ordered a larger plant, that they might extend its operations beyond the forge shop for crucible work, galvanizing, brazing, japaning, annealing, and various other purposes for which they considered Acme gas better adapted than the fuel they were using. At this point the output of the forge shop was increased, by the use of Acme gas, about 100 per cent per man, it is claimed. At all events the results were so satisfactory that, as before stated, the process has been adopted in practically all of the other government navy yards.

The Acme gas plant consists of a series of generators with connecting apparatus and pipes that work automatically. Its novelty consists in the appliance whereby refined petroleum is made into a fixed gas by forcing air, under pressure of, say, four or five pounds per square inch, through the oil (68 gravity crude distilate preferred) and through perforated diaphragms, and a porous material, which process is continued through a number of generators, more or less, according to the quality or volume of gas desired. The plant automatically regulates the manufacture of gas to the requirements, that is to say, if any number of burners are in service, to the limit of the plant and they are all cut off but one, the plant immediately adjusts itself so that it only makes gas for that one burner and if the full capacity of the plant is turned on at once, it will instantly supply them all.

The gas produced is a light fixed gas, wholly free from undigested or unassimilated hydro-carbon in any form. Carrying some oxygen, 19 to 20 parts in 100, it is more rapidly and completely consumed in burning than if dependant wholly upon the oxygen supplied at the burners. This gives the flame its great intensity. The proportioning of the parts is such that at natural temperaure no separation is possible. In burning, no part of the hydrocarbon constituents of this gas passes off unconsumed. This is rarely true of any other gas, burned under the most perfect conditions attained in practice. The products of combustion of Acme gas are N., H_2O and CO_2.

FIGURE 1—TYPICAL SMALL ACME GAS GENERATING PLANT.

Acme gas can be burned to give an oxidizing or a reducing flame. The fact that the quality of the flame is at all times perfectly under control of the operator, and that satisfactory conditions are automatically continued without change through as long a period as the operator pleases, makes it invaluable in all metallurgical operations. In this respect it is superior to natural gas, which varies in composition, in pressure and in the character of the flame produced. This is a matter of experience wherever natural gas is burned. Acme gas

FIGURE 2—WASHINGTON NAVY YARD FORGE SHOP.

is the same 365 days in the year—a quality of more value to the consumer than a higher theoretical value in heat units which are rarely utilized in practice.

We give three illustrations relating to this remarkable process. In figure 1 is shown a typical small generating plant, that in use at the works of the Milwaukee Wagon Iron Works. In figure 2 is shown an interior at the Washington Navy Yard forge shop—snap shot taken when a 2,300 pounds ingot has just been taken from the furnace, where in 30 minutes it had been, by Acme gas, brought to welding heat. In figure 3 is shown, in suggestive comparison, an old oil furnace and an Acme gas furnace—the latter having displaced the former, doing more and better work and occupying very much less space. This view is an interior at the Deering Harvester Works, at Deering, Ill., where Acme gas is used for many heating purposes and where it is being developed, also, for lighting purposes. In this latter line the new gas seems to promise very well indeed; some experiments that have been made show high lighting powers and some remarkable results in the way of freedom from condensation and from trouble on account of low temperatures.

This process of gas manufacture is owned by the Acme Gas Co., of Chicago, 1256 Monadnock block, of which company Mr. T. W. Harvey is president.

FIGURE 3—OIL FURNACE AND ACME GAS FURNACE COMPARED.

The Car Foremen's Association of Chicago.

December Meeting.

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Chicago, Wednesday evening, Dec. 13. President Sharp called the meeting to order at 8 p. m. Among those present were the following:

Anderson, Geo.
Blohm, Theo.
Bates, G. M.
Bossert, Chas.
Bundy, C. L.
Bourell, J. W.
Borrowdale, J. M.
Bannes, A.
Brazier, F. O.
Bates, Louis.
Baasch, H.
Buker, J.
Callahan, J. P.
Cather, C. C.
Cornwall, J. R.
Cardwell, J. R.
Cook, W. C.
Elkins, J. L.
Evans, J. L.
Earle, Ralph.
Grieb, J. C.
Goehrs, W. H.
Graessle, E. J.
Harvey, H. H.
Hansen, A. P.
Hughes, Chas
Hall, W. B.
Johannes, A.
Jones, R. R.
Keebler, C. F.
Kramer, Wm.
Krump, M.
Kirby, T. B.
Kroff, F. C.
Kline, Aaron.
Kline, J. C.
Longfellow, F.
Morgan, I. E.
Morris, T. R.
Murray, D.
Marsh, Hugh.
Miller, R. S.
Monahan, Jas.
Nordquist, Chas.
Opie, Jos.
Olsen, L.
Perry, A. R.
Rieckhoff, Chas.
Ruff, A. W.
Stimson, O. M.
Sielaff, R.
Schultz, Aug.
Schultz, F. C.
Sharp, W. E.
Stewart, H. A.
Spees, W. F.
Samn, G. N.
Swift, C. E.
Terry, O N.
Williams, Thos.
Willcoxson, W. G.
Widner, J. E.
Weschler, H.
Wharton, R.
Walsh, W. J.
Wessel, W. W.
Zanone, F. J.

Secretary Kline stated that the following had made application for membership:

Geo. G. Allen, chief clerk, C., M. & St. P. Ry., West Milwaukee, proposed by J. C. Grieb; J. Bytwork, car inspector, C., M. & St. P. Ry., Woonsocket, S. D., proposed by J. C. Grieb; J. Barraclough, car inspector, C., M. & St. P. Ry., Wells, Minn., proposed by J. Opie; H. Bitters, foreman, C., M. & St. P. Ry., Green Bay, Wis., proposed by J. C. Grieb; Chas. Behrens, car inspector, C., M. & St. P. Ry., Chicago, proposed by J. C. Grieb; Henry Baasch, assistant foreman provision dealers' despatch, Chicago, proposed by R. Earle; Jno. E. Ballou, clerk, Armour car lines, Chicago, proposed by W. E. Sharp; J. B. Caldwell, car inspector, A. C. L., Chicago, proposed by W. E. Sharp; D. H. Cross, foreman, C., M. & St. P. Ry., Mason City, Ia., proposed by Wm. McFarlane; D. Clune, foreman, C., M. & St. P. Ry., Pembine, Wis., proposed by J. C. Grieb; W. A. Carter, foreman, Armour car lines, Chicago, proposed by W. E. Sharp; Roy J. Cook, clerk, C., B. & Q. Ry., Chicago, proposed by H. H. Harvey; Geo. D. Casgrain, representing Griffin Wheel Co., proposed by J. C. Grieb; Jos. R. Cornwall, carpenter, C., M. & St. P. Ry., Chicago, proposed by J. C. Grieb; C. Dunn, foreman, C., M. & St. P. Ry., Stone City, Ia., proposed by F. Longfellow; F. A. Delano, S. M. P., C., B. & Q Ry., Chicago, proposed by W. E. Sharp; W. H. Downing, Mojave, Cal., proposed by D. Downing; P. J. Downing, car inspector, C., M. & St. P. Ry., Milwaukee, Wis., proposed by J. C. Grieb; Peter Johnson, foreman, C., M. & St. P. Ry., Manilla, Ia., proposed by F. Longfellow; Robt. Koperski, car inspector, C., M. & St. P. Ry., Milwaukee, Wis., proposed by J. C. Grieb; Henry Lumpp, car inspector, C. T. T. Ry., Chicago, proposed by J. B. Julian; Robt. Lorimer, chief clerk, C., M. & St. P. Ry., Milwaukee, Wis., proposed by J. C. Grieb; Reginald Le Bron, clerk, Armour car lines, Chicago, proposed by W. E. Sharp; Jas. Monahan, clerk, I. C. Ry., Chicago, proposed by J. R. Cardwell; I. E. Morgan, foreman, C., M. & St. P. Ry., Savanna, Ill., proposed by F. Longfellow; W. H. Marshall, car inspector, C., M. & St. P. Ry., Herndon, Ia., proposed by F. Longfellow; R. W. Monfoot, foreman, S. W. S. C. L., Chicago, proposed by C. M. Mileham; Geo. A. Mehl, clerk, C., M. & St. P. Ry., Dubuque, Ia., proposed by J. C. Grieb; E. Milligan, foreman, C., M. & St. P. Ry., Dubuque, Ia., proposed by J. C. Grieb; James E. Mehan, chief clerk, C., M. & St. P. Ry., West Milwaukee, Wis., proposed by J. C. Grieb; Wm. McFarlane, general foreman, C., M. & St. P. Ry., Mason City, Ia., proposed by J. C. Grieb; A. F. Peterson, general foreman, P. D. D., Chicago, proposed by R. Earle; Geo. W. Pulford, clerk, C., M. & St. P. Ry., Savanna, Ill., proposed by F. Longfellow; F. E. Place, general foreman, I. C. Ry., Chicago, proposed by C. D. Pettis; C. Peterson, car inspector, C., M. & St. P. Ry., Mankato, Minn., proposed by J. C. Grieb; John Potts, foreman, C., M. & St. P. Ry., Green Bay, Wis., proposed by J. C. Grieb; Wm. Queenan, foreman, C., B. & Q. Ry., Aurora, Ill., proposed by G. M. Bates; P. Renier, M. C. B., C., M. & St. P. Ry., Dubuque, Ia., proposed by J. C. Grieb; J. E. Ricketts, foreman, C., M. & St. P. Ry., Dubuque, Ia., proposed by J. C. Grieb; H. H. Richardson, stenographer, A. C. L., Chicago, proposed by W. E. Sharp; H. A. Stewart, clerk, Armour car lines, Chicago, proposed by W. E. Sharp; Jas. A. Smith, wrecking master, C., M. & St. P. Ry., Savanna, Ill., proposed by F. Longfellow; Geo. Shepherd, foreman, C., M. & St. P. Ry., Manilla, Ia., proposed by F. Longfellow; Chas. G. Swanson, foreman, S. W. S. C. L., Chicago, proposed by C. M. Mileham; A. J. Sherman, car inspector, C., M. & St. P. Ry., Egan, S. Dak., proposed by J. C. Grieb; R. Sielaff, car inspector, P. D. D., Chicago, proposed by R. Earle; Norman Swinson, clerk, Armour car lines, Chicago, proposed by W. E. Sharp; L. Tuftie, car inspector, C., M. & St. P. Ry., Jackson, Minn., proposed by J. C. Grieb; J. W. Taylor, chief clerk, C., M. & St. P. Ry., Dubuque, Ia., proposed by J. C. Grieb; Wm. Thomas, car inspector, C., M. & St. P. Ry., Chicago, proposed by J. C. Grieb; O. N. Terry, car inspector, C., B. & Q. Ry., Chicago, proposed by G. M. Bates; J. Van Dell, M. C. B., C., R. I. & P. Ry., Chicago, proposed by A. R. Perry; W. J. Vance, representing Galena Oil Co., proposed by J. C. Grieb; R. Van Cleave, clerk, Armour car lines, Chicago, proposed by W. E. Sharp; Wm. Wratten, general foreman, C., M. & St. P. Ry., Dubuque, Ia., proposed by F. Longfellow; James Wilson, car repairer, C., M. & St. P. Ry., Monticello, Ia.; S. J. Watson, car inspector, C. T. T. R. R., Chicago, proposed by J. B. Julian; J. A. Whalen, representing Galena Oil Co., proposed by J. C. Grieb; Wm. G. Willcoxson, foreman, C., M. & St. P. Ry., Chicago, proposed by J. C. Grieb; Robt. Young, foreman, C., M. & St. P. Ry., Chicago, proposed by J. C. Grieb—a total of 60.

Then followed the report of the Committee on Labor Allowance for Renewing Draft Timbers on Refrigerator Cars:

Report on Labor Required in Renewing Draft Timbers on Refrigerator Cars.

To the Members of the Car Foremen's Association:

Your committee appointed to inquire into and determine the actual amount of labor consumed in renewing draft timbers on refrigerator cars begs leave to report as follows:

A circular of inquiry was sent to 110 members of the Car Foremen's Association, and 28 replies were received; 10 of these were from parties associated with private car lines, and 18 from parties associated with railway companies.

In reply to inquiry No 1—"Do you find that more carsmith's labor is required in renewing a set of draft timbers on a refrigerator car than on an ordinary freight car?".—4 replied "No" and 20 replied "Yes"; the balance did not state.

In reply to inquiry No. 2, as to the cause of making more labor necessary, the concensus of the opinions offered was to the effect that it was due to bolts and nuts being rusty, necessitating their being cut, or draft timbers split; also that it was necessary in some cases to remove body transoms, the double floor and insulation; further, that the presence of ice boxes, drip pans, etc., militates against the performance of the work in the same length of time as on ordinary freight cars.

In reply to inquiry No. 3, as to the amount of time required to renew draft timbers on refrigerator cars so constructd as to necessitate extra labor for removing ice boxes, drip pans, etc., in excess of the carsmith's labor necessary to renew draft timbers on an ordinary freight car, 20 replies were received, the replies making separate recommendations for cars equipped with long and cars equipped with short draft timbers, those for the long timbers ranging from 1 to 10 hours, the average being 3 hours and 33 minutes; and those for the short draft timbers ranging from 1 to 10 hours, the average being 3 hours and 21 minutes.

In reply to inquiry No. 4, "What amount of time is required to renew the draft timbers on refrigerator cars where extra labor for removing ice boxes, drip pans, etc., is *not* required,"—20 replies were received covering cars equipped with long draft timbers, and 21 covering cars equipped with short draft timbers, ranging from 5 to 16 hours for cars having long draft timbers and from 4 to 14 hours for cars equipped with short draft timbers, the average being 11 hours and 12 minutes for long draft timbers, and 9 hours and 43 minutes for short draft timbers.

In reply to inquiry No. 5, "Are you in favor of making any change in the present schedule of labor allowance for renewal of draft timbers from Section 22 of Rule 5," replies were received as follows:

"A," Covering cars where extra labor is required on account of removal of ice boxes, drip pans, etc.—18 recommending a change and 4 desiring no change. On cars equipped with short draft timbers the recommendations range from 5 to 20 hours for one timber and from 7 to 24 hours for two timbers, the average being 8 hours and 47 minutes for one timber, and 12 hours and 57 minutes for two timbers. On cars equipped with long draft timbers, the recommendations range from 6 to 26 hours for 1 timber, and from 10 to 30 hours for 2 timbers, the average being 10 hours and 13 minutes for 1 timber and 15 hours and 13 minutes for 2 timbers.

"B." Covering cars where extra labor is *not* involved account of renewal of ice boxes, drip pans, etc.—20 replies recommend a change and 4 desire no change. On cars equipped with short draft timbers, the recommendations range from 3 to 12 hours for 1 timber, and from 5 to 14 hours for 2 timbers, the average being 5 hours and 33 minutes for 1 timber and 9 hours and 21 minutes for 2 timbers. On cars equipped with long draft timbers, the recommendations range from 5 to 12 hours for 1 timber, and from 8 to 15 hours for 2 timbers, the average being 6 hours and 33 minutes for 1 timber and 10 hours and 51 minutes for 2 timbers.

In explanation of the difficulty experienced in connection with the replacement of draft timber bolts on refrigerator cars, all replies received were to the effect that it was due to rusty bolts and nuts.

But two replies were received as to kinds of tanks requiring more labor for renewal of draft timbers or bolts than the ordinary car, namely: Arnold, Duplex and Cold Blast.

In view of the above, your committee would recommend the following:

In making a discrimination between short and long draft timbers it is the intention of the committee that draft timbers which do not pass into the body bolster should be considered in this report as short draft timbers, and that draft timbers which pass through or over the body bolster should be considered as long draft timbers.

In view of the fact that cars equipped with long draft timbers have a larger number of bolts, and in some instances require the removal of the lower section of the body bolster, the committee considers it desirable to recommend a separate schedule of the labor for renewing short draft timbers and long draft timbers as follows:

Cars with short draft timbers—1 timber, 6 hours; 2 timbers, 9 hours.

Cars with long draft timbers—1 timber, 7 hours; 2 timbers, 11 hours.

On cars having either short or long draft timbers, where tinsmith's labor is required in excess of the ordinary carsmith's labor, 1 hour additional for each end.

The committee would further recommend the following changes in the allowance for labor specified in Section 22 of Rule 5 for renewal of draft timber bolts for refrigerator cars:

Draft timber bolts complete at one end of car 5 hours, instead of 3; draft timber bolts, 3 or less, 3 hours instead of 2; draft timber bolts, 4 or more, 4 hours instead of 3.

Relative to an extra allowance for labor for cars so constructed as to require the removal of the ice tanks in order to replace draft timber bolts or draft timbers, we are of the opinion that these cases are so few and far between that they represent an exceedingly small minority in the original renewal of draft timbers under refrigerator cars, and, on this account, cannot be considered.

The committee wishes to tender its sincere thanks to those who were kind enough to make reply to the circular, but it does not feel that it is within its province to express its sentiments relative to those who were asked (and that more than once) and given more than three months' time in which to make reply and failed to do so, although it wishes to state that in its opinion inquiry on a matter of such importance should certainly have met with a more generous and ready response.

J. C. Grieb, Chairman.
G. M. Bates.
L. C. Wirtz.

It was voted that this report be received, the committee discharged and discussion be deferred until the January meeting.

A discussion of Mr. Bundy's paper on Hot Boxes (read at the November meeting) next followed.

The following letter from Mr. M. Parkinson, General Foreman of the C. M. & St. P. Ry at Milwaukee, Wis., was read by the Secretary:

Hot Boxes--Their Causes and Preventives.

My experience is that hot boxes are generally due to the following causes:

1. Brasses not fitting journals properly.
2. Defective journals due to tool marks and other defects.
3. Wedges improperly placed.
4. Tapering journals.
5. Overload on car or loads unevenly distributed.

Referring to cause No. 1.—Care should be taken to see that there are no lumps or babbitt on back of brass or wedge, as this will start an uneven bearing at once by bearing more in one place than in another, and if the weight is too great the oil will cease to flow between journal and brass, causing it to run hot; but should it eventually wear down so that the weight is evenly distributed, without heating—which is rarely the case—then the chances are that brass is worn down more in one place than another and the packing at this point will be just so much further away from the journal and liable not to carry the oil to it; then it will start to heat.

I prefer a filled brass with a slight raised rib on each side and core hole on each end to hold the babbitt, for the reason that it will form a perfect bearing quicker than the solid or lined brass, and will adjust itself more readily to a worn-down journal or to a journal slightly tapered.

Cause No. 2.—Journals should be free from rust and show no tool marks. I have frequently seen axles turned over to carsmiths for use, and also under new cars, where the journals were not properly trued up and showed tool dents or bruises, made by being struck by wheel flanges when loading for shipment.

Cause No. 3.—Wedges are often improperly placed, and in most cases this is due to flange wear, causing the lateral motion to work mostly to one side, so that when brass is taken out on that side and new brass applied, the wedge cannot pass the shoulder in the oil box; then when the jack is taken out, the weight drops on front end of brass. I have known this to occur with carsmiths, but more often where brass was exchanged by train crew. If they had moved the lateral motion the other way by prying the wheel over, there would have been no trouble in properly placing the wedge.

Cause No. 4.—Tapering journal is sometimes caused by packing not being kept up in back end of box to feed journal, the wear being greater where there is no lubrication.

Another cause is that frequently one wheel is smaller than the other. This will throw the lateral motion towards the smaller wheel, wearing its flange and shifting more journal in one box and less in the other. The journal that is more in the box wears on the back end and the other on front end. They do this without running hot, but when new brasses are applied your trouble commences.

Cause No. 5.—A great many cases of hot bearings are due to cars overloaded or loads improperly distributed. In the former it is hard to tell just when the trouble begins. A 60,000 lbs. capacity car may carry 10 or 20 thousand excess without any trouble if bearings are in first-class condition. After a time it is found necessary to remove some of the bearings on account of wear, while the others are too good to be taken out. Car will carry the same load possibly for one or two trips, but it don't stand to reason that the old brasses will carry the overweight long, and as the inspector does not know the car is overloaded, he will not remove brasses that are in his opinion fit to carry full capacity.

In the matter of uneven distribution of loads we find many cases where a car is loaded nearly to its full capacity, but most of load is on one end or one side. The chances are that such car will run hot.

I would say a few words in regard to the solid brass with thin lining of soft metal, similar to the one mentioned by Mr. Bundy. I find that where this lining wears through when car is under load, it invariably runs hot, on account of journal coming in contact with the rough brass.

We also have trouble with filled brasses that are faulty in construction; some of these have diagonal ribs, and others with rib in center to hold the filling, the ribs being covered over only very lightly, and when journal wears through to ribs, they heat up.

I have experimented with these brasses, and have taken several out shortly after they showed signs of heating. The lining had just worn off the ribs. I put in filled brasses, repacked with the same packing, using no oil, and they ran all right.

In regard to application of free oil in boxes, I do not advocate its use under any circumstance. In cold weather it either weighs the waste down or goes where it has no effect—in fact, does anything but go through the waste; and in warm weather you will find a surplus in bottom of box, leaving no more in waste next to journal than there would be if packing properly prepared had been applied, and the application of free oil even in this case is an excuse for letting packing mat together, thus destroying its usefulness.

Packing irons should be made long enough to reach back end of box. The iron should be inserted edgeways between waste and side of oil box, and when it reaches back end of box, twisted half way around. This will raise the packing behind and bring it in contact with the journal. You can then easily take care of the front end.

The most effective packing iron is made with blade 1½ in. wide at the end, tapering towards the handle with a "T" at end of handle to use as a grip.

Mr. Kramer (P. F. W. & C.): We are having some hot boxes right along. We have tried to overcome the trouble but it seems as though we could not do it. Of course I think that we are doing the very best in packing boxes, and I think the way Mr. Bundy has outlined the practice is very good. We are coming very close to his way and the results are very good. We have not as many hot boxes at the present date as we had five or ten years ago.

Mr. Walsh (Galena Oil Co.): I have been listening very attentively to Mr. Parkinson's paper, and were I to talk on the causes of hot boxes it would be but a repetition of what Mr. Parkinson has said. I want to say that I never heard a more able paper on the causes of hot boxes than that written by Mr. Parkinson.

Sometimes we find a great deal of fault with the oils, and think hot boxes come from the oils being too thin; then when we come to the next station the oil is too thick. Where the thin oil is used we have hot boxes and where the thick oil is used we have hot boxes. We are inclined to think, from an oil company's standpoint, that the thicker the oil is the more hot boxes you will have. The brass is separated from the journal by a thin film of oil, so thin that it cannot be measured. Although an effort to measure it has been made by such men as Dudley, of the Pennsylvania Railroad, and many others, yet they have been unable to determine its thickness; so that if you apply a thick oil to the box, either summer or winter, you will have to run the box warmer in order to get this thin film. Now if you use a reasonably thin oil you do not have to reduce it so much--that is you do not have to generate as much heat in the oil box with the thin oil as with the thicker one.

In my opinion hot boxes are caused many times by an overloading of the waste. I am in this business day in and day out, 365 days in the year, and my experience has been that a majority of the hot boxes are due to the waste dropping away from the journals. We go to one railroad and it wants a thick, heavy oil. We are a supply company and we give that company what it wants. Just as soon as the thick oil is placed in the boxes there is more or less trouble, because the thick oil will not penetrate the waste, and the consequence is that we have an overloaded waste in the boxes; and every time a low joint is struck the waste has a tendency to drop away from the journal. We figure a great deal on the springing of the waste. Of course the only thing in favor of the woolen waste is its springing qualities. The capillary attraction of the cotton waste is superior to that of woolen; therefore the only thing in favor of the woolen is the spring. We think that if the little lumps that we sometimes find on the face of the brasses keep the brass from the journal for the time being that the spring of the waste will always feed the oil to that journal. My experience has been such that there is not nearly so much spring as we think there is and, as Mr. Parkinson has said in his paper, the use of the packing iron on cars, and time used, is almost as important as the oil. The car repairer, if the box is a little warm (brasses new, perhaps) and if there is ever so much oil in the box, gives it a little more just because it smoked.

If it is cold weather and the oil is a little thick and heavy, it adds that much weight to the waste. A few years ago we figured on a gallon of oil to one pound of waste. A gallon of oil on top of a pound of rags will not spring it up very high. The ordinary car box will hold a pound and a half of waste, and figuring a gallon and a half of oil we have twelve pounds of packing in the box, the oil weighing ten and a half pounds. As the oil is thick and will not penetrate the waste in winter, we have a large part of the oil on top of the waste, and every time you strike a low joint on your railroad this heavy laden waste will drop away from the journal. It has been my experience that such is the case. Now then, if the packing iron is used, and used properly, the waste is kept in contact with the journal and the box will run for 500 miles. We know that every time a wheel turns round the brass or journal, or both, wears away, and it leaves a separation between the journal and brass. It may be only one hundredth part of an inch, still there is a separation there.

In making a test of hot boxes on the testing machine, by drawing waste from the center of the journal we find a friction is caused right in the central part of the journal. We do not notice it at the front of the box because the waste is well up to the journal there, but in the middle the waste does not touch the journal and that of course becomes dry, it turns black, it heats, we get beyond the fire test of the oil, and it starts to burn the oil. Possibly the space of the axle that was uncovered was only the thickness of one finger, but in a few hours that which was only a dry spot on the journal—only ⅜ to ½ inch in width—becomes two or three inches and the first thing we know we have another hot box. The waste falls away in the box in the center; in the front sometimes, but seldom, because every man that has anything to do with the front of the box gives it a punch, but we cannot say that much for the back of the box. If the car man could get to the rear of the box and give it a punch the number of our hot boxes would be cut in two. If, when our cars are set on the repair track, the man who oils the car were to have the oil can taken away from him and a bucket of dope given to him and be told to pull the waste from the boxes and repack them with new waste, hot boxes on our roads would be cut in two. But he too frequently has only a tool four inches long. You cannot get back in a box eight inches with a 4-inch tool. He uses the same kind of a packing iron now that we did twenty years ago. We sometimes have a little V in the end of it. I have tried for seven years now to find out what it is for, but cannot do so. I know it is a mighty good thing for cutting packing. It used to be the case a few years ago that we wanted the packing chopped. That is done away with now. It chops itself soon enough. I am a little bit of a crank on the packing iron, but you must also bear in mind that where I am a man representing the Galena Oil Co, and a number of you gentlemen use Galena oil on your railroad, you must also remember that when the Galena Oil man offers a recommendation or suggestion that is not practicable to the practical man he is very soon called down, and if the suggestion increases the number of hot boxes on the railroad, when he makes another call the hot box statement is shown him. So that he is not trying to make hot boxes by anything he may say or do. On the contrary his instructions are to first see that good service is obtained on a railroad, and after good service is obtained, save every drop of oil you can.

In conclusion allow me to say that you are putting too much oil in your waste; that it is impossible to keep the waste in contact with the journal if it is loaded down with oil. I have seen so much of this that I cannot keep it from my tongue, that the waste in car boxes today is overloaded and the fact of its being overloaded causes it to drop away from the journal, and if it does not touch the journal the consequence is hot boxes. Soak as much oil in your waste as the wick of a lamp will hold oil. You will then leave some spring in that waste; but if you fill it full of heavy grease it deadens it. If you use summer oil in the winter time it will be heavy. Now then, if you attempt to use that in the summer time, or in the winter time, it will thicken your waste so that the thin oil that you apply will not penetrate the waste and give the journal the lubrication it should have.

Mr. Kroff (P. F. W. & C.): I would like to ask the gentleman about how far a car is to run after it has been packed and oiled—about how many miles before it needs looking after again.

Mr. Walsh: That again brings up the quantity of oil that you have in your waste. You can enter an oil room and find the oil literally dripping from the waste. You find it on the wheels and on the ground. It is a very good indication that you have too much oil in the waste. Now then, if you apply such waste as that it will not stay up to the journal as long as if proper packing had been used. Now in soaking waste figure this way; that your clothes are made of the same material that the waste is, that is if you are using woolen clothes, and if you will fill that waste and get as much oil in it as the wick of a lamp will hold, or as much water as your clothes will take, without running down your back, I will say with all confidence in the world that your car will run one thousand miles without attention, provided that you have a perfect fitting bearing. The reason new bearings run warm is because the pressure is altogether on part of the bearing. There is a high lump, or the bearing may be a little uneven, making the pressure so very heavy that the oil will not flow. The oil will not flow at a pressure of 900 lbs. per square inch. It will flow at 800 lbs. per square inch, but if you overcome that and bring it up to 900 lbs. it will not flow, so that those little lumps will show a bearing of 900 lbs. and the oil will not flow until those lumps are worn away; but if your bearing is perfect, your journal all right and box nicely packed, without too much oil, you can figure that your box will run nicely at least one thousand miles.

Mr. Kroff: I think a thousand miles is too far for a car to run without giving it some attention, for this reason: that the car, running, will draw the waste up on one side and to the front of the box, no matter how much oil there is. I think the waste ought to be looked after about every 500 miles at least. The waste should be shoved back to the back end of the box. Attempting to run a thousand miles without attention may account for some of the hot boxes.

Mr. Walsh: You cannot open and examine the box too often to suit me. I do not want to leave the impression that I do not think the box should be looked after; but I do say that a majority of your boxes that you have attended to in the proper manner will run a thousand miles. But at the end of 500 miles I think the box should be opened and the waste stirred up. With regard to the waste balling up in front: if in packing your box you will cause a wall to be built between the waste under the journal and that in the front of the box you will not be troubled with that balling up. The packing under the journal and that in the front of the box should be entirely separate—no thread connections whatever; that is, if you will have a separation right on the inside of the outside collar, and a roll of waste put in the front of the box, intended merely to hold that underneath the journal, you will find that the balling up in the front of the box will cease.

Mr. Marsh (C. N. Y. & B. Ref. Co.): I believe that one great preventive for hot boxes is mechanical perfection in the construction of cars. With a properly fitting journal and box properly packed there will be no trouble.

Mr. Longfellow (C. M. & St. P.): After fifteen years daily experence on the road, averaging, as I do, 1,000 miles a month on freight cars, I have come to the conclusion that Mr. Bundy is right. The last gentleman that spoke fully endorses my opinion. I think the mechanical construction is largely at fault. But there is one point that has been made that I do not quite agree with and that is with reference to the use of the packing iron. In my experience the packing iron in the hands of a careless person is a dangerous article. I at one time found our freight cars running very hot. They would come into Council Bluffs perfectly cool. On one occasion I remember distinctly, there were two or three cars taken off Union Pacific passenger trains and put on our passenger trains. I went around the cars and examined the boxes and found every one cold. I congratulated myself that we would have no trouble whatever. Twenty-one miles out of Council Bluffs I was advised by the conductor that we had three hot boxes, and upon examination I found his statement correct, one of them being very warm. We run along with the use of oil and by repacking them, but found we could not do anything with them. At Manilla, 60 miles out, we had eight hot boxes. Now what caused those boxes to heat? The journals and brasses were in good condition. They were not worn out and did not indicate anything of tapered journals, but evidently something had caused the heating of those journals and the only thing I can attribute it to was pushing the waste back in the box. The sand and dirt that had formed on top of the packing coming across the country was pushed under the journal and no amount of oil would make those boxes run cool. I had a hook made and required the men to get the back part of the box loosened up and applied oil there. When that was done our hot boxes ceased. I think the packing iron in the hands of a careless man is certainly a great nuisance on a railroad. I think the matter of the use of oil, as spoken of by Mr. Walsh, is a good one. I think we use too much oil; but we do not put it in at the right time. A heavily loaded freight car needs a slight oiling every 500 miles, at least.

Mr. Walsh: I would just like to have one word to say to Mr. Longfellow. Now I do not believe in handling the packing iron in the way Mr. Longfellow possibly found his men handling it a few years ago, when he had this trouble. I just wish to ask Mr. Longfellow if the use of the packing iron as applied by his men today is not a good thing, and I wish to ask if his system of using the packing iron today will cause the waste in the back of the box to become thick and hard back there. That is what I would like to bring out, because I am responsible for this packing iron in different places and if the packing iron is put in a car in a way that will stiffen the waste and have a tendency to harden it, it is wrong. We want to keep the waste soft, and I would like Mr. Longfellow's idea as to how a packing iron should be used, or if it can be used in any way and be beneficial to the car.

Mr. Longfellow: As I said before, if I had my own way about it the packing iron should never be used unless the box is thoroughly repacked. The packing iron as used on the C. & C. B. Div., in Iowa, of the C. M. &

St. P. Ry. is all right, but it has been severe hard work that has brought that about. The packing iron now in use at Council Bluffs, Mr. Walsh said, was the best packing iron he had seen. But I do not dispute the fact that it is the general custom of men in getting around, to jam the iron in the box, as though caulking the seams in a vessel, and when this is done it is wrong. The packing iron, if placed in the back part of box and packing loosened, may not do any injury.

Mr. Walsh: With reference to putting a hook into a car box I look at it in this way. Can you drive a hook into a ball of waste and pull it out again without pulling some packing with it? You cannot loosen up the waste too much to suit me. I think the waste should be removed from a car box and the box repacked whenever there is an opportunity. But the question that bothers me is can you raise that waste to contact with the journal with a hook. It appears to me that when you pull your hook out from under your journal you cannot help pulling some waste with it. Now my system of handling the packing iron is this: The packing iron, according to my way of using it, is never placed in the front of the box. We make the packing iron 1½ in. wide on the end; that seems rather wide for a packing iron. We take the flat side of the packing iron and we put it in the side of the box, using the side of the box as a guide until we get to the rear end of the box; then raise the handle of the packing iron as high as we can and then turn it over. The other side of the box is treated in the same way. The forcing of the waste from each side causes it to raise in the center and touch the journal. Now then, we have not cut any of the waste, nor have we forced any waste to the back of the box. We have merely followed the side of the box and when we turn the packing iron it forces the waste over to the journal the width of the packing iron.

Mr. Bundy: I am a little like Mr. Longfellow. I think the packing iron is all right in its place but I think it has been misused a great deal. I find that a great many of the car men keep pushing the waste back into the box and the result is it gets packed too tight. We found, in pulling all the waste out of the boxes, and putting it through a picker, that we had more waste than we could get back into the boxes. At that time it was costing 14 or 16 cents per 1000 miles, and we reduced that to 6 or 7 cents for freight and from 22 to 11 or 12 cents on passenger cars. I believe that after a car has been packed and has made a run of say 500 miles, it needs a little attention. The waste will probably need replacing in the box and possibly need a little oil, but not always.

Pres. Sharp: Before taking up the next question I want to call attention to the changes in the constitution and by-laws which were presented at the last meeting. It will be necessary to take a vote on this tonight. As the changes are slight I do not think it necessary to have them read again, and unless there are some objections we will proceed to vote.

The changes were then voted upon and unanimously carried.

Charges for Pintsch Gas.

The meeting then took up the question: "What is the price generally charged by Chicago lines per receiver, for Pintsch gas furnished? Should any additional charge be made in excess of the Pintsch Co.'s price?

Mr. Grieb: I would say that with but one exception I have always found that there was a uniform charge of 85 cents per receiver for gas delivered in the tank—net price. We have, however, run across one man representing an eastern line, who charged about 10 per cent additional, which he claimed represented the price that he paid somebody else for charging the car—introducing the gas into the tank. We had some little controversy at the time and finally paid the bill, as the amount was small, but the principle was not satisfactorily adjusted. I have made some inquiries but cannot find any one who charges more than 85 cents. We have no charging plant of our own and obtain our supply direct from the Pintsch Compressing Co., who charge a uniform rate of 85 cents per receiver. There may be some one present who is familiar with a practice different from this and who can explain why an additional charge should be made.

Mr. Cather (I. C.): I have never yet received a bill from any road for anything but the usual rate of 85 cents per receiver, and that, as I understand the matter, represents the cost of the gas placed in the tanks on the car. That is the way we are paying it; and in all interchange of cars, and there are many every month, the uniform rate is 85 cents per receiver, both east and west.

Mr. Bates (C. B. & Q.): I am not in the passenger department, but I have made some inquiries as to the amount charged by the Pintsch Co., and also by other lines, and I find that the charge is 85 cents per receiver. We have never received a bill for anything more than that.

Mr. Weschler (P. F. W. & C.): All our cars are charged by the Pintsch Compressing Co. and we pay 85 cents per receiver for gas furnished in the tanks. I do not think that any additional percentage should be added, because there is no loss to the railroad company. The Pintsch Compressing Co. fill the tanks on the cars and if there is any loss they should stand it. On cars interchanged it is the same way.

Mr. Evans (B. & O.): It seems to be the universal practice at Chicago for the Pintsch Compressing Co. to fill the tanks in all cars by their own men. I know of several points where it became necessary for the railroad people to have their own man do the work, but invariably the Pintsch Compressing Co. billed 85 cents per receiver, so I do not see how you can charge more than 85 cents. That, of course, is simply an arrangement between the railroad and the Pintsch Compressing Co.

Owing to the lateness of the hour the discussion of question number four was postponed until the next meeting. Mr. H. H. Harvey, of the C. B. & Q., at Chicago, then presented his paper on air brake repairs, as follows, after which the meeting adjourned:

Repairs on Air Brakes on Box Cars.

In presenting these suggestions as to the best and most economical method of handling repairs to air brakes on freight cars, I would say that the method to be described has been in successful operation for three years, and while it can be most advantageously used at a terminal station, where a great many cars are handled, it can be modified to suit the conditions at smaller stations, where they have fewer cars.

My remarks will be confined principally to the triple valve, as it is the most intricate and important part of the freight car equipment. I think we will all agree that ten months or a year is the limit any triple should run without being overhauled.

Some roads are, I believe, cutting this limit down to eight months, and in my opinion this is a wise thing to do, only I would prefer seeing it carried further and make six months the limit.

When one sees triple after triple opened up and notes their condition after only a few months' service, he is led to inquire how we can expect good results from our air brakes when we allow this vital part of the equipment to get in such a condition.

The increased efficiency of the air brakes will, I think, amply repay any company for the money expended in overhauling triples oftener.

To get the most satisfactory results, triple valve work should be confined to as few hands as possible, and to do this it is best to have one man overhaul all triples at his station and hold him personally responsible for all defects found in his work.

As an illustration I will state that at Chicago, on our road, we catch from twenty-five to thirty triples a day, and one man easily overhauls this number, cleaning, oiling and making all necessary repairs, but to do this he must be furnished with good tools and a warm place in which to work.

We have four yards in which we station air brake men, and they each catch from five to eight cars per day. These men make no repairs whatever on triples, simply clean and oil cylinders and exchange dirty triples for ones previously overhauled and stenciled by triple valve man. From five to eight cars so handled, along with the other air brake work found on cars in yards, is considered a fair day's work for a yard man.

To enable us to handle our triples in this way we carry a sufficient number of extra ones to supply our yards each morning with the number required for the day.

To illustrate, a yard changes eight triples a day. We send him this number on a certain train or yard engine each day, these triples being stenciled one day ahead, so that he uses to-day the valves overhauled yesterday. He sends the dirty valves to us on a certain train, and they go to triple valve man, who overhauls and stencils them. Should a yardman have some extra work come up and be unable to change his usual number, we send him only enough good triples to replace dirty ones sent us.

In shipping triples from shops to yards a brass tag with shop foreman's name and station on one side and yard foreman's on the other is used, these tags having a slot at each end to admit a strap something like a baggage check strap. When sending triples to shop, the strap is run through slots and covers yard foreman's name, and vice versa when they go to yards.

To keep dirt and cinders from getting into valves while in transit, we use a piece of one-inch pine, about six inches in diameter, counterbored to fit bottom of triple, securing it to triple with one carriage bolt. A union fitted with a pine plug is used to cover train pipe opening.

When a yardman locates a car he wants to overhaul, he takes a clean triple to it, cleans and oils cylinder, removes dirty valve, blows out pipes, takes board and union from clean triple, and puts it on the car, putting his board and union on the dirty valve.

In each yard not piped with air the yard man is furnished a small double cylinder pump, to which is attached a gauge, and when car is finished he tests it to see that everything is in working order.

Right here I would call attention to the necessity of carefully cleaning triple and drain cup strainers, also blowing all dirt and scale from pipes, before applying clean triple.

This explains method of handling repairs in yards, and we will now turn to triple valve room.

This may be any size desired, but a room eight by fifteen feet is amply large for a shop where from twenty to thirty triples are handled daily.

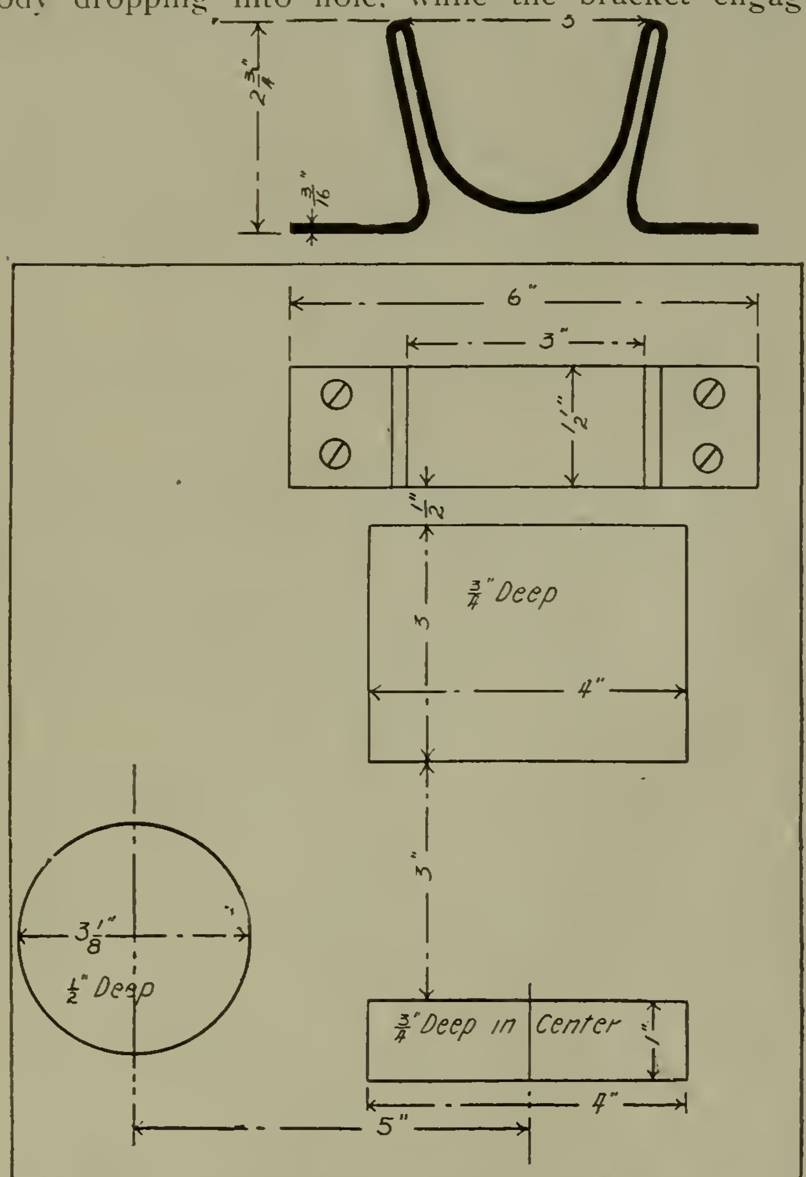
There should be conveniently arranged on one side an engineer's valve, cylinder, reservoir, sixty-eight feet of $1\frac{1}{4}$ in. pipe to represent an engine and one car, a work bench with a folding seat attached, a vise and a small air hose with nozzle.

On the other side put a cupboard for supplies, etc., and about three rows of shelves on which to lay triples.

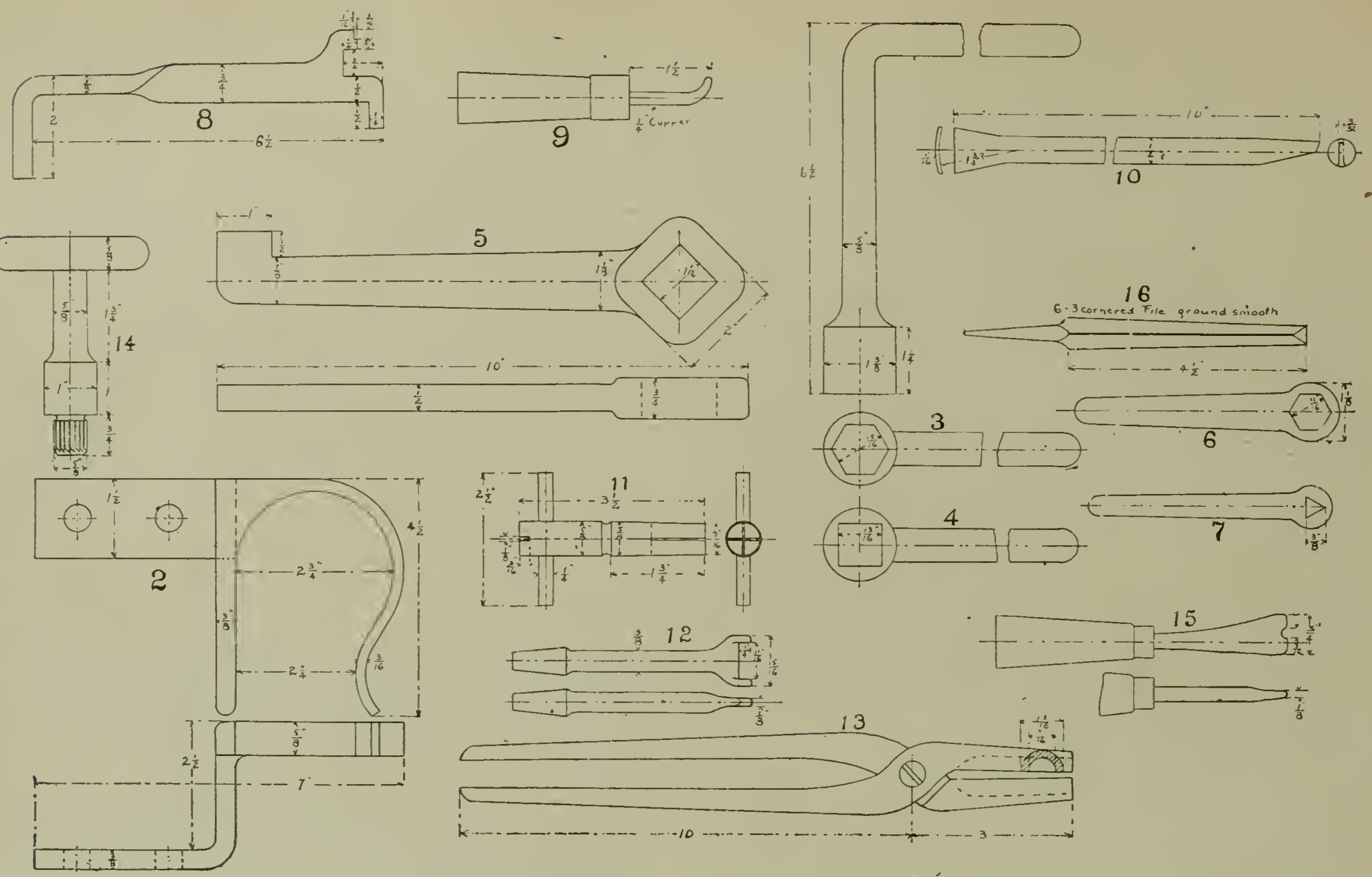
With your permission I will now show some fittings and tools that are very convenient for triple valve work.

Some of you are probably already using part or possibly all of these tools, but there may be some who are not, and to those who are not the exhibit may be of interest.

No. 1 is a section of a common whitewood board, to be nailed to top of work bench. You will note it has a hole three and a quarter inches in diameter counterbored about three-eighths of an inch deep, also two oblong slots and a small iron bracket. When working on cylinder cap end of triple, the valve is placed face down on this board, the projection on bottom of triple body dropping into hole, while the bracket engages



No. 1—Special Work Bench Board for Triple Valve Work.



Tools for Repairing Triple Valves.

check valve case and keeps valve from turning while nuts are being removed and replaced. When working at check valve case end, the triple is stood on end, the flanges on body and cylinder cap fit into slots, and the cylinder cap is held by bracket. This arrangement does away with necessity of using a vise to hold triple while dismembering and assembling.

No. 2.—A bracket to fasten at end of bench to hold check valve case while grinding in check valve.

Nos. 3, 4, 5, 6 and 7 are wrenches in common use.

No. 3 fits cylinder cap bolts.

No. 4 fits check valve cap screws.

No. 5 fits graduating nut. (It is necessary to have two of these, one to fit square nut, the other for hexagon nut.)

No. 6 fits old style emergency valve nut.

No. 7 fits new style emergency valve nut. Nos. 6 and 7 may be combined, having one end for new style and other for old style nuts.

No. 8.—A tool for removing emergency valve seat.

No. 9.—A copper awl for cleaning out port holes, etc.

No. 10.—A gouge and scraper, the gouge being used to enlarge feed port in main piston.

No. 11.—A plug to fit into check valve.

No. 12.—A bit fitting into a carpenter's brace, and used in connection with No. 11 in grinding in check valve seat.

No. 13.—Plyers to catch end of main piston stem when fitting packing ring to bushing.

No. 14.—Reamer to true up hole in emergency valve seat.

Nos. 15 and 16.—Scrapers for various uses.

Other tools will be needed from time to time, but if one man devotes his time to triple valve work exclusively, he will soon provide himself with everything needed.

Locate the small air hose previously mentioned within easy reach of triple valve man, and adjust with cord and pulley, so it will slide up out of way when not in use. This jet of air is indispensable in getting rid of dirt and grease. Use cotton rags instead of waste, as shreds of the latter may adhere to slide valve or other interior parts of triple and give trouble.

In overhauling a triple begin at check valve case end. Remove case, scrape dirt from inside, blow out well, and place it in bracket ready for grinding; clean check valve and place it with case; rub a well-worn, smooth file over seat for emergency valve two or three times to remove surface dirt, and finish with fine emery cloth; remove seat, true up stem hole, take out piston, see that it has plenty of clearance, so it wont cock up on one side, swab and blow out bushing, grind check valve seat, and assemble parts. Turn valve over, remove graduating nut, clean stem and spring, blow dirt from cap, replace nut, remove cylinder cap, examine and remove all surface dirt from gasket, but do not remove gasket unless it is bad, as it frequently does more harm than good to remove this gasket when it has a perfect seat; take out main piston and drop it into a pot of kerosene to soak, swab bushing and clean out port holes, blow dirt from bushing, take piston from kerosene, work packing ring back and forth to loosen up dirt, blow dirt from around it, examine well to see that ring fits bushing and is of the proper thickness, look at graduating and slide valves, see that all port holes are clean, and after wiping and blowing dirt from piston, oil bushing, replace parts, and valve is ready for test. We have tried numerous articles for grinding purposes, but get best results from Trojan grinding compound, using the medium grade for first grinding and the extra fine for finishing.

Among the things to be guarded against in overhauling triples I will mention those that are most common:

1st. Packing rings too thin or not fitting bushing properly. If a ring is too thin the air may blow around it even though it fits bushing perfectly.

2d. Loose cap screws, these must be tight or a leaky check valve case gasket is the result.

3d. Imperfectly seated slide valves; frequently an almost infinitesimal file cut from edges of guide on end of main piston will save a great deal of grinding.

4th. Poor rubber seats and check valve case gaskets.

5th. Feed port in main piston too small or too large; if too small, enlarge it, if too large solder it up and make a new one.

Among the tests to which every triple is put I will mention four which cover the ground pretty thoroughly:

1st. Slide valve test, made by noting if air blows through exhaust port when charging up.

2d. Packing ring and emergency valve test, made by having train pipe arranged with a by pass in which to insert a brass disc with a 1-32 in. hole.

Cut out train pipe and test through disc.

3rd. Check valve and cylinder cap gasket test, made by having a cut out cock in train pipe about two feet from triple; between this cock and triple place a small bleed cock. Cut out train pipe and exhaust air from pipe through bleed cock; if it continues to blow something is wrong.

4th. Graduating valve test, made by making a service application, putting thirty or forty pounds of air in cylinder, placing engineer's valve handle on lap and watching gauge. If gauge continues to show same amount valve is O. K.

In summing up the advantages gained by this method of handling triples I may mention:

1st. Better work. We formerly had five men who overhauled triples in Chicago and while they did the best work they could they were handicapped badly by poor facilities, bad weather and other causes. Most valves were overhauled right where they were removed and it was too much to expect good work under these conditions, especially in cold weather when the men had to wear mittens. We now have one man who in the past three years has overhauled over seventeen thousand triples and profiting by the experience gained in so doing, he has become an expert and is capable of doing good work and lots of it. Complaints of poor work have practically ceased and his capacity for turning out triples seems to be limited only by the number we can give him to overhaul.

2nd. Economy; as regards this I think it is a safe proposition to make that no road in the country handles their freight car equipment for less money per car overhauled than we do at Chicago under the method as above outlined.

*A Mechanical Integrator Used in Connection with a Spring Dynamometer.**

By Max H. Wickhorst.

THE integrator described herein is one designed and gotten up by the author for use in the dynamometer car of the Chicago, Burlington and Quincy Railroad for the purpose of automatically and autographically showing the average drawbar pull or the work performed. The dynamometer apparatus of this car consists of a spring dynamometer, with suitable recording apparatus and recording pens for obtaining a record of the compression of the springs, the distance traveled, the time consumed, and now, also, of the work performed in suitable units, such as mile-pounds.

The mechanical integrator consists of a registering wheel, which slides backward and forward in sympathy with the dynamometer springs, and a circular disk, making in this case nearly three revolutions per mile, and on which the registering wheel slides. The arrangement is shown on attached diagrammatic sketch (Fig. 2), and Fig. 1 also shows the recording apparatus

*Paper presented at the New York meeting (December) of the American Society of Mechanical Engineers.

FIG. 1—MECHANICAL INTEGRATOR FOR SPRING DYNAMOMETER.

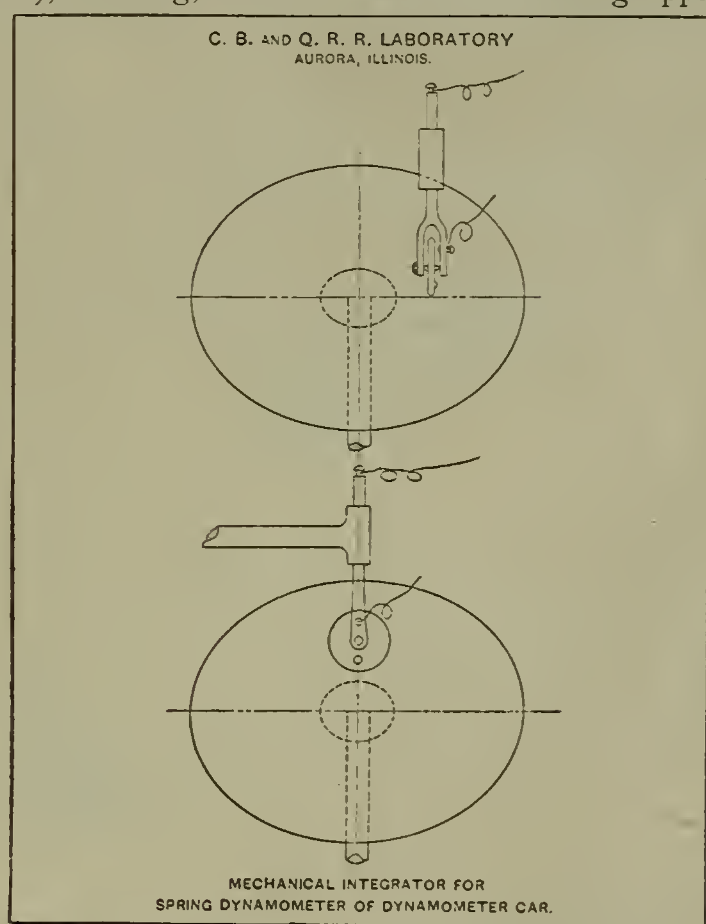


FIG. 2—MECHANICAL INTEGRATOR FOR SPRING DYNAMOMETER.

with the integrator in position. The registering wheel is a small steel wheel 2 inches in diameter, and the disk is brass, 11 inches in diameter. The wheel is so placed that when there is no compression of the springs the wheel stands on the center of the disk. Its plane is at all times at right angles to the line of motion of the spring compression. Thus the farther the wheel gets from the center of the disk, the more revolutions will it make for a given number of revolutions of the disk. The sliding of the wheel back and forth on the disk causes no revolving of the wheel. Only the turning of the disk causes the wheel to revolve, and in proportion to the distance the wheel is from the center of the disk.

In the Chicago, Burlington and Quincy car the dynamometer recording pen makes an ordinate equal to twice the compression of the springs, and the wheel slides back and forth in rigid conenction with the same bars which hold the recording pen, and thus moves the same amount as the pen. Thus, if the pen make an ordinate of 1 inch, the wheel will make 1 revolution for each revolution of the disk, the wheel being 2 inches in diameter and revolving on the disk 1 inch from the center. If the disk makes 3 revolutions per mile, the integrator wheel will make 3 revolutions per mile for an ordinate of 1 inch. Then an ordinate of 1-3 inch for 1 mile causes 1 revolution of the wheel; that is, 1 revolution of the wheel in 1 mile is equal to 1-3 inch ordinate; 3 revolutions, to 1 inch ordinate; 6 revolutions, to 2 inches ordinate; 15 revolutions, to 5 inches ordinate, etc. Let a = number of pounds necessary to produce a 1-inch ordinate, then $\frac{a}{3}$ = mile-pounds of work for each revolution of the integrator wheel. The work represented by each revolution of the integrating wheel may be found by the formula shown below.

Let w = mile-pounds of work per revolution of integrator wheel.

o = any ordinate made by pen.
r = pounds resistance for the given ordinate.
i = diameter of integrator wheel in inches.
d = revolutions of disk per mile.
s = space or distance traveled in miles.
p = average drawbar pull for any given distance.
n = number of revolutions of integrator wheel.

Then
$$w = \frac{r}{\frac{2\pi o}{\pi i} \times d} = \frac{ri}{2do};$$

$$p = \frac{wn}{s} = \frac{rin}{2dos}.$$

Where s = 1 mile, $p = wn$.

Our method of recording the revolutions made by the wheel is to let the wheel close an electric circuit every ¼ revolution. This actuates an electro-magnet, which in turn actuates a recording pen. Thus, when the car moves, the paper moves under the pen at the rate of 12 inches per mile, the pen making a line, and at every ¼ revolution a notch is made in this line. By counting the number of these notches for any mile, and then multiplying by the proper factor, we get the mile-pounds of work for this mile, and by then dividing by 1, the average drawbar pull.

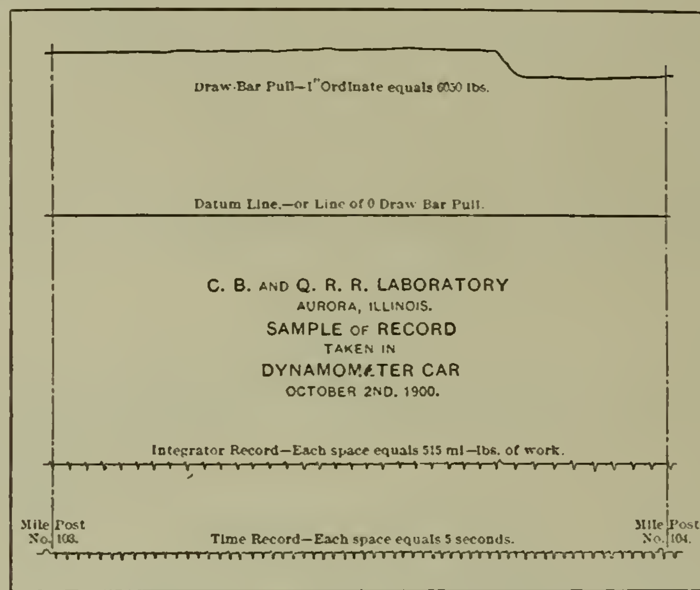


FIG. 3—INTEGRATOR RECORD.

To show how the integrator record is taken, a facsimile copy, reduced (Fig. 3), of the record taken in the dynamometer car is shown. It will be noticed that this record leaves the integrator readings in such shape that they can be checked by means of the planimeter. Such checkings have shown that with ordinate of 3 or 4 inches the integrator and planimeter results agree within a fraction of a per cent. With small ordinates the differences amount to 1 or 2 per cent, and occasionally more, depending on the care taken to set the integrator wheel correctly on the center of the disk, where there is no strain on the dynamometer.

Finally, I wish to express my thanks to Mr. P. H. Cummings, who made the necessary shop drawings, and looked after the details of making the instrument and made many valuable suggestions, and also to Messrs. J. C. Thorpe and E. V. Hanson for their work and suggestions in connection with same matter.

*New Recording Air Pyrometer.**

By William H. Bristol.

THE instrument herein described has been designed to meet a demand for a pyrometer to measure temperatures of high ranges, and to give continuous records of changes of such temperatures on a moving chart; also to produce an instrument which would be self-compensating for barometric and thermometric changes of the atmosphere without introducing delicate mechanism which would tend to inaccuracy and to preclude its use for commercial purposes.

The diagram (Fig. 1) shows the arrangement of the parts of the pyrometer, which consist simply of a porcelain bulb connected by a capillary tube to a recording pressure gauge. The stem of the porcelain bulb is made of sufficient length to pass through the furnace wall. The capillary connecting tube is made of seamless copper.

The recording pressure gauge employed is constructed on the same plan as those previously described, in which each pressure tube or spring is constructed on the Bourdon principle, and consists of a tube of closely flattened cross-section formed into a helix of two complete turns. Two of these pressure tubes or springs are employed in the recorder—one of these, the indicating tube or spring, being connected to the air bulb by the capillary tube, and adapted to be turned axially by the variations of pressure due to changes of the temperature to be measured; the other, a compensating spring, is mechanically attached to the free end of the indicating tube or spring.

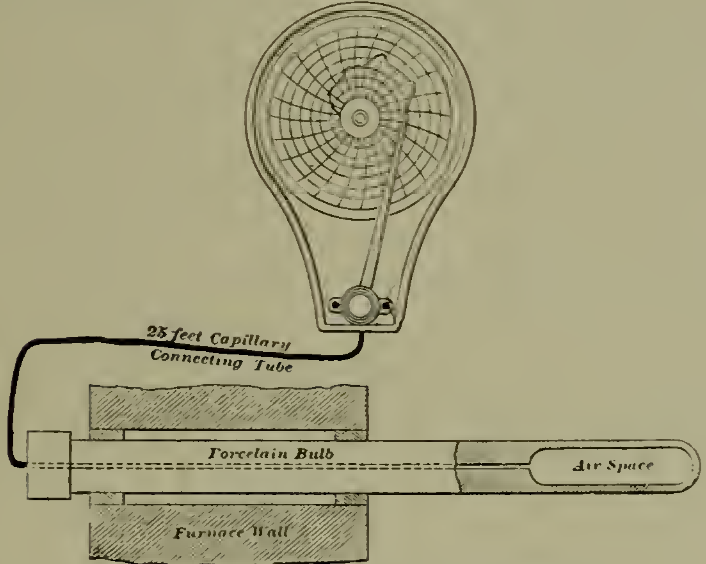


FIGURE 1—RECORDING PYROMETER

The compensating spring is adapted to be turned axially by variations of atmosheric pressure and temperature in a direction opposite to the motion of the first or indicating spring under the same influences.

Fig. 2 shows an interior view of the recording portion of the instrument. The compensating and pressure tubes are lettered respectively *A* and *B*. These tubes are made of equal strength, hence external or internal pressure will produce the same angular movement in each.

The air bulb, capillary connecting tube, and indicating spring are almost exhausted of air, so that when

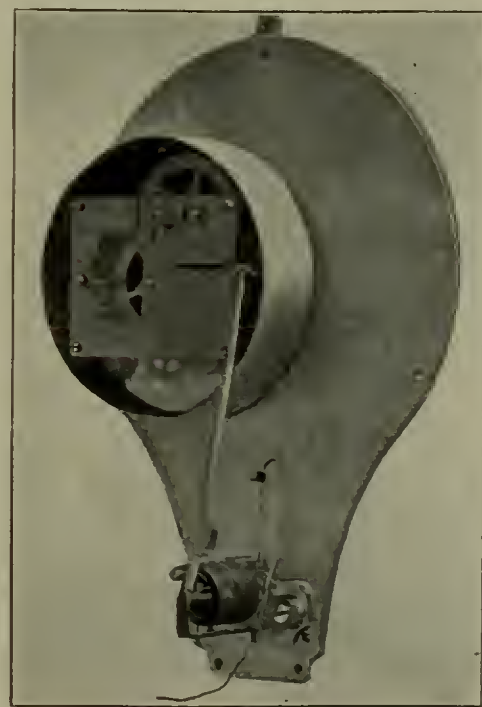


FIGURE 2—INTERIOR VIEW.

the air bulb is cold, it is subjected on the exterior to nearly atmospheric pressure; but when the bulb is exposed to high temperatures, the remaining inclosed air is expanded so as to practically balance the external pressure, and the bulb is relieved of strains which would, in its weakened condition, tend to injure it.

Fig. 3 shows the indicating and compensating springs of the recorder on an enlarged scale. *C* is the bracket to which one end of the indicating spring *B* is secured; *D* represents a portion of the capillary connecting tube where it enters the stationary end of the indicating spring. The compensating spring *A* is helically formed in the same direction as the indicating spring, but of a larger diameter, so that it may be placed outside of and

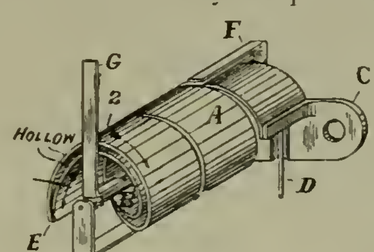


FIGURE 3—INDICATING AND COMPENSATING SPRINGS.

concentric with the indicating spring, as shown, and is mechanically attached at *E*, there being no opening or connection between the interiors of the two springs. At the free end of the compensating spring a bracket *F* is soldered, making a rigid connection to a shaft through the center of the springs. At the front end of the shaft the recording arm *G* is rigidly secured.

To illustrate the operation of the compensating spring, assume that the air has been partially exhausted from it, and that the barometer rises under such a condition the indicating spring would turn to the left (Fig. 3) if the compensating spring was not present;

*Presented at the December meting of the American Society of Mechanical Engineers.

that is, in direction of arrow 1; but the compensating spring *A* being present, and tending to turn to the right as indicated by arrow 2, through the same angle, the effect of changes in atmospheric pressure is neutralized, and the position of the recording arm is unaffected by the rise of atmospheric pressure. For the same reasons there would be no movement of the recording arm where there is a fall in atmospheric pressure.

If the air is not entirely exhausted from the compensating spring, it will also compensate for thermometric changes in the same manner, the indicating spring tending to turn in the direction of arrow 1 when the temperature falls, and in the direction of arrow 2 when it rises; while the compensating tube will be turned in opposite directions equal amounts under the same influences. By leaving the proper amount of air in the compensating spring the compensation may be made perfect for any change of atmospheric temperature, provided the air bulb is at a given temperature. The error for small variations from the average temperature to be measured will be so small that it may be neglected. As the tubes are turned in opposite directions by barometric and thermometric changes, it is evident that there will be no movement of the recording arm unless due to changes of pressure communicated to the indicating spring through the capillary tube from the air bulb exposed to the temperature to be measured.

The helically formed pressure springs are particularly well adapted for use in this instrument on account of the small internal space, which, together with that of the capillary connecting tube, forms a small volume in comparison with that of the air bulb.

Thus far, special attention has been given to working out the mechanical features of the instrument, and to determine experimentally on the most practical form of the porcelain air bulb, and how these bulbs may be applied to continuously record high temperatures. As the volume of air space outside of that exposed to the temperature to be measured is very small, and as there are no corrections or computations necessary for barometric or thermometric changes, it will be a simple matter to calibrate the instrument according to the theory of the air thermometer, which is a recognized standard for measuring temperatures. The instrument here exhibited has been calibrated by comparison with a standard from 32 degrees up to 600 degrees Fahr., and by the melting points of aluminum and copper for the scale up to 2,000 degrees Fahr. This instrument is the joint invention of E. H. Bristol and the author.

*After Graduation.--What Next?**

By George M. Basford.

You are soon to come to the decision, "What next," and I am safe in saying that you do not all know your possibilities, and that comparatively few know just what you are best fitted for. It is specially important, under such circumstances, to seek opportunities rather than positions. It is well to be informed as to what others are doing. Study their work in its bearings upon your own, and use the ideas of others as improved upon by yourself. The technical press may be made a factor in your experience if properly used, and you can help yourself by the right sort of reading. It is a good plan to acquire experience in writing. A well-considered article in a technical journal of high standing once or twice a year brings the writer's name into pleasant and profitable prominence, and a good paper on a vital subject read before one of the technical associations is exceedingly helpful in acquiring and extending acquaintance. It is a serious mistake to neglect opportunities of this kind. The writer also profits directly because he crystallizes his own opinions in telling them to others. The reputation gained by having one's name at the head of good articles on important subjects is not to be despised. If you think you cannot write well enough, perhaps some editor will be glad to help you. Whether you write papers or articles or not, subscribe for the best technical papers and join an engineering association or railroad club.

It is not sufficient to know something, it is necessary that others should know that you know it, in order to open the opportunities for which you are prepared. Many complain that they are not consulted and that they have no chances, being kept in the same old ruts and not entrusted with important and interesting matters. Doubtless such a situation would be changed by well-considered suggestions to superiors, carefully worked out and presented in finished form. One may urge and argue with his superiors, hoping to induce them to take up some improvements, but if put in the form of a complete scheme, with perhaps alternatives, the arguments, even if not successful, will carry an impression of ability and earnestness which will not be lost.

There was never a better time for young men to enter locomotive work than now. For years the chief improvements have been in the form of increased weight and size, and motive power men have generally found the problems presented by the traffic and passenger departments more important and more pressing than those affecting economical operation. The demands for fast and heavy trains are growing not less, but more severe, and the development in size and weight has been carried to a point which compels attention to economy for its own sake, and also because of the fact that increased economy means increased capacity and more horsepower without exceeding the limitations of clearance and weight. The question now is, as put by Mr. E. M. Herr, how to enable a fireman to shovel more horsepower into the firebox. The fireman's limit has been reached and in some cases passed, and this fact seems

*From an address delivered at Purdue University.

likely to exert a most important influence on the future design of locomotives. The desire to postpone the day of two firemen on a locomotive has already led to the consideration of the wide firebox. One after another of the improvements which have marked the progress of other branches of steam engineering will probably come up for consideration for the same reason, to relieve the fireman, and also to increase the capacity of the locomotive. This will probably mean much for the locomotive and also for the young men who prepare themselves to take a part in its future development. A total weight of 250,300 pounds for a locomotive has been reached; the wheel loads are probably as high as they can go with present construction, and recently the boiler of a well-known high-speed passenger locomotive of a western road has been adopted without change for a heavy freight engine of an eastern road. The locomotive is clearly in a most interesting stage, and it offers a worthy field for the best of talent. The questions are difficult, and they call for knowledge, ability, experience and business judgment.

Engineers have always been consulted as to what certain things will cost; they are now also asked whether projected schemes will pay, and the most successful engineers are those who can answer both questions. It is necessary to acquire ability to see what should be done and to render opinions to practical, hard-headed men, which will convince them. Technical considerations should be used to form opinions, but they usually will have less weight with so-called practical men than simple, common sense reasoning.

The importance of clear expression and convincing argument in the work of a mechanical engineer will appear forcibly under the sharp and not always considerate criticism of superiors, and opinions put in form of reports of investigation must stand criticism if they are to become precedents for practice. A reputation for clear and correct reasoning and painstaking search to the bottom of things will be very helpful, and it will pay to prepare in every possible way to get such a name.

The late David L. Barnes once advised a young engineer to acquire, if possible, the reputation for being a "hustler," because, when once so considered, the idea would be permanent among his friends. Rapidity, combined with accuracy and thoroughness, should be sought for. It is surprising to what an extent these may be acquired by practicing intensity of application.

There has been a tendency for technically educated young men to seek work which was congenial and most directly in line with their studies, positions in mechanical engineering being particularly attractive. This is illustrated by the preponderance of applications for mechanical engineering positions by a large number of young men, graduates of technical schools, who have recently expressed their preferences. The railroad mechanical engineer is a very important and useful official, and his position is a highly desirable one, with intensely interesting duties. The demand, however, is for a small number of such officers, while a large number of executives are wanted. On the Pennsylvania Railroad proper there are 16 master mechanics and only one mechanical engineer. This is probably a fair proportion in the opportunities. To one who has studied the situation it appears that there is a demand for men who can direct departments and undertake minor responsibilities as foremen and general foremen.

A prominent motive power superintendent recently sought assistants for relatively minor positions with a view of improving the personnel by securing men who would be eligible for promotion, and he expressed a desire for technical school graduates who knew how locomotives and cars are made, and who knew men and could actually do things. He was careful to say that he did not want draftsmen or test experts. A portion of his letter is quoted, because it contains an idea which is worthy of considerable thought. He said: "We could give employment to several men as gang bosses and foremen. I would like to get a number of intelligent, ambitious young men in the service of this company, with a view of having them on hand when vacancies occur. These young men should have some practical experience, as this would insure early promotion. We could employ a few young men from polytechnic institutes if they have had sufficient experience to hold their own as machinists. We could not promise employment to purely technical men, as we have all the draftsmen we require and have no testing department."

Promotion of young men on several railroads is very carefully managed, and, whenever possible, the higher position is given in another shop, and not the one in which the advancement has been earned. This is mentioned because it recognizes a feature of human nature which should be understood because of its bearing upon the foundation work of young graduates, and to this principle earnest attention is invited.

*Suggestions as to Fuel Economy.**

By Ira C. Hubbell.

THERE probably has been no time in the history of the railroads when all persons have so generally recognized the fact that the railroad presents problems of gigantic proportions, and probably never before in the history of our railroads has there been as great effort made in the practice of intelligent economies of operation as exist at this period. There is no department of railway operation but what has its problems with which the heads of the respective departments are confronted.

In the "Advance Copy of the Twelfth Annual Report of the Interstate Commerce Commission" for the year ending June 30, 1899, the following items of expense attract attention:

Repairs of roadway	$87,307,140.00
Engine and roundhouse men	78,913,978.00
Fuel for locomotives	77,187,344.00
Train service	61,756,607.00
Station service	61,160,732.00
Repairs and renewals of freight cars	57,320,521.00
Repairs and renewals of locomotives	50,555,264.00
Switchmen, flagmen and watchmen	33,791,383.00
Renewals of ties	23,623,325.00

There are several other expense accounts in the list closely approximating and in excess of $10,000,000.00. This aggregation of figures forcefully illustrates the immense detail continuously before those who have the active management of the several railroad properties. An analysis of the table from which the figures above given are taken reveals the fact that "fuel for locomotives" is the greatest single item of expense with which the railroads are confronted, in that in the accounts—"repairs of roadway," etc.—are necessarily included more than the one item entering into these expense accounts. Your subscriber is not able to verify the statement, notwithstanding he hazards the opinion that the fuel expense in all classes of manufacturing is among the heaviest items of expense.

A company may engage in a manufacturing business that will necessitate a power plant costing several thousand dollars, but it is simply the question of a comparatively short time when the amount that has been paid out for fuel is considerably in excess of the first cost of the power plant. This fact is largely responsible for the development that has taken place in economizing the power plants in these, and even in the smaller manufacturing establishments.

Conditions in stationary engine practice are entirely different from those obtaining in locomotive practice; therefore it has been easier to make the more marked advancement in stationary practice, and in this, if you please, we will include the marine engines.

A well known engineer and writer has made this statement: "The best economy (steam) is attained when the mean effective pressure is highest relatively to the terminal pressure, and anything which will increase the former without correspondingly increasing the latter, or which will diminish the latter without correspondingly diminishing the former, will improve the economy." We speak of the consumption of steam, for behind this is the well known fact that a certain amount of steam means a certain amount of heat, and heat means fuel.

There has been on the market for several years past a class of stationary engines which, so far as the indicator diagrams are concerned, would be quite naturally classed with the locomotive, because of the similarity of steam distribution. In these automatic engines, however, the point of cut-off is determined by an inertia governor, the governor, practically speaking, weighing the load on the engine and so determining the point of cut-off.

In the locomotive, the engineer with his reverse lever supplants the inertia governor, and the engineer regulates the point of cut-off through his experience as a runner.

A certain company, building two classes of stationary engines, decided in August, 1900, to do a little experimenting to determine the actual amount of clearance necessary in the automatic engines to accommodate the compression necessarily resulting under the valve movement in this type of engines, and they therefore constructed a 14 by 14 engine, running 280 revolutions per minute, and used a piston of extra length so as to give this engine at first a clearance of 3½ per cent, and with the result shown in the indicator cards below marked Nos. 1 and 2.

In these cards it will be noted that compression runs considerably above the boiler pressure owing to the limited clearance. It should be stated in connection with cards Nos. 1 and 2 that it was well known in advance that the clearance would not accommodate the compression, and therefore no attempt was made to equalize the valve for the two ends of the cylinder before taking these cards.

The piston was then removed from the engine and its length decreased, giving the engine 5.27 per cent clearance, with the result as indicated in cards Nos. 3 and 4.

In card 3 it will be noted that, owing to the early closing of the exhaust, compression still runs considerably above the boiler pressure at the earlier cut-off, although, as indicated by card No. 4, the engine with 5.27 per cent clearance accommodates the compression resulting from the correspondingly later closing of the exhaust.

The piston was again removed from the cylinder and decreased in its length until the engine had 7 per cent

*Paper presented at the December meeting of the Wester Railway Club.

clearance, with the result shown by the indicator cards Nos. 5, 6, 7 and 8.

In locomotive practice, as a rule, conditions have seemed to require a greater clearance than is shown in the last series of cards given. The locomotive cards indicate the presence of three serious losses: First, a high relative terminal pressure as compared to the mean effective pressure; second, additional waste resulting from excessive clearance: third, excessive back pressure.

Herewith are submitted indicator cards from a 19 by 26 locomotives. Card No. 9, taken at 7 inch cut-off, speed 65 miles per hour, or 317 revolutions per minute.

Card No. 10, 8½ inch cut-off, speed 56 miles per hour, or 273 revolutions per minute.

Card No. 11, 8½ inch cut-off, speed 48 miles per hour, or 234 revolutions per minute.

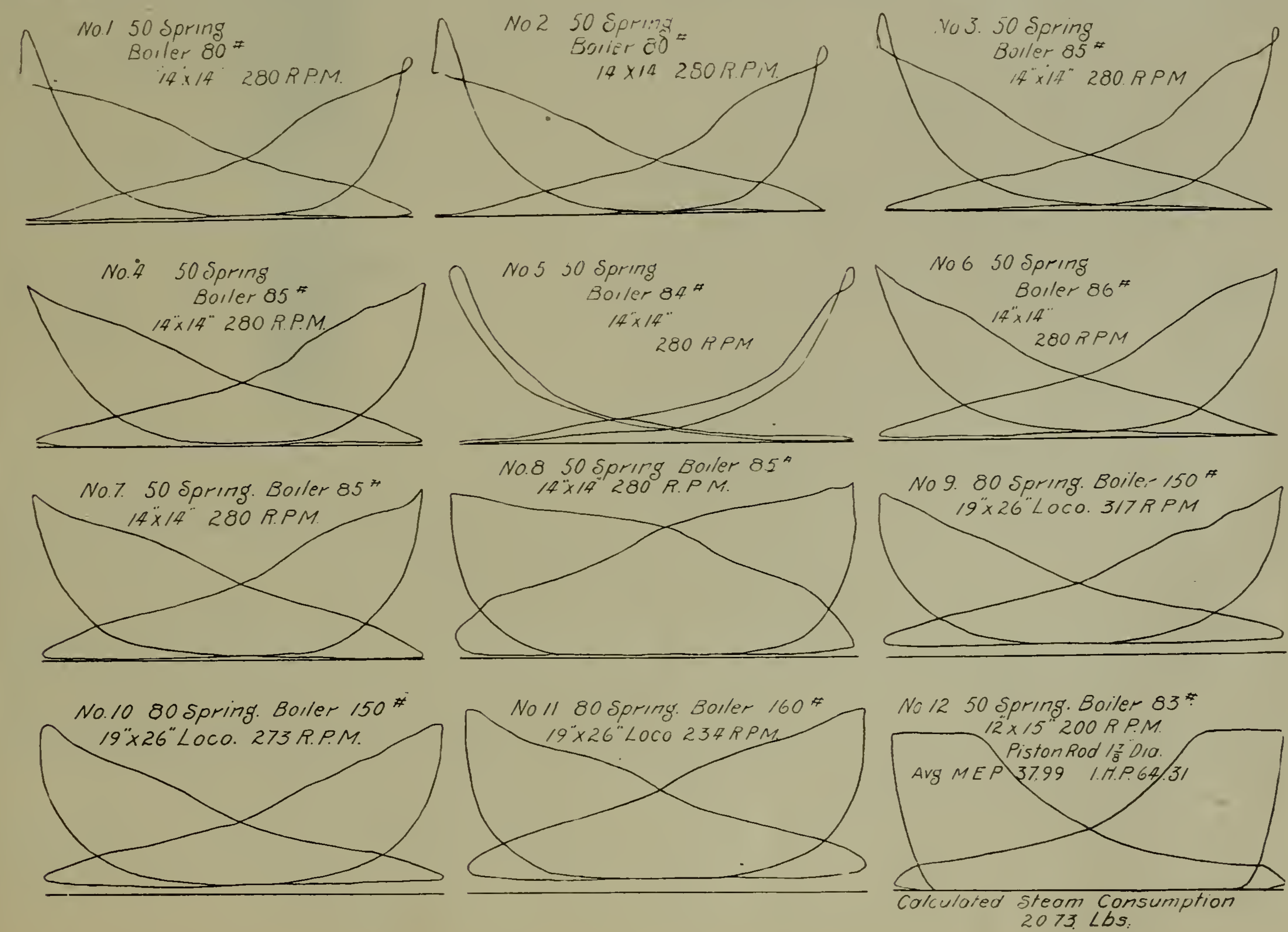
It is, perhaps, impossible to altogether eliminate the loss from back pressure in locomotive performance; however, it would seem that the necessity for fuel economy existing, the way of accomplishment will be divulged, and that we will have in the locomotive a greatly improved fuel economy.

It has long been considered in stationary practice that in the four valve engines we approach closely to the ideal in the steam distribution, notwithstanding in Corliss practice it is considered that a clearance of 3 per cent is practically the best possible result obtainable. There are probably more Corliss engines with greater than with less clearance than stated.

Herewith is given a pair of indicator cards, numbered 12, from an engine 12 inch bore, 15 inch stroke, developing nominally 70 indicated horse power, under 80 pounds initial pressure, at 200 revolutions per minute.

This engine has 1.54 per cent clearance, actual water determination, and has a single valve not altogether dissimilar to the face of the ordinary flat locomotive valve; however, it is so constructed that the valve is thoroughly balanced and avoids the additional clearance necessary with piston valves. The valve movement is of recent development, comparatively, but the result shown commends it to the attention of those interested in the economical use of steam. A study of diagram No. 12 indicates good steam distribution, minimum clearance, although the exhaust is closed at the proper time to bring the compression close to the initial steam pressure, preserving the economy which engineers usually maintain results from a judicious utilization of compression and an absence of back pressure.

An interesting article recently appeared in one of the engineering journals touching upon the various economies possible in connection with the ordinary steam plant, and which is, perhaps, more or less applicable to the locomotive. The article mentioned recalls vividly some of the writer's previous experiences as a salesman of engines, boilers, etc., where the man was told that if he would put in a feed water heater he would save so much per cent of the fuel; if he would throw out the throttling engine and put in an automatic engine he would save so much per cent; if he would discard the in-



jector he was using to feed the boiler, and put in one of the late improved steam pumps, he would guarantee to save him so much more per cent; and if he would replace the old type two-flue boiler he was using with one of modern construction and design, he would save him so much more per cent; and after a while the man had coal to sell after operating his plant to full capacity.

Underlying all of this, however, is a serious question which necessarily must have the attention of the heads of the respective mechanical departments of the several roads.

It has been stated that the locomotive is today producing a horse power on from 26 to 32 pounds of water per indicated horse power per hour; the distribution of steam in the cylinder is such as seemingly to preclude the possibility of any such result. This doubt is the result of the writer's experience in stationary practice, where he tested many of the automatic stationary engines previously referred to herein.

A great deal of time and large sums of money have already been expended in an effort to secure better results in the steam distribution in the locomotive cylinders, and while the devices brought out were capable in a measure of accomplishing the desired steam distribution, nevertheless practice developed the inefficiency of the devices to meet certain conditions seemingly unavoidable in locomotive service. This does not necessarily prove that the desired end will not be accomplished at some time. Given the necessity we can rely upon the "Yankee ingenuity," so-called, to meet the demand.

A Locomotive Graphite Lubricator.

The development of high speed and of high steam pressures in locomotive practice has made the question of successful lubrication more serious than ever before. With increased valve and cylinder areas and increased pressures and speeds there is difficulty in properly lubricating valves and cylinders, especially in bad water districts.

Recourse is frequently had under these conditions to graphite—Dixon's pure flake lubricating graphite for instance. Graphite is the best solid lubricant known. It is not affected by heat or cold, by acids or alkilies; and it greatly increases the life and lubricating value of any oil, tallow or grease to which it is added. But there has always been question as to an effective method of applying it to the surfaces where it is needed.

To meet the requirements of graphite lubrication the device shown herewith was designed and developed to its present form in freight service. This lubricator feeds graphite only and is absolutely reliable in its work. In practice a lubricator is placed as shown in figure 1 on each steam chest, and it does not displace the sight feed oil lubricator in the cab. In figure 2 is shown the internal arrangement of this lubricator. The principal features are the check valves A and B, which check in opposite directions; the piston head C, which has two packing rings D, with fibrous packing around the feed tube E. The piston head C forms the dividing line

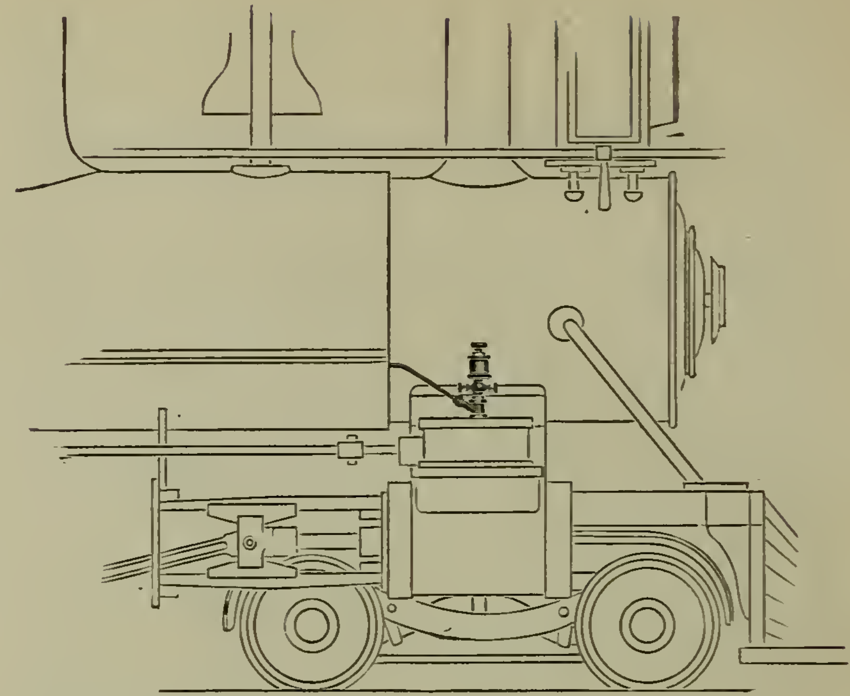


FIGURE 1.—GRAPHITE LUBRICATOR.

between the water and the graphite. The graphite is placed in the lubricator through the filling plug F. When the locomotive is working steam, steam enters through the check valve A, which has a very small port, so small in fact that it will just admit the point of a pin.

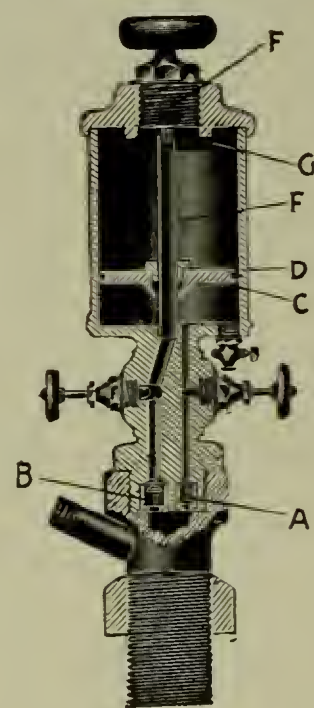


FIGURE 2.—GRAPHITE LUBRICATOR.

The steam passes upward to the space beneath the piston head, where it is condensed, meanwhile moving the piston head up, thus pressing the graphite between the filling plug F and the top of the feed nozzle G. The graphite remains there until steam is shut off. The steam check valve A seats and retains the pressure, water, under the piston head C. The quantity of graphite immediately above the feed nozzle G is drawn down by suction through the feed tube E and graphite check valve B to the valves and cylinders. This operation is repeated every time the throttle is closed and the locomotive is drifting. It will be observed that the graphite comes into contact with the oil as the latter comes from the oil pipe, and they both pass together to the valves and cylinders.

It is claimed for this device, which has been thoroughly tested in both freight and passenger service, that it effects thorough lubrication of valves and cylinders and thus produces increased mileage for valve oil, coal and water; and that the strain on the valve motion is reduced to a minimum. This device is the invention of Mr. A. D. Homard of Massillon, O., a locomotive engineer on the Wheeling & Lake Erie.

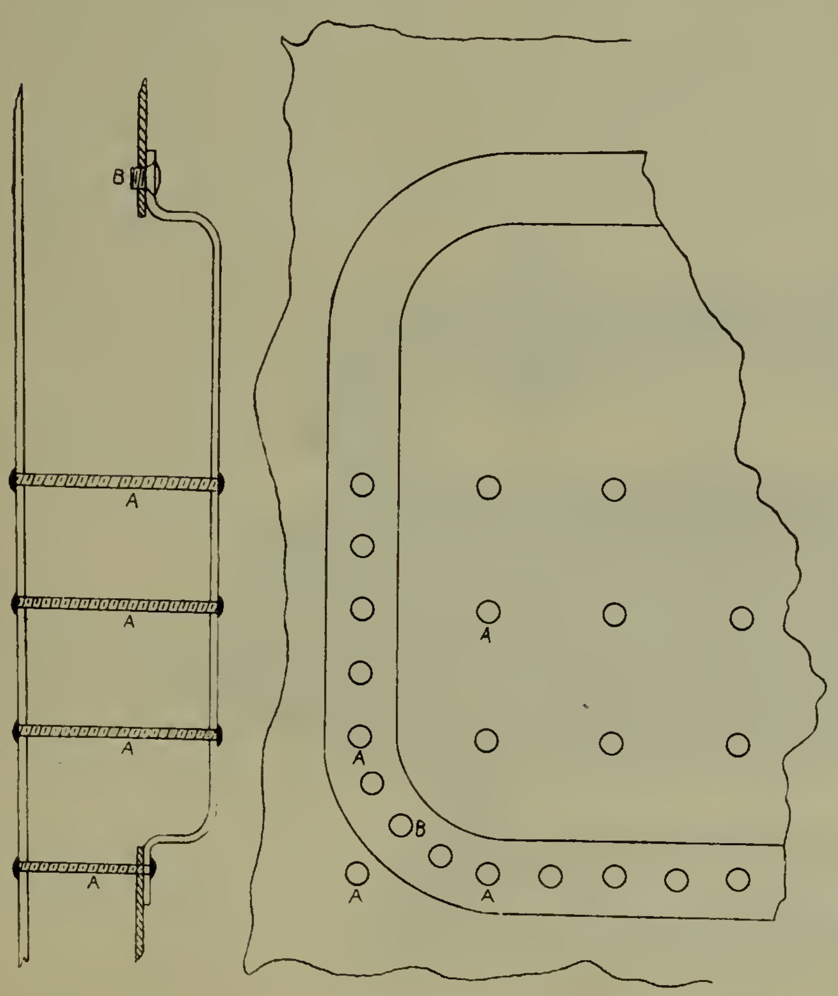
*Box or Raised Patches, and the Best Method of Applying them to Fireboxes.**

By W. H. Graves.

THERE has been of late a great deal of discussion in relation to box or raised patches for firebox repairs. Their superiority over the plain patch is so evident that it only remains to ascertain the best means of applying them, so as to obtain the best results in their use.

The writer, after six years' observation of them in different localities, and with all kinds of water, ranging from six to fourteen degrees of hardness, has come to the conclusion that they are the only logical patch for firebox repairs; that is, when they can be used. Of course, there are several points to be observed, and there is as much danger of them giving out as soon as the plain patch if the workman is careless or not proficient in the means of applying them. I think it is necessary to classify them under two different heads: First, those that are only for a flat surface; second, those that take in part of the bend of the firebox. The general shape is the same, the offset should not be too sharp, and one that is raised two inches from the seam edge seems to give the best results.

*Paper presented at the December meeting of the Western Railway Club.



Box Patches.

I will attach drawing of them, so as to give a comprehensive view of those kinds that I have observed to give best results.

You will notice from sketch that there are attached to side sheet in staybolt rows alternate patchbolt and staybolt, excepting in corners, and I have always endeavored to have corners round, as they seem to crack less in offset when given that shape. When attaching to side sheet they should be worked up hard and laps should be short. I would recommend not more than ⅞ of one inch from center of patchbolt holes, and care should be taken that they are caulked good and they will soon pay for themselves over plain patches in increased length of utility.

It is evident that firebox patching is a problem that is not easily solved, and some maintain that it is better to remove the firebox and replace it with new one, but in some cases flue sheet, door sheet, crown sheet and one side sheet are in good condition, and good for at least one year's service, and in other side sheet only one place that is in poor condition, and if a patch could be applied that would carry that sheet until full life of firebox expires, it would be one year more service gained with but little added cost, especially where there is a shortage of motive power, and that seems to be a chronic complaint at present. On some roads where engines are six and seven hundred miles from the main shop a patch could be applied and engine in service again before it could be deadheaded to shop. A form of patch that would make a tight firebox would have the advantage of little cost and a great deal better than new side sheets, as they are prone to leak as quickly as a plain patch. They are subject to the same diseases, and the main objection to half side sheets and patches is their liability to leak, making them expensive in added fuel cost per ton mileage, not counting mechanics' labor, caulking them each trip, beside their effect in shortening the life of the rest of the firebox.

Referring to the sketch again, you will observe that they are attached in staybolt rows, and my reason for doing it this way is that it makes the seams more rigid, throwing the alternating sway and creeping effect of expansion and contraction in the less rigid portion of the patch, i. e., the longer bolts that go through the raised part of the patch there is less liability of the seam leaking, and also lessens the danger of cracking in offset, especially when the corners are rounded and no staybolt in extreme corners. I have known of patches of this kind, when put on in a careful manner, to run a year without a leak. One more great advantage obtained by using this method of applying is, that you can use a standard size. I do not mean one size for all cases, but they could be, say, six staybolt rows wide and five staybolt rows deep, or three staybolt rows wide and ten staybolt rows deep, or any size or sizes that would be an advantage to use, and I would suggest that at the main shops a set of former blocks could be kept, and a number of patches made and kept in stock of the different sizes that could be sent out to the smaller shops on requisition. The form of block could be male and female, and the piece of steel corresponding to the size of patch could be heated all over and then pressed in, one heat making not only a good patch, not crystallized by hammering, but one of little cost, and when sent to small shops on the road could be applied at once, saving at least a day in time of repairs, as otherwise they would have to make it by hand, and in some cases spoil material by incompetent workmen. From my experience in using them, they are the best and cheapest side sheet patch in use, and until some other form of patch is designed, or as long as fireboxes are of the usual type, it would be an advantage to all interested in them to obtain the best results from the different forms of them by comparison, and if the discussion of this paper will shed any light on what I consider a very important subject, I will be amply repaid for what little trouble it has cost me.

The Fisher Air Compressor.

The air compressor built by the Sedgwick-Fisher Company, of 53-55 South Clinton street, Chicago, is so designed that it may be attached tandem fashion to a steam engine, or it may be operated by belt power.

In attaching the compressor tandem the back cylinder head of the engine is fitted with a stuffing box to receive the piston rod of the compressor; the head is drilled and tapped to attach the two tie rods which hold

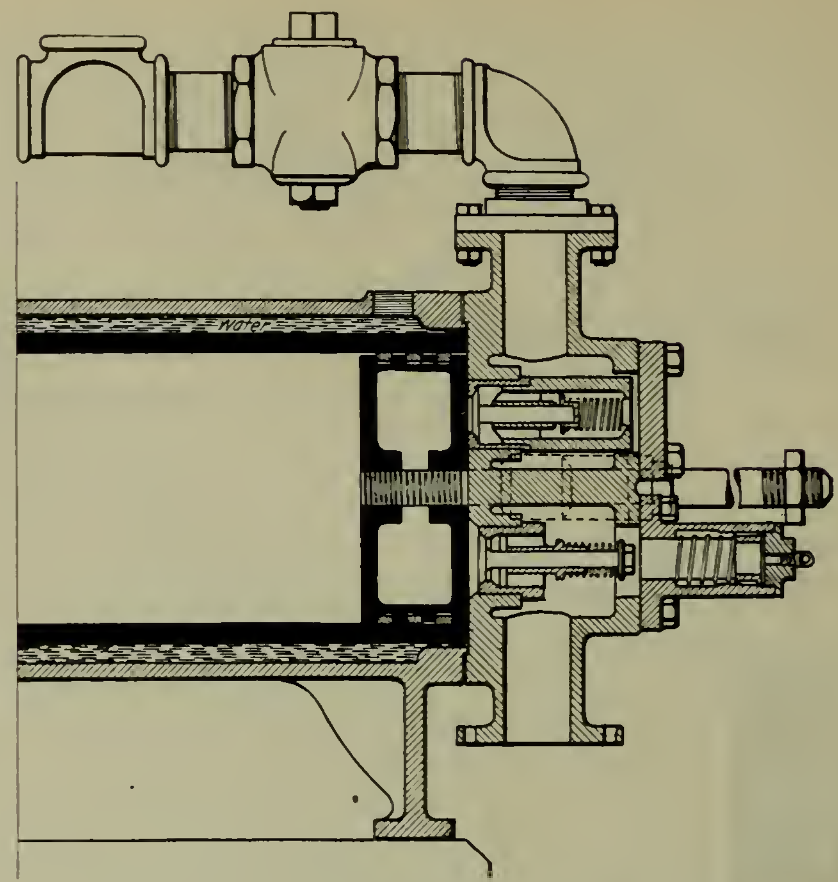


FIGURE 2.—THE FISHER AIR COMPRESSOR.

it firmly in position. The piston rod of compressor is screwed into the piston of engine, operating in unison and in a direct line. Further, any of the valves may be removed while the compressor is in motion without losing any of the air compressed. This is of decided advantage in case of a slight accident to the most vital parts of the compressor. The receiver pressure is automatically regulated to any desired pressure, which will be maintained, within two pounds, up to the capacity of the machine. No air is compressed unless the receiver pressure falls below the point set on the regulator, the result being a saving in fuel.

The capacity of the compressor can be increased or decreased by a simple change in the diameter of the inner cylinder and piston. For instance, if the bore is 5 ins. in diameter and the stroke 18 ins., the capacity may be increased by removing the 5-in. cylinder and substituting one that is 10 ins. No change is required in either the valves, cylinder heads or water jacket. This

FIGURE 1.—FISHER AIR COMPRESSOR.

change can be quickly made and at a nominal cost. The valves are of tool steel and the valve seats can be removed and replaced by new ones at any time. Their construction will be understood from the section elevation, Fig. 2. Since the compressor is held firmly to the engine by tie rods, no foundation is necessary except enough to carry the weight of the compressor. The air cylinders are thoroughly cooled by water circulating through the jacket. The compressor is so arranged that the free air supply can be piped from the outside of the engine room.

The June Conventions.

Mr. Joseph W. Taylor, secretary of the Master Mechanics' and the Master Car Builders' Associations has announced the location of the next conventions.

The thirty-fourth annual convention of the American Railway Master Mechanics' Association will be held at Saratoga, N. Y., commencing Wednesday, June 19, 1901.

The thirty-fifth annual convention of the Master Car Builders' Association will be held at Saratoga, N. Y., commencing Monday, June 24, 1901.

Headquarters for both conventions will be at Grand Union Hotel, which has made the following terms for members and their friends:

	Per day.
Single room, without bath, one person	$3.00
Double room, without bath, one person	4.00
Ordinary double room, with bath, one person	5.00
Extra large double room, with bath, one person	6.00
Double room, without bath, two persons, each person	3.00
Ordinary double room, with bath, two persons, each person	4.00
Extra large double room, with bath, two persons, each person	5.00

Members of the association will have preference of rooms until March 15, 1901. Applications for rooms should be made to Woolley & Gerrans, Saratoga Springs, N. Y., and the committee of arrangements requests that the members should apply at once for rooms.

The joint committee of arrangements consists of Messrs. R. C. Blackall, F. W. Brazier and H. W. Frost.

Spirit of the Railway Press.

Being the Cream of the Literature of Railway Mechanics Appearing During the Past Month.

Coke for Locomotive Fuel.

(Railroad Gazette, Dec. 21, 1900.)

It appears that the Boston & Maine has stopped using coke for fuel in those passenger locomotives which make long runs, on account of difficulty in keeping the flues open. This difficulty was mentioned in Mr. Fowler's article on the subject in the Railroad Gazette, June 22 last. He said: "Clinker tends to form on the tubes and on the grates. In the case of the tubes it is deposited about the ends and will gradually close them up. After a run of a hundred miles or more it is not uncommon to find a good percentage of the flues entirely closed and others so clogged that a hole scarcely ¾ in. in diam. is left through them. This is the most serious feature of the clinker, as it adheres quite firmly so long as there is a hot fire back of it, but is scraped off with comparative ease when the engine becomes cooler." On the through express runs between Boston and Portland this difficulty, as before stated, has necessitated the abandonment of coke. The accumulation of clinker on the tubesheet would become so thick before the end of the run that some of the tubes would be completely closed and the draft destroyed. Various expedients were tried in order to remedy the difficulty, but nothing effective could be found, so the use of the fuel for that particular service has been given up.

Stay Bolt of Stranded Wire.

(Railway Review, Dec. 1, 1900.)

Mr. G. R. Joughins, mechanical superintendent of the Intercolonial Ry. of Canada, has devised a method of making staybolts from sections of wire rope or collection of strands. It seems apparent that if a piece of wire rope could be used to stay flat surfaces together it would have all the strength and flexibility desired, and would therefore probably be an ideal staybolt, so far as those two points are concerned; but it has appeared impossible to apply it to such a purpose, as no one has hitherto suggested a means of making a wire rope bolt in such a manner as to be steam-tight in the screwed holes of the plates. Neither has anyone until now suggested a means of threading such a piece of rope or pointed out how it can be applied to the sheets of a boiler, all of which operations are, of course, absolutely necessary and essential to make up a practicable and useful bolt.

Mr. Joughins surmounted these difficulties by forming a solid knob upon each end, so that its form would be fairly described by saying that it is a bolt made up of a central portion consisting of several strands laid together, which are attached to a solid knob or cylindrically-shaped piece at each end. In this way a bolt is produced which is as flexible as may be desired, depending upon the shape and area of the section of the strands composing the body of the bolt and yet is completely solid where it passes through or is attached to the plates. The body is made partially solid, so that there is a sufficiently substantial connection between the two ends—in short, a backbone.

To make a bolt of one inch in diameter a piece of ⅜-in. round iron of a suitable length is taken and a ferrule is placed upon it at each end and around both iron and ferrules a bundle of wires, each about ⅛-in. in diameter is placed and then over the wires at each end is put another ferrule, and then are welded together the parts composing each end; thus forming a solid knob, which would then be machined down to the proper size and threaded.

Preventing Cylinder Condensation.

(Locomotive Engineering, December, 1900.)

The cylinders of a locomotive are so badly exposed to chilling influences that appliances put upon them to prevent condensation may fail when the same appliances used on the cylinders of stationary or marine engines may act satisfactorily. The leading difficulty with applying steam jackets to locomotive cylinders has been that the devices used to keep the jackets drained of the condensed water failed to work properly, and the jacket became in itself a condenser instead of acting to prevent condensation. This has been repeatedly demonstrated experimentally.

Inside cylinders are to some extent protected from condensation by the heat of the smokebox. We have always believed that an efficient means of protecting outside cylinders could be devised by passing a current of the hot air from the tubes around the cylinders. Several attempts of this kind have been made without producing satisfactory results. It may be one of those cases where important points have been overlooked that mark the line between success and failure. The prevention of cylinder condensation effects such a material influence on fuel-saving that trying to produce an efficient system of prevention is a highly meritorious line of engineering endeavor.

Train Delays.

(Railway Review, December 1, 1900.)

It would be reasonable to consider a very large percentage of the attributed causes of delay as being but alleged. Aside from bona fide cases of hot boxes and engine breakdowns the real cause of the majority of passenger train delays can be traced to time needlessly wasted at stations. A personal check of the actual elapsed time between stopping and starting at each station will often make a surprising total for the engine to make up under adverse conditions. In freight service celerity at stations on most lines seems a matter of indifference to everyone intimately connected with the work. Registering out five or ten minutes before leaving is also regarded almost invariably as legitimate, notwithstanding the fact that this time must be made up by the engine, and in case the machine is unable to do it the delay is attributed to some false cause. A freight crew generally stops for a meal at least once over a division and the time consumed in consequence of the stop is seldom less than 30 minutes. Yet this time is not taken out of the schedule expected and not allowed for in case of delay through this time not being made up. We have seen conductors spend from 20 to 30 minutes endeavoring to change a brass, where the car was stopped on a curve. The mechanical department certainly should not be compelled to accept the 10 to 20 minutes excess delay in such a case. The leisurely manner in which many engineers oil around is worthy of regard from the traveling engineer —providing he is not kept too busy in bringing brake practice to a needless degree of refinement. The blame laid at the door of the dispatcher for bad meeting points will in most cases be found on tracing, to be a result of some of these examples. The actual duty of the dispatcher is to straighten out the tangle caused by every failure, oversight, accident or piece of carelessness on the division and the wonder is not that he makes bad meeting points occasionally, but often that he is able to get the number of trains over the road at all. Not steaming on account of poor coal is a familiar report. For this the motive power department is charged and the purchasing agent blamed. The real reason generally is that it is business policy for the company to foster the mine and that according as the mine has demands from purchasers from whom the company derives freight revenue the company is content to accept the grade of coal which will interfere least with traffic interests. But the cost of changing grates and draft arrangements, as well as the delays due to such alterations of fuel should be charged to the business and not to the mechanical or purchasing end. The traveling engineer and the trainmaster, together, by leaving the dispatchers out of it and getting out on the road and staying there can do much in reducing train delays by getting at the actual facts in individual cases and infusing into the service in general that vim which gets trains over the road.

The Staybolt Problem.

(American Engineer, December, 1900.)

In the matter of staybolts one of two things is certain. They should be made so that they will not break or locomotive boilers should be so constructed that staybolts will not be necessary. Both are possible, and the exigencies of present service demand a decided step away from present practice, which is giving so much trouble. Delays to engines because of inspection and necessary replacements of broken bolts and the cost of present methods are becoming sufficiently important to demand radical treatment without consideration of the question of safety at all.

The extent of the effect of the advent of the wide firebox on this question is uncertain. It is expected to lead to an improvement. But the 35,000 or so narrow fireboxes in use in all parts of the country constitute a problem by themselves, and it is highly desirable that a remedy should be found to meet the needs of these, and also new fireboxes, in the same way.

Enough is known of the peculiar relative movements of the inside and outside firebox sheets to show the necessity for flexibility in the staying, and it has been said that, if the ends could be properly secured in the sheets, wire rope stays would be ideal. Perhaps they would, but it is now believed to be doubtful whether the typical sling stay so long used for crown sheets would not be even better, because it permits of a slight approach of the sheets toward each other. This is held to be a necessary feature by one who has experimented with staybolts and stuffing boxes to measure these movements. * * At present a flexible connection with the outer sheet seems to be the most promising factor. These bolts will cost more than ordinary ones to install, but if they do not break, the expense is justified. We do not believe that present common practice in staybolts will be perpetuated or even defended much longer.

Personal Mention.

Mr. J. H. Hangsden, master mechanic of the Findlay, Ft. Wayne & Western, has resigned.

Mr. William Oliver has been appointed acting master mechanic for the El Paso & Northeastern Ry., vice R. L. Stewart.

Mr. Walter J. Thomas has been appointed master mechanic on the Chesapeake & Ohio, with headquarters at Louisville, Ky.

Mr. J. E. Monahan has been appointed division master mechanic of the Louisville & Nashville, with headquarters at Paris, Tenn.

Thomas F. Colfer, treasurer of the Laclede Car Company of St. Louis, Mo., died suddenly from heart disease on December 1, aged 53 years.

Mr. E. F. Needham has been appointed assistant master mechanic of the Wabash, with headquarters at Decatur, Ill., vice F. H. Paine, resigned.

Mr. J. H. Milton, general foreman car department of the Rio Grande Western, at Salt Lake, has resigned to take a similar position with the Colorado & Southern at Denver.

Mr. John A. Hughes, late of the Illinois Central, has been appointed foreman of the blacksmith shop of the Chicago, Rock Island & Pacific, at Horton, Kan.

Mr. A. T. Flodenberg has resigned as acting chief draftsman of the Pittsburg, Cincinnati, Chicago & St. Louis, at Columbus, O., to accept a position with the Pressed Steel Car Company at Pittsburg.

The persistent rumors that Mr. Waldo H. Marshall, superintendent of motive power of the Lake Shore & Michigan Southern, had resigned are, we are officially informed, without any foundation whatever.

On the Great Northern the office of motive power clerk has been abolished. All reports heretofore made to J. C. Morrison, motive power clerk, will hereafter be made to Max Toltz, mechanical engineer, St. Paul.

Mr. J. W. Fogg has been appointed traveling engineer on the Chicago Terminal Transfer Railroad, formerly the Chicago & Calumet Terminal. Mr. Fogg has hitherto been locomotive engineer on this road.

Mr. F. C. Gates has resigned as purchasing agent of the Wheeling & Lake Erie to engage in other business, and the duties of the office will be performed by Mr. J. T. Stark, under the supervision of President Blickensderfer.

Mr. R. A. Dugan, who has been purchasing agent of the Elgin, Joliet & Eastern for many years has been appointed assistant general manager of that road and the Chicago Lake Shore & Eastern, with headquarters at Joliet, Ill.

Mr. E. M. Lake, heretofore master mechanic of the Gulf & Ship Island, has been appointed general master mechanic of the same road; and W. F. Post has been appointed division master mechanic, both with headquarters at Saratoga, Miss.

Mr. William Swanston, master mechanic of the Pittsburg, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind., retired January 1 under the provisions of the pension plan. He is seventy-three years of age and has been in continuous railway service since 1850.

Mr. L. C. Todd has been appointed master mechanic of the Fitchburg Division of the Boston & Maine, with headquarters at Charlestown, Mass., vice Mr. J. S. Turner, resigned to become superintendent of motive power of the Toledo, St. Louis & Western. Mr. C. B. Hutchinson becomes master mechanic of the Connecticut & Passumpsic Division, north of White River Junction, at Lyndonville, Vt., vice Mr. Todd.

Mr. F. J. Zerbee has been appointed master mechanic of the Cleveland, Indianapolis Division of the Big Four, with headquarters at Bellefontaine, Ohio, vice E. E. Hudson, resigned. G. Wirt has been appointed master mechanic of the Michigan Division, at Wabash, Ind., succeeding Mr. Zerbee. P. J. Hickey becomes master mechanic of the St. Louis Division, at Mattoon, Ill., succeeding W. P. Orland, assigned to other duties.

Mr. J. S. Turner has been appointed superintendent of motive power and equipment of the Toledo, St. Louis & Western. Mr. Turner was formerly superintendent of motive power of the Fitchburg R. R., and later continued to perform similar duties as master mechanic of the Fitchburg Division of the Boston & Maine, after the consolidation of those two roads. He was also prominently identified with the mechanical department of several other roads.

Mr. G. L. Potter, general superintendent of motive power of the Pennsylvania Lines West of Pittsburg, has been promoted to be general manager of those lines, vice Mr. L. F. Loree. This promotion is the occasion of general congratulation from all sources, especially from the mechanical departments of our railways, the members of which have for many years looked upon Mr. Potter as one of their shining lights. The feeling is akin to that experienced when Mr. Rhodes passed from the mechanical department to the operating department. It is that of pleasure at a fellow worker's advancement, coupled with regret that the old field of work loses one of its leaders.

Supply Trade Notes.

The Tower coupler has, we understand, been adopted by the Rio Grande Western.

Mr. David W. Pye has been appointed assistant to the vice-president of the Safety Car Heating & Lighting Company.

The Gould system of electric lighting by power derived from the car axle is being applied to the business car of General Manager Ramsey of the Wabash.

The Shickle, Harrison & Howard Iron Co. has taken an order for cast steel bolsters for 2500 cars which the Missouri Pacific has just ordered of the American Car & Foundry Co.

The McCord journal box has been specified on 1500 cars for the Chicago & Eastern Illinois which are being built by the American Car & Foundry Company and the Mount Vernon Car Company.

The National Car Coupler Co., Monadnock Block, Chicago, has opened an office in New York city, in charge of Mr. S. A. Stephenson. The National steel platform owned by this company will be pushed.

The Industrial Water Co., of New York, of which Mr. C. Herschel Koyl is manager, calls attention to the fact that its sole office is at 15 Wall St., New York, and it should not be confounded with a Chicago company having a very similar name.

Mr. P. M. Elliott has been appointed western representative of the Monarch Brakebeam Company, with office in the Old Colony building, Chicago, vice Mr. J. S. Andrews, who resigned to become vice-president of the Waycott-Andrews Supply Company, of St. Louis.

The firm of Albert Waycott & Co., of St. Louis, has been incorporated under the title of the Waycott-Andrews Supply Company. Mr. Albert Waycott is president; Mr. J. S. Andrews, vice-president and general manager; Mr. Thomas Dunn, treasurer, and Mr. F. C. Stevens, secretary.

The Brooks Locomotive Works stockholders have elected the following officers: Frederick H. Stevens, president; Robert J. Gross, vice-president; Marshall L. Hinman, treasurer; Theo. M. Hequembourg, secretary; David Russell, general superintendent; James McNaughton, superintendent.

The Rogers Locomotive Works were closed Dec. 1, as per the original announcement quoted in our pages some time ago. The several plans that have been considered for purchasing the plant and continuing the business either at Paterson or elsewhere seem to have failed, for the present time at least.

Messrs. M. R. Muckle, Jr., & Co., the Philadelphia representatives of Messrs. Westinghouse, Church, Kerr & Co., have removed to their new office, No. 512 Stephen Girard Building, No. 21 South 12th street, Philadelphia, Pa. All communications or papers intended for them should be addressed as above.

The Robert Aitchison Perforated Metal Company, 305 Dearborn street, Chicago, has closed a contract with one of the large thresher manufacturers of the Northwest for a season's supply of perforated metals, and has also just received an order for over 60,000 square feet of perforated steel for malt machinery.

The Standard Car Lighting Company, of Chicago, has been organized under the laws of New Jersey with capital stock of $1,500,000. The company has opened offices in the Merchants' Loan & Trust building, Chicago, and will handle the Lovejoy car lighting system. Mr. E. H. Mayhew is president of the company and Mr. W. T. Barutio is their expert.

Mr. Thomas R. Freeman, well known for years in railway supply circles, has been engaged by the Crosby Steam Gage & Valve Company as representative in the West, with office at 21 West Lake St., Chicago. Mr. William T. Johnson will represent the concern in New York, with office at 78 John St., and Mr. Robert Pirie will cover New England territory, with office in Boston.

The Chicago Pneumatic Tool Co. issues a handsome January calendar relating in its illustration to "Two Magicians." One magician, the Oriental, is Aladdin, who, with his wonderful lamp, built a beautiful palace; the other, the Occidental, is the modern mechanic who, with his pneumatic tools, builds many and much more wonderful structures. For copies address the Chicago Pneumatic Tool Co., 635 Monadnock Block, Chicago.

The Richmond Locomotive Works has just secured an order from the Norfolk & Western Railroad Company for ten Class "W" 21-in. x 30-in. consolidation locomotives with piston valves. The principal dimensions of these engines are as follows: Driving wheels, 56 ins.; driving wheel base, 15 ft. 6 ins.; total wheel base, 23 ft. 11 ins.; weight in working order, about 170,000 lbs.; weight on drivers, 150,000 lbs.; capacity of tank, 5000 gallons.

The Paris agent of the Rand Drill Company reports that all the compressors and drills which were on exhibition at the Exposition have been sold. The large Corliss compound compressor at Vincennes was purchased by the firm of Messrs. J. & A. Niclausse, the manufacturers of the famous Niclausse water tube boilers, by whom it is to be used for the operation of pneumatic tools in their extensive establishment. This is the compressor which supplied the compressed air to all the American exhibits at Vincennes.

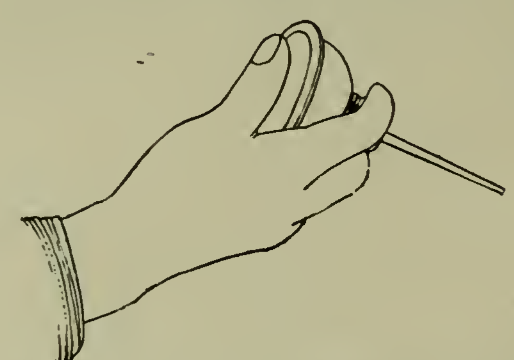
Mr. John H. Converse, of the Baldwin Locomotive Works, during a recent examination before the Industrial Commission stated that the capacity of the plant was 1200 locomotives a year, the capital employed was $10,000,000, and that 8500 hands were engaged. He gave as reasons for the introduction of American locomotives abroad the possibility of earlier delivery, preference for American locomotives as to type, size and details, and the question of price. Engines had been constructed at less cost per unit of weight than the ordinary foreign locomotives. Mr. Converse said that owing to the government ownership system existing in most foreign countries no difficulty was ever encountered from tariff conditions. Attempts to form a locomotive trust, he said, had failed.

The Bethlehem Steel Co. has closed a contract with the General Electric Co. for six more of the weldless field-rings of "Bethlehem" nickel-steel for the extension of the big power-plant at Niagara Falls. These rings measure 142½ ins. outside diameter, and 103¾ ins. inside, leaving the walls 5⅞ ins. thick. The width of face is 50¼ ins. and the estimated weight of each ring is about 35,000 lbs. They will be worked up on a mandrel, under the hydraulic press, and are said to be among the largest forgings of this sort which have yet been produced. Among other orders now in hand at the Bethlehem works may be noted the shafts and engine forgings for one of the new ferry-boats which are under construction at the yards of Harlan & Hollingsworth, Wilmington, Del., for the New York ferry of the Central Railroad of New Jersey.

The Harrison Dust Guard Company, Toledo, have recently received orders for guards as follows: From the Pullman Company for 25 New York Central & Hudson River suburban coaches; from the Richmond Locomotive Works for 20 Southern Railway locomotives; from the Pressed Steel Car Company for 300 box and 40 ballast cars for the Union Pacific, and from the American Steel Foundry Company for 10 Hedley motor trucks. These guards were also, during the month, specified on the 1000 box cars of 80,000 lbs. capacity and 200 furniture cars of 60,000 lbs. capacity ordered by the Lake Shore & Michigan Southern; 40 Goodwin steel cars and one dining car ordered by the Rio Grande Western, and 10 hopper cars of 80,000 lbs. capacity ordered by the Pittsburg & Buffalo Coal Co. In one week during the month the Harrison Company distributed 11,000 guards to the following companies: Pressed Steel Car Co., American Car & Foundry Co., Pullman Co., Barney & Smith Car Co., Illinois Car & Equipment Co., and the American Steel Foundry Co.

Mr. Ira C. Hubbell has been elected vice-president of the Natural Food Company, a company of $10,000,000 capital, incorporated under the laws of the state of New York. The Natural Food Company is erecting a large food conservatory at Niagara Falls. The main building is 540 feet long and 66 feet wide, with necessary elevators, power house, shipping department, administrations building, etc. The buildings aggregate nearly 70,000 square feet floor space, with total cubic contents of 4,500,000 cubic feet. The plant will be operated exclusively by electricity, the present installation calling for 5,000 electrical horse power. The Natural Food Company has absorbed the business of the Shredded Wheat Company, and will very materially increase the product of the Natural foods made exclusively from the cereals, and in which the entire cereal is used, nothing being taken from or added to the grains. Mr. H. D. Perky, formerly president of the Shredded Wheat Company, is president and managing officer of the new company. Mr. Hubbell will still retain the presidency of the Locomotive Appliance Company, and give only incidental attention, as vice-president, to the affairs of the food company.

You Can with a Can.



It is a surprise to many to know that Dixon's Pure Flake Graphite can be used in an ordinary squirt can. It is nevertheless a fact, and a more convenient and efficient way for applying this wonderful lubricant cannot be found. Where the coarser flake is used the opening in the nozzle of the can may require enlarging. Only a dry can should be used. A can that has had oil in will clog the graphite. Use a dry and new can. It will pay you to try graphite in this way.—Graphite.

Established 1878.

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

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WALTER D. CROSMAN, Editor.
ALLEN R. COSGROVE, Manager

Vol. XXV. CHICAGO, FEBRUARY, 1901. No. 2.

WE WISH to direct especial attention to Mr. Rhodes' letter to us, on air brake repairs, given elsewhere in this issue. It does seem a shame that, after our railways have spent so much money in fitting up their freight cars with air brakes, they should allow them to run in such large numbers with triples in an inefficient and even non-workable condition. Mr. Rhodes' frank admissions as to the interference with the movement of freight approaching the Rocky Mountains, caused by dirty triples, will cause astonishment in some quarters. It is evident that he has not overstated the importance of keeping air brakes in first-class order. It seems that such roads as the Burlington, Pennsylvania, New York Central, Lake Shore and Baltimore & Ohio have been sadly remiss in attending to the triples on their freight cars—some cars having triples undated as to cleaning and others showing by dating that the triples had not been cleaned for as long as two years. As the best practice calls for cleaning every six months, and as cars are often away from home for long periods, it has been suggested that it might be well to make the interchange prices high enough to induce repairs on foreign roads.

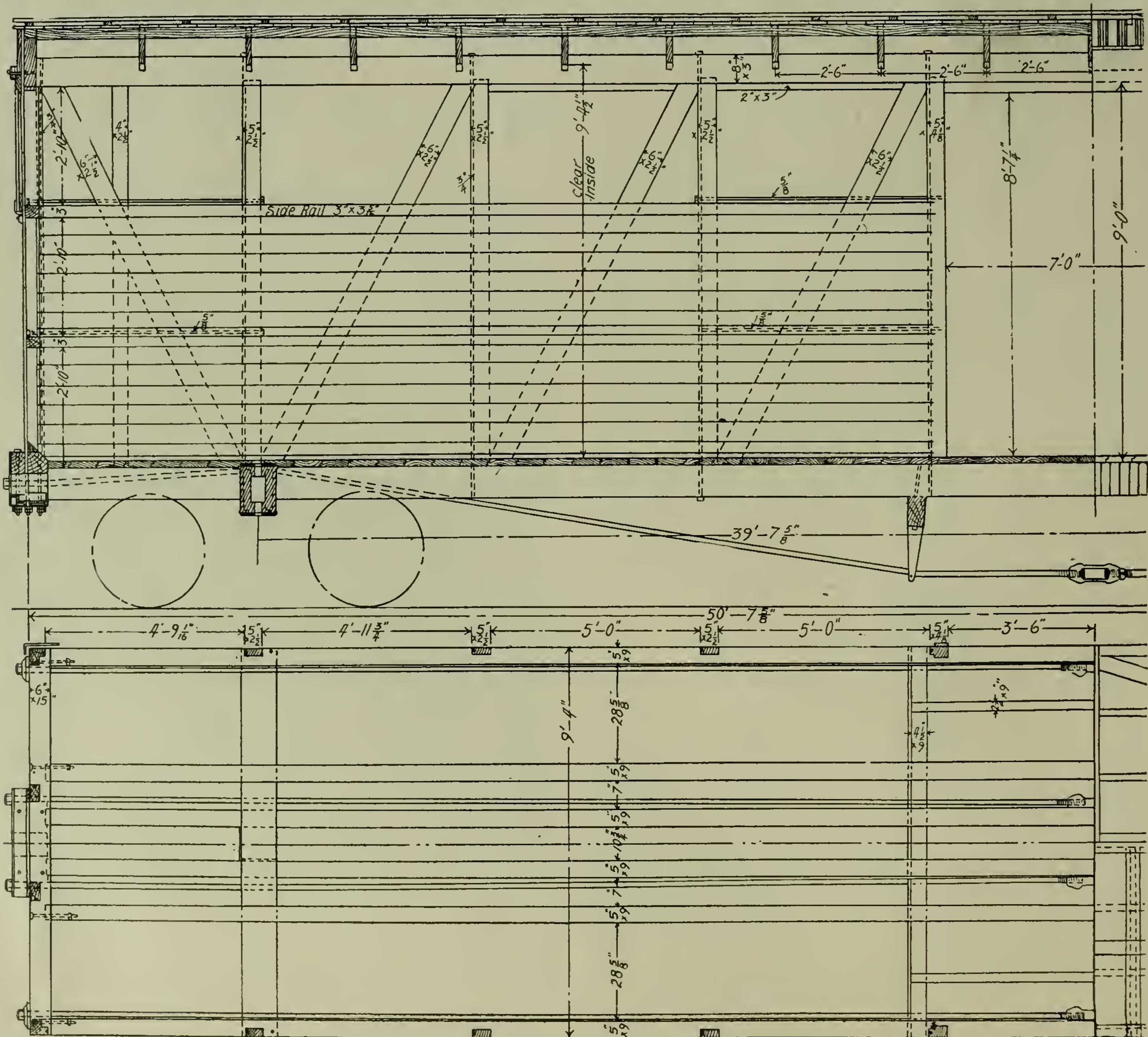
ENGLISH manufacturers have once more been distanced by American competitors, the Pressed Steel Car Company, of Pittsburg, being the enterprising concern in question. When the Rand Mines, Ltd., of Cape Colony, decided to purchase 334 steel coal cars, the Pressed Steel Car Company, of Pittsburg, would have received the entire order had it not been for adverse criticisms and insinuations of disloyalty in Great Britain. These criticisms were peculiarly disagreeable on account of the Boer war, but in spite of them, 167 pressed steel hopper gondola cars of 60,000 lbs. capacity, were ordered from the Pittsburg concern. On the morning of Jan. 28th, the first consignment of 30 cars were lying alongside the steamer "Elleric" in Jersey City. Thirty more of the cars were shipped to Jersey City Jan. 29th, and by Feb. 4th the remaining 107 cars will be waiting to be stowed away for the long ocean trip to Cape Town. The 167 cars made in Pittsburg will reach their destination before those made by the English competitors. They have been constructed and shipped with such dispatch that other business from the other side of the Atlantic will doubtless follow.

THE M. C. B. Committee on Triple Valves has at last had some work offered to it to do. It recently completed tests of a new form of triple submitted by Mr. R. Fitzgerald, general superintendent of the Chicago Junction Railway. The tests were made upon the associat'on rack in the laboratory of Purdue University. They were conducted by Messrs. G. W. Rhodes, W. S. Morris and William McIntosh, representing the M. C. B. commttee. The committee was assisted by Mr. A. J. Cota, air brake instructor of the Burlington System; Mr. W. P. Huntley, Jr., air brake instructor of the C. & O. R. R., and also by members of the instructional corps and by students of Purdue University. The owner of the valves was represented by Messrs. Harvey S. Park and M. W. Hibbard.

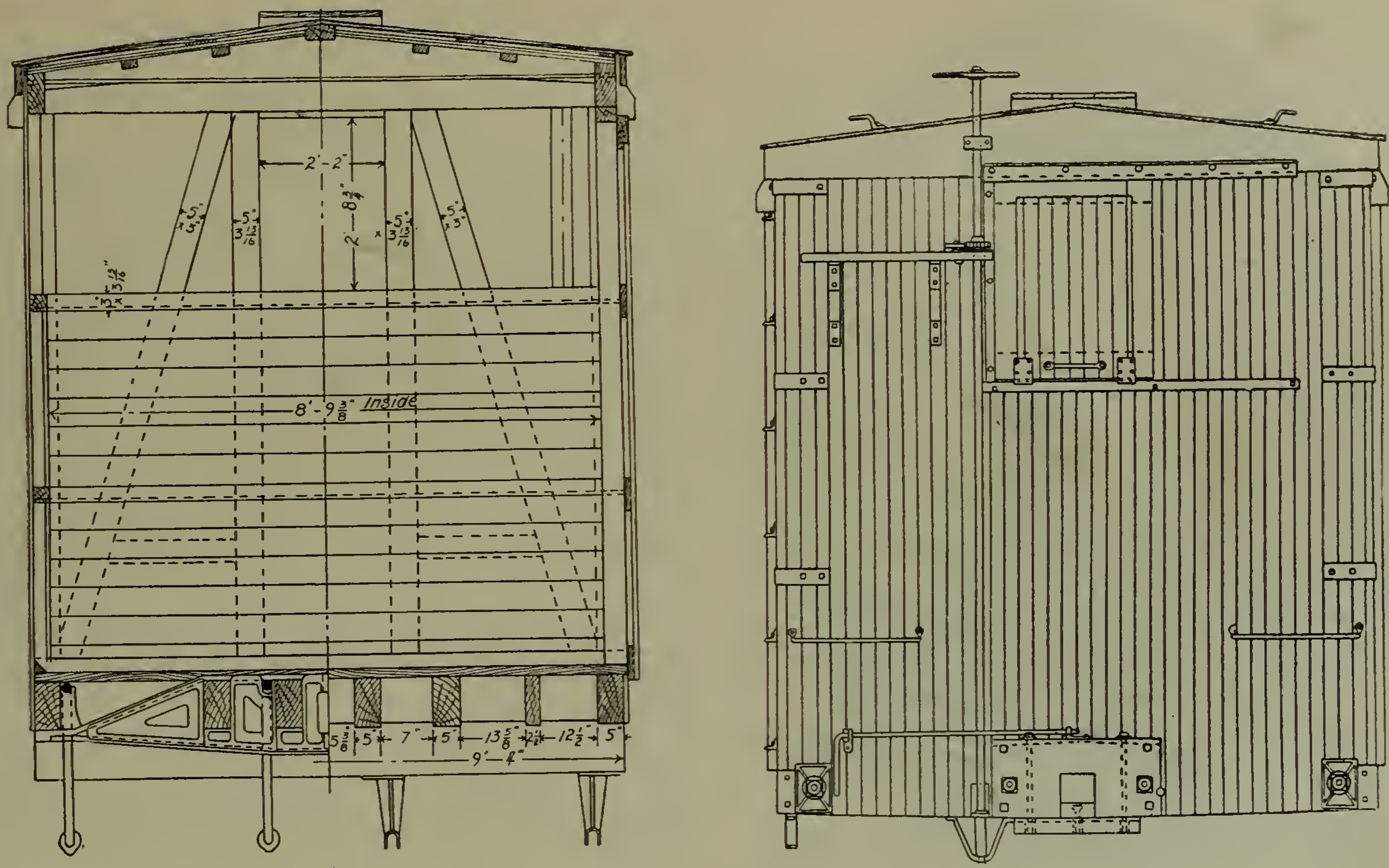
MR. GODFREY W. RHODES, assistant general superintendent of the B. & M. R. R., delivered, on Thursday, Jan. 24th, an address before the engineering students of Purdue University. His subject was "The Burlington Brake Tests." He first described the various changes which, step by step, have led from the hand brake to the present high speed brake, and briefly discussed their significance. After referring to the extent and character of the Burlington tests, he emphasized the fact that every brake which on that occasion was first subjected to test had been pronounced unsatisfactory by the committee, and that all have since completely disappeared from service. It was worthy of note, he said, that no one had complained or had found fault with the committee because of its conclusions. Those whose apparatus had given most promise found in the results facts which served to give new ideas and to lift their practice to higher planes. The Burlington tests proved the impracticability of the buffer brakes and disclosed serious defects in the automatic air brake, which at that time was in its early stages of development. The work, he said, had profited by the association of a large number of persons who were concerned in planning its details and in the final execution of the tests, the credit for the results being shared by from thirty to fifty people. The modesty with which the speaker referred to the difficulties encountered, and to the far-reaching effect of the results obtained, aroused but slight suspicion in the minds of the student audiences that he was the masterful leader in the great work he described.

Fifty-Foot Furniture Car.---C. G. W. Ry.

The Chicago Great Western Railway has had in satisfactory service for some time a lot of remarkably large furniture cars. They are 50 feet long inside, 8 feet 9⅜ wide inside, and 9 feet 4½ inches high inside. Their width at eaves is 10 feet. The cars weigh 38,700 pounds, and have a capacity of 60,000 pounds. Our half-tone view shows the car to be handsome in lines and in finish. The drawings reproduced reveal the details of design, which will be seen to exemplify good practice. It will be noted that the draft and intermediate sills pass through the body bolster, and that they are supported by cast iron fillers which fill up the spaces between the



Chicago Great Western Furniture Car.



CHICAGO GREAT WESTERN FURNITURE CAR.

lower and upper members entirely. The draft rigging is attached to the draft sills, the drawbar passing through the end sill. The end and corner posts and braces are set in cast iron shoes, the others being simply mortised into the sills. The cars are equipped with Barber steel trucks, the Chicago roof and the Jones door. We are indebted to Mr. David Van Alstine, master mechanic of the Chicago Great Western, for the privilege of illustrating this car.

Personal Mention.

On the Grand Trunk system important changes in the mechanical department have just been made, as outlined in the following circulars issued by Mr. Frank W. Morse, superintendent of motive power: "Mr. J. E. Muhlfeld, on account of the resignation of Mr. A. G. Elvin to accept a position with another company, is this day (Feb. 1) appointed master mechanic in charge of Montreal works."—"Mr. E. D. Jameson is appointed master mechanic of the Western Division, with headquarters at Battle Creek, having jurisdiction over all matters pertaining to this department excepting those at Fort Gratiot shops and Port Huron tunnel pumping station. Mr. J. McGrath is appointed master mechanic in charge of Fort Gratiot shops and Port Huron and Sarnia pumping stations. The above appointments are effective this date (Feb. 1) and are due to the transfer of Mr. Muhlfeld."

Mr. Clement Hackney, for many years general manager of the Joliet works of the Fox Pressed Steel Co., died at Milwaukee, Jan. 6, aged 52 years. Mr. Hackney was born in England, and his first work in railway service was in this country, in the mechanical department of the Chicago, Milwaukee & St. Paul. In later life he was assistant superintendent of machinery of the Atchison, Topeka & Santa Fe, and still later superintendent of motive power and rolling stock of the Union Pacific. Mr. Hackney had been for nearly two years out of active business because of long continued ill health.

Mr. N. W. Sample, of Denver, Colo., formerly superintendent of machinery and later general superintendent of the Denver & Rio Grande system, has accepted the position of superintendent of machinery at the Baldwin Locomotive Works in Philadelphia.

At the January meeting of the Northwest Railroad Club, held at St. Paul, Jan. 16th, the resignation of President E. A. Williams, who is about to make a change in location, was read and accepted. Mr. T. A. Foque, former secretary, was elected president of the club, and Mr. T. W. Flannagan, chief clerk, mechanical department, Soo Line, was elected to succeed Mr. Foque as secretary.

Mr. V. B. Lang, hitherto master mechanic on the Chicago & Alton, has been appointed assistant superintendent of motive power of that road, and will perform such duties as may be assigned to him by the superintendent of motive power.

Mr. E. A. Williams.

Mr. Edward A. Williams, for many years in charge of the mechanical department of the Soo Line, has been made superintendent of rolling stock of the Canadian Pacific, vice Mr. R. Atkinson, resigned. Mr. Williams was born Oct. 4, 1848, near Wiscasset, Me., and was educated in the Milwaukee public schools. He entered railway service in 1865 as machinist apprentice on the Milwaukee & Prairie du Chien road, since which he has been consecutively, from August, 1877, to December, 1880, roundhouse foreman, Chicago, Milwaukee & St. Paul Ry. at Prairie du Chien, Wis.; December, 1880, to March, 1886, general foreman Southern Minnesota division of the same road at Wells, Minn.; March, 1866, to July, 1890, assistant general master mechanic of the same road at Milwaukee, Wis.; July, 1890, to September, 1893, master mechanic of the Minneapolis, St. Paul & Sault Ste. Marie Ry. in charge of locomotive and car departments. In September, 1893, he was made mechanical superintendent of the same road, and has held that position continuously since. "Ed" Williams has hosts of friends in the States, who, while sorry to see him go "abroad," yet are glad that he has been called to such a high post.

Mr. William Westlake, an inventor of considerable fame and one of the founders of the Adams & Westlake Company, died Friday morning, Dec. 28, at his home in Brooklyn, N. Y. He was born in Cornwall, England, in 1831, and came to the United States when he was 16 years old. He learned the trade of a tinsmith, and was employed by the La Crosse & Milwaukee Railroad (now Chicago, Milwaukee & St. Paul) as a tinsmith and coppersmith. While there he invented the Westlake car heater, a loose globe lantern and various other things. He was ingenious and persistent in developing a lamp for burning kerosene oil in railroad cars. In 1877 he retired from the Adams & Westlake Company, and in 1883 retired from business.—Railroad Gazette.

Mr. Samuel W. Miller, assistant master mechanic of the Pennsylvania Lines West of Pittsburg at Indianapolis, Ind., has been appointed master mechanic to succeed Mr. William Swanston, resigned.

Mr. T. M. Price has been appointed master mechanic of the Findlay, Fort Wayne & Western, with headquarters at Findlay, O., in place of Mr. H. A. Hansgen, resigned.

Mr. J. S. Brown has been appointed traveling engineer of the Franklin division of the Lake Shore & Michigan Southern.

Mr. Joseph A. Baker, heretofore traveling engineer of the Atchison, Topeka & Santa Fe, has been appointed traveling engineer of the Toledo & Ohio Central, with headquarters at Toledo, O.

Mr. H. E. Poronto has been appointed purchasing agent of the Union Stock Yard & Transit Company of Chicago, and of the Chicago Junction Railway, with office in the Exchange building, Union Stock Yards, Chicago.

Mr. T. A. Foque, assistant mechanical superintendent of the Minneapolis, St. Paul & Sault Ste. Marie, has been appointed mechanical superintendent of that road, vice Mr. E. A. Williams, resigned to go to the Canadian Pacific. Mr. Foque has made a fine record in the northwest, and while holding his chair on the Soo Line has been active in promoting the interests of the Northwest Railroad Club, as its secretary. He has just been made president of that club, and it is quite evident that, with these two upward steps, Mr. Foque is making his mark.

Mr. T. A. Foque.

Mr. F. W. Chaffee, master car builder of the New York Central at West Albany, N. Y., has been appointed general chief car inspector of that system.

Mr. H. B. Brown, traveling engineer of the Baltimore & Ohio, has been appointed master mechanic of the shops of that road at Chicago Junction, O.

Mr. T. R. Browne has resigned as master mechanic of the Juniata shops of the Pennsylvania Railroad at Altoona, Pa., to accept a position with the Westinghouse Company at Wilmerding, Pa.

Mr. W. T. Reed has retired from the position of mechanical superintendent of the Seaboard Air Line, and the office has been abolished. Mr. F. H. McGhee, master mechanic of the road at Americus, Ga. has been appointed superintendent of motive power, with headquarters at Portsmouth, Va. Mr. Reed has been in charge of the mechanical department of the Seaboard Air Line since 1895, and was formerly superintendent of motive power and rolling stock of the Chicago Great Western. Mr. McGhee has been division master mechanic at Abbeville, S. C., and Americus, Ga., since December 1, 1895, and was formerly master mechanic of the Central Georgia for a number of years.

Mr. William Swanston, master mechanic of the Pennsylvania lines at Indianapolis, Ind., was retired under the operation of the pension rules of the Pennsylvania system on Jan. 1st, 1901. At this juncture it will be of interest to present a brief review of Mr. Swanston's busy career. He was born in Glasgow, Scotland, on May 11, 1827. His father was the curator and librarian of the Glasgow Mechanic's Institution, and young William lived in the institution building all the days of his life that were spent in Scotland. After going to the parish or common school, and while serving his apprenticeship, he attended the classes of the institution, principally those of natural philosophy, chemistry and mechanical drawing. In June, 1849, he left Scotland for Canada, and after spending one year in Toronto, he went to Cincinnati, O., in July, 1850, entering the service of the Little Miami railroad in October of that year. This was his first railroad work, and after serving as machinist, sub-foreman and general foreman, he was, in June, 1866, appointed master mechanic of the Cleveland, Sandusky & Cincinnati railroad. In 1871 he left this road to accept the position of master mechanic of the Burlington, Cedar Rapids & Northern. He remained there two years, and in 1873 re-entered the service of the Little Miami railroad as assistant master mechanic at Columbus, O. In 1876 he was transferred to Indianappolis as motive power foreman for the Jeffersonville, Madison & Indianapolis railroad, and in 1879 went to Jeffersonville as master mechanic of the same road. In 1884 the shops at Jeffersonville were abolished, and he was transferred to Indianapolis as master mechanic of all the Pennsylvania lines centering at Indianapolis, and served in this capacity until his retirement on the first of this year. It was while Mr. Swanston was on the Cleveland, Sandusky & Cincinnati railroad that he, in June, 1868, attended a meeting of the Master Car-Builders' Association at Dayton, O. In company with five other master mechanics that represented their roads at that meeting, he issued a call to other master mechanics to meet in Cleveland to consider the subject of forming a master mechanics' association, and the American Railway Master Mechanics' Association is the result. His connection with this association is so well known that it is unnecessary to review his services on committees, etc. Mr. Swanston became a member of the Western Railway Club very soon after its organization, and was a frequent attendant at the meetings of that club, and still retains his membership therein. Mr. Swanston's boyhood connection with the Mechanics' Institution laid the foundation of his love of machinery and of the associations that were calculated to increase the knowledge of those connected with it. Mr. Swanston acquired a fine reputation with the Pennsylvania company, particularly in matters relating to shop tools and shop management. He introduced the first air hoist on the Pennsylvania lines, in the spring of 1885. For a number of years he was chairman of the committee to select tools for the shops of the Southwest System of the Pennsylvania Lines; and he was also one of the tool committee to purchase tools for the new locomotive shop at Altoona, Pa., in 1888 and 1889. Mr. Swanston retires on well earned laurels; and with the purpose of enjoying a well earned rest, for while in excellent health for an "auld man," he does not contemplate assuming active connection with any other business. The best wishes of an unusually wide circle of friends go with him.

Mr. William Swanston.

(Personal Mention concluded on page 59.)

General Charles Miller.

Mr. Chas. T. Schoen.

Mr J. W. Duntley.

Col. Thomas M. Egan.

Americans Signally Recognized at the Paris Exposition by the French Government.

The gentlemen whose portraits appear above were among those given the decoration of Chevalier of the Legion of Honor, by the French government, in recognition of their valuable participation in one way and another in the Paris Exposition of 1900. Those in railway circles who were so honored were: Mr. Chas. T. Schoen, Mr. Geo. Westinghouse, Gen. Chas. Miller, Col. Thomas M. Egan, Mr. J. W. Duntley, Mr. Chas. A. Moore, Col. Alex. Gordon and Mr. Willard A. Smith. The Legion of Honor was founded nearly 100 years ago, and its decoration is very highly prized.

Some Schenectady Locomotives for Foreign Lands.

The Schenectady Locomotive Works have recently turned out three locomotives for foreign customers—a ten-wheeler and a consolidation (both narrow gage) for the Cape Government Railways, Africa, and an eight-

SCHENECTADY EIGHT-WHEELER, FOR JAPAN.

wheeler (also narrow gage) for the Sanyo Railway of Japan. The latter weighs 82,000 pounds, of which 53,400 pounds are on the drivers; has 16x24 inch cylinders; 60-inch drivers; an extended wagon top boiler,

SCHENECTADY TEN-WHEELER, FOR AFRICA.

52 inches in diameter, designed to carry 200 pounds working pressure; heating surface of 1053.50 square feet, of which 963.46 square feet is tube and 90.04 square feet fire box surface; grate area of 15.71 square feet.

The Cape Government ten-wheeler weighs 107,830 pounds, of which 85,350 pounds are on the drivers; it has 17½x26 cylinders; 54-inch drivers; a straight boiler, 60¼ inches in diameter, and designed to carry 180 pounds working pressure; heating surface of 1275.23 square feet, of which 111.7 square feet is fire box and 1163.53 square feet tube surface; grate area of 18.84 square feet.

The Cape Government consolidation weighs 115,450 pounds, of which 101,670 pounds are on the drivers; it has 18½x24 inch cylinders; 48-inch drivers; a straight boiler 60¼ inches in diameter, andd esigned to carry 180 pounds working pressure; heating surface of 1407.3 square feet, of which 126.6 square feet is fire box and 1280.7 square feet tube surface; grate area of 20.03 square feet.

The special equipment of these engines includes the following details of Ameriman make: Richardson balanced valves on the African engines, and American balanced on the Japanese engine; Jerome metallic packing on the African engines and U. S. metallic packing on the Japanese engine; magnesia sectional lagging on the African, and asbestos sectional lagging on the Japanese engine; Nathan lubricators on all; Dressel round case headlights on the African engines; Star chime whistles on all; American steam driver brake with steam cylinders for tender on the Japanese engine; Ashton steam gage on the Japanese engine.

SCHENECTADY CONSOLIDATED, FOR AFRICA.

Appraisal of Fire Damage Due to Railroad Wreck.

By H. M. Perry.

A FEW years ago a serious accident occurred on one of our well known roads in which a passenger train, running at a high rate of speed, met a heavily loaded freight train on a short piece of single track, resulting in a bad wreck. Fire added its horrors, and in a short time all that remained of the passenger train was six piles of burned and twisted scrap.

A claim was made on an insurance company for settlement of the fire damage, and, as this involved a considerable amount, it was decided to appoint two experts to make the appraisal, one acting for the railroad and one for the insurance company, they to decide on a third party, as arbitrator, to whom any disputed claims could be referred for final settlement.

The writer was selected as one of the appraisers, and as many features of the case were entirely outside of ordinary practice, it might be of interest to note the method of arriving at our conclusions, especially when we take into account the fact that all that remained of the train was the iron work, every particle of wood being completely burned.

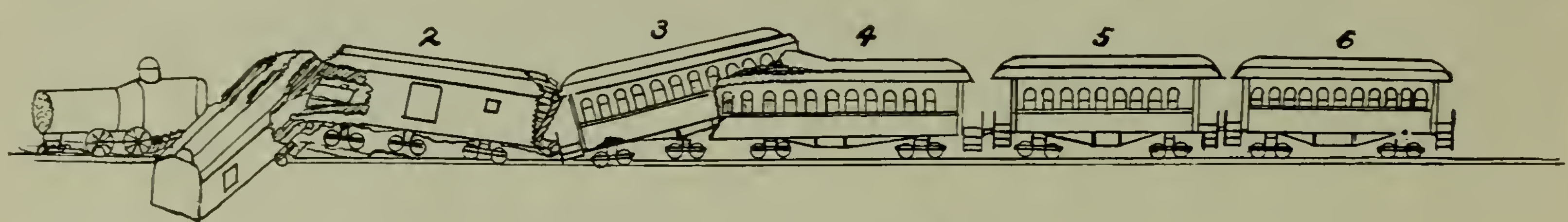
In clearing up the wreck the iron work from each car was loaded into separate cars and shipped to the shops, where it was unloaded and spread out on the ground, to make easy a thorough inspection of all the parts.

After a careful consideration of all the facts in the case it was decided to first summons the train crew and endeavor to arrive at the condition of the cars immediately after the wreck occurred. Each man was questioned, separately, as to the position of the cars in the train; the condition of the car or cars on which he was at work when the fire started; the length of time between the wreck and when the fire started, and his general opinion of the whole occurrence. After taking all this evidence the wrecking crew were questioned as to the position of the wreckage of the different cars and its general condition before it was moved; and this was generally corroborated by the condition of the scrap as it was inspected in the yard.

In order to make the matter perfectly clear the accompanying sketch was made and referred to the train crew, and from this sketch the probable damage by the wreck was estimated, particular notice being paid to the condition of the scrap from the different parts of the car on which the estimate was being made.

As an illustration we will take the fourth car in the train: Referring to the evidence of the conductor of the train, we find he was in the front end of the smoking car (No. 3) when the collision occurred, at which time all the lights in the train were extinguished. When he recovered himself he walked out of the front end of the smoker and ran back to the front end of the next coach but, finding the cars telescoped, he went back to the front end of the smoker and through that car back to the coach, where he assisted in getting the passengers out until driven out by the fire.

His evidence also proved that the smoking car was driven about fifteen feet back into the first coach (No. 4) and from the height of the floor of the smoker above the floor of the coach it was evident that the floor frame of the coach was not badly damaged, although the end of the car was completely destroyed, as well as about fifteen feet of both sides of the car. The rear end was not damaged, as the passengers all escaped from that end. The front truck of this car (No. 4) must also have been badly damaged, as it was driven back under the car; and we found all of the pedestals and oil boxes broken while the truck and timber plates were twisted out of shape. The rear truck was not damaged by the accident, as none of the iron work showed any signs of the wreck.



Diagramatic Sketch of Wreck.

Taking all these points into consideration, we first made an estimate of the cost of a new car similar to the one destroyed; from this we deducted the trucks, the wrecked end and sides, and one coupler, and estimated the depreciation due to age on the balance, as it would not have been right to have allowed depreciation on the parts destroyed by the wreck. This balance gave us the value of the parts of the body destroyed by fire, to which was added the fire damage on the trucks, which was arrived at in a similar manner, the total amount, less the value of the scrap, being the fire damage to the car, for which amount the insurance company was responsible.

All of the other cars in the train were estimated by the same methods and the settlement seemed to give entire satisfaction to both the railroad and the insurance company.

Air Brake Repairs.

A Serious Matter Neglected.

THERE have been of late a few notes of warning sounded concerning the neglect of air brake apparatus. The following letter, addressed to us by Mr. Godfrey W. Rhodes, touches up this matter in the directly practical way which characterizes most of his work and utterances:

To the Editor of the Railway Master Mechanic:

I have noticed the paper given in your January issue by Mr. H. H. Harvey in connection with your report of the last meeting of the Car Foremen's Association of Chicago. While I do not propose now to discuss Mr. Harvey's paper I wish to emphasize the point that our air brakes are not in general being properly cared for. I want to urge upon your readers the present actual pressing need of a thorough, systematic method of maintaining air brakes, especially the triple valves under freight cars. Most railroads have now a large equipment of air brake cars; but I am afraid we do not all have any method by which we can tell whether we are doing our proportion of cleaning and maintaining. The Master Car Builders' rules require triple valves under freight cars to be cleaned at least once in 12 months. Air brake men generally will agree that this is not frequent enough, and that to clean them once every 6 months would be better than to clean them once every 12 months. I have no doubt but that in time the association will reduce the number of months between cleanings. To railway men located in mountainous districts the importance of having efficient air brakes appeals much more strongly than it does to those located on comparatively easy grades.

On some of the B. & M. lines in the Black Hills territory we do not allow freight cars to be moved unless they are air braked. The same ruling pertains to other Western roads. At Grand Junction, west of Denver, the Rio Grande Western will not receive any air brake cars unless the record shows that the triple valves have been cleaned once in 12 months. This has so frequently blocked the yards at Grand Junction that the railways west of Denver will not receive air brake cars from Eastern roads unless the triple valves have been cleaned once in 12 months. The Burlington, along with other railroads, is constantly having transcontinental freight thrown back on its hands at Denver simply because triple valves have not been cleaned within 12 months, no other defect being noted on the cars. Not only are our own cars at fault in this respect, but we have the equipment of such prominent roads as the Lake Shore, New York Central, Pennsylvania Railroad, B. & O. and other lines, which in some cases shows no date as to when triples were last cleaned, and in other cases shows as bad as 18 months and two years without cleaning.

We have thought that if freight agents and others wished their transcontinental freight to go through expeditiously two or three days would sometimes be saved at Denver by seeing that their freight was loaded in air brake cars that had recently had their triple valves cleaned.

We took this matter up with several of the railroads and subsequently sent the correspondence to the Westinghouse Air Brake Company. The latter company called our attention to the fact that, realizing the importance of properly maintaining triple valves under freight cars, they have issued their circular notice No. 7 offering to care for triple valves at a price that they believe will be an object to the railroads.

It seems to me that the principal thing for railroads to do is to keep some kind of record of the number of triple valves cleaned per month. On the Burlington road a statement is sent in monthly from each triple valve cleaning point showing the number of triple valves cleaned. This divided into the total number of air brake cars gives the ratio cleaned. The following is a comparison of August, September and October, 1900, with the same months of 1899:

Comparison of Triple Valves Cleaned C. B. & Q. and System Lines.

	Ratio Cleaned.		No of Cars Fitted with A. B.	
	1899.	1900.	1899.	1900.
August.....	1 in 13	1 in 10	20,432	21,139
September..	1 in 13	1 in 10	20,531	21,271
October....	1 in 11	1 in 10	20,614	21,484

I send with this also a copy of our cleaning record for June, 1900. This will give your readers an idea of the way the data is tabulated and issued. Any one of the system lines not doing its proportion of cleaning can at once be picked out. You will notice, for instance, that the C., B. & Q. cleaned the largest per cent of triples in June, averaging 11.46 per cent, whereas, the Missouri Lines did rather poorly, only averaging 7.86 per cent. The total averages up fairly well, as it shows one cleaned in every nine.

Statement of the Number of Triple Valves Cleaned under C., B. Q. and System Lines during the month of June, 1900.

	C. B. & Q. CARS	B. & M. CARS	MO. LINE CARS	FOREIGN CARS	TOTAL CLEANED	TOTAL CARS FITTED WITH A. B.	PER CENT. CLEANED OF TOTAL A. B. CARS
By C. B. & Q.	949	362	96	59	1466	12798	11.46
By B. & M..	344	200	40	17	601	6374	9.43
By Mo. Lines	96	30	23	8	157	1995	7.86
Total cleaned	1389	592	159	84	2224	21167	10.50
Total cars fitted Air B.	12798	6374	1995			21167	
Average number cleaned	1 in 9	1 in 10	1 in 12			1 in 9	

Will you not bring this matter before your readers and urge upon them the importance of properly maintaining air brakes? While I have stated that the idea of keeping air brakes in first-class order seems to impress railroads operating on mountainous grades more forceably than it does those operating on levels, it nevertheless seems to me that the high speed of the trains on the level roads makes it almost as essential that their air brake cars should also be in first-class order. The high speed of today, in both passenger and freight trains, is largely made possible by the effectiveness of the modern air brake. Railroads should do everything possible to maintain the effectiveness of these brakes, as they will insure safety, not only to the passengers that are being transported over the road, but to the high grade and expensive freight that is also being transported.

G. W. Rhodes, Asst. General Superintendent B. & M. R. R. in Nebraska.

The circular above referred to by Mr. Rhodes is as follows:

The increasing number of cars now hauled in freight trains on all of the leading railways of the country, the greater porportion of air-braked cars in service, and the higher ratio of load to light weight combine to emphasize the importance of maintaining air-brake equipment at its highest efficiency. No argument is necessary to convince railway managers of the truth of this statement, since its confirmation appears daily on the records of every department; and it is equally well understood that any failure to give due consideration to its significance may have far-reaching results.

About two years ago we issued a circular calling attention to the fact that the satisfactory operation of brake apparatus very largely depends upon the condition of the triple valve and stating that, while this device can be and has been used for years without serious deterioration, still, in the course of time, the renewal of the more perishable parts and the re-standardizing of the entire valve become necessary to maintain its efficiency and the consequent efficiency of the entire apparatus. At that time we believed that unless we established a flat rate for making repairs, so that railway companies sending their valves to us would know the ultimate cost beforehand, they would hesitate to do so, and a net charge of $4.00 each was therefore fixed for general repairs to quick-action triple valves. On this basis we have received and practically rebuilt a great many triples, sometimes at a cost largely in excess of the amount charged; on the other hand, in not a few instances the price paid exceeded a fair charge for the actual work done, and while, on the whole, the result was fairly profitable to this company, we believe that in view of the experience thus secured we are now in a position to make a more equitable arrangement by charging only for the repair parts funished and the labor involved in each particular case. We fully realize that in departing from the fixed-price policy we are laying ourselves open to intimations and even assertions that we have supplied parts that did not need to be renewed; but the fact that there are thousands of inefficient valves in service to-day that can be re-standardized and put in excellent condition at a net cost of about $2.50, constrains us to lay the matter thus plainly before our patrons and urge them to give the new plan a fair trial and closely investigate the results.

We find that practically every quick-action triple valve returned to us to be repaired, in addition to a general overhauling and a careful test to demonstrate the thoroughness of the work requires the renewal of the piston packing ring, slide-valve spring, graduating valve, emergency-valve rubber seat, check-valve spring, check-valve-case gasket, strainer, graduating spring, cylinder-cap gasket, and union gasket. This work we will undertake to do for $2.25, subject to the usual rebate of 15 per cent from list price, accorded to holders of our regular form of agreement, or, say $2.02 net, which represents the minimum charge. In the large majority of cases, however, it will also be necessary to renew the 3½-inch bush, at a cost of 60 cents list, or 51 cents net, increasing the total to $2.53. It will be noticed that these figures include the furnishing and grinding in of a piston packing ring, and a final test of the repaired valve. Both of these operations, to be done properly and economically, require skilled workmen and the employment of costly special machinery and testing apparatus which no railway company would attempt to provide for the purpose, simply because the limited amount of such work would not justify the necessary expenditure. For these reasons alone, not to mention others, we believe it will prove more satisfactory and, in the end, much cheaper to send all imperfect valves to us to be repaired, especially in view of the fact that unless repaired triples be carefully tested and adjusted to our standards the amount expended in the renewal of repair parts is otherwise practically thrown away.

For all additional parts furnished to replace those found broken or so imperfect as to impair the proper action of the valve or render it non-standard within reasonable limits, we will charge the current repair-part price, subject to rebate. We recapitulate by giving below a complete schedule of prices for repairing quick-action triple valves:

For taking down, inspecting, and overhauling triple valve, renewing and grinding in piston packing ring, facing slide valve, furnishing new slide-valve spring, graduating valve, emergency-valve rubber seat, check-valve spring, check-valve-case gasket, strainer, graduating spring, cylinder-cap gasket, and union gasket, and fitting up and testing out repaired valve complete, $2.25.

For all additional parts furnished to replace those broken or otherwise plainly imperfect, the following charges, in addition to the minimum of $2.25 specified above, will be made:

Slide valve, $1,00; triple piston (without ring), $1.75; emergency-valve piston, 50c; emergency-valve seat, 55c; emergency valve, 60c; check-valve case, 90c; check valve, 25c; union nut, 10c; union swivel, 10c; drain cup, 75c; graduating-stem nut, 25c; graduating stem, 15c; one and one-fourth-inch bush, 75c; two and one-half-inch bush, 25c; three and one-half-inch bush, 60c.

We would prefer that, whenever possible, triple valves sent to us for renewal be forwarded in lots of 50, carefully marked with the name of the consignee. On receipt, these valves will be carefully examined and repaired on the basis suggested above, unless it be discovered that they are in such condition that they cannot be re-standardized and made substantially as good as new without costing more than $5.00 list, or $4.25 net; in all such cases the valves in question will be held until we have communicated with the owners and advised them definitely as to the exact cost of their renewal.

The Car Foremen's Association of Chicago.

January Meeting.

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Wednesday evening, Jan. 9th. Vice-President Grieb called the meeting to order at 8 p. m., and, because of the absence of President Sharp, presided during the evening.

Among those present were the following:

Aley, David.	Depue, Jas.	Olsen, L.
Bossert, Chas.	Elkin, Jno. L.	Powell, Chas. R.
Buker, J.	Earle, Ralph.	Peck, P. H.
Bates, G. M.	Grieb, J. C.	Perry, A. R.
Bundy, C. L.	Gruhlke, Edw.	Peterson, A. F.
Blackburn, D. W.	Hedrick, Elias.	Richardson, H. H.
Caldwell, J. B.	Helwig, Henry.	Spees, W. F.
Carey, C. H.	Johnson, A. F.	Schultz, F. C.
Cook, W. C.	Kidder, S. J.	Sanderson, S. P.
Chadwick, A. B.	Kershaw, J. A.	Saum, G. N.
Clark, I. N.	Kline, Aaron.	Terry, O. N.
Callahan, J. P.	Lauer, John.	Thiverge, J. C.
Curran, Thos. P.	Longfellow, F.	Toweson, Otto.
Cope, Thos. P.	Marsh, Hugh.	Van Cleve, R. S.
Cardwell, J. R.	Munsell, E. L.	Widner, J. E.
Deen, Chas.	McOmber, A. H	Wessel, W. W.
Davis, E. J.	Nordquist, Chas.	Wentzel, Geo.

Secretary Kline: The following have made application for membership:

Thos. Cope, car clerk, Belt Ry., Chicago; I. N. Clark, clerk, C., B. & Q. Ry., Chicago; A. M. Collett, general foreman, U. P. Ry., Omaha, Neb.; M. P. Conery, foreman, C., M. & St. P. Ry., Iron Mountain, Mich.; B. H. Doidge, car clerk, C., L. S. & E. Ry., Chicago; Albert Doyle, foreman, C., M. & St. P. Ry., Ottumwa, Ia.; John Gadbois, foreman, C., M. & St. P. Ry., Cedar Rapids, Ia.; Wells Harris, M. C. B., Erie R. R., Binghampton, N. Y.; F. A. Henry, assistant foreman, Erie R. R., Huntington, Ind.; H. J. Humphrey, foreman, I. C. R. R., Gilman, Ill.; Jos. Kastner, foreman, Erie R. R., Huntington, Ind.; Henry Kersten, car inspector, C., M. & St. P. Ry., Chicago; M. J. Lacourt, carsmith, C., M. & St. P. Ry., Channing, Mich.; W. J. LaRue, car inspector, C., M. & St. P. Ry., Clinton, Ia.; E. L. Munsell, general foreman, C., M. & St. P. Ry., Ottumwa, Ia.; J. H. Orchard, M. C. B., D. & H. R. R., Carbondale, Pa.; W. W. Pettis, estimating clerk, S. R. L., Chicago; P. Parke, general shop foreman, S. R. L., Chicago; Chas. R. Powell, billing clerk, I. C. R. R., Chicago; T. Sullivan, foreman, Erie R. R., Huntington, Ind.; G. S. Wood, railway supplies, Chicago; E. A. Westcott, M. C. B., B. & O. R. R., Newark, O.; C. E. Walinder, general foreman, C., R. I. & P. Ry., Davenport, Ia.; Chas. Young, foreman, Erie R. R., Huntington, Ind.

Vice-President Grieb: The first number on the program was the discussion of the report of the committee on labor for applying draft timbers to refrigerator cars. As it appeared that the members had not had an opportunity to study the committee's report, the motion prevailed that it be laid over until the next meeting in order to give each member an opportunity to look into the matter and be prepared to discuss it intelligently.

Vice-President Grieb: The next on our program is the discussion of Mr. H. H. Harvey's paper on the most successful method of

Repairing and Handling Air Brakes.

We have with us tonight several representatives of air brake companies and others who have made a study of air brakes. I would ask Mr. Kidder, of the Westinghouse Air Brake Co., if he will not be kind enough to give us the benefit of his experience in that line.

Mr. S. J. Kidder (W. A. B. Co.): I did not get an opportunity to read this paper over until this evening, but I must say that I subscribe heartily to everything Mr. Harvey has said. It seems to me the time is ripe now—in fact, it was ripe a few years ago—for more of an effort to be made to properly maintain triple valves (this most vital part of the air brake system) in proper condition. It is the neglect of them, so far as maintenance is concerned, which is contributing, to a large extent, to the trouble existing between railroad companies, and between railroad and private companies, and resulting in more or less voluminous correspondence that takes place between them on account of slid wheels, etc. It is quite true that the great majority of slid wheels is caused by the condition of the triple valve itself.

The general method of testing triple valves is not what it should be to determine whether the triple valves are in proper condition for operation. We frequently see triple valves cleaned, and possibly repaired to some extent, and then tested; but the method of testing practically proves nothing. Now by attaching a hose to a car, having an air plant in the yard, or shop, and charging up the auxiliary reservoir, then closing the angle cock at one end of the car and opening it at the other and applying the brake and finding that it applies all right; then closing that angle cock and opening the cock at the other end of car, suddenly permitting a rush of air into the train pipe, which releases the brake—all this by no means proves the triple valve is in good condition. The triple valve piston packing ring and bush may be in a deplorable condition, but under the application and release as above stated the brake would work all right.

That is a very important point. I think that it would pay any railroad company to concentrate the work of triple valve repairs and handle what would perhaps come from five or more hundred miles of the road, in one shop. In the first place a requisite for rapid and economical work is proper tools, and a man constantly employed on a certain kind of work becomes an expert in doing that work, and one who makes a business of repairing triple valves becomes an expert in that particular line of work. He learns what is required to put a triple valve in proper condition. Then he knows how to test the valve to prove its condition, and as the man becomes more expert the work is facilitated.

As I personally know, all of these different tools that have been shown by Mr. Harvey have been gotten up by a man who started in green at the triple valve repair business; and as he found he required something to help him out he would get up these devices. Now, instead of putting the triple valve body in a vise and consuming valuable time in attaching it, he simply drops it down and is ready to go to work on it; the amount of time thus saved is in the long run enormous.

Mr. Harvey speaks of the method of testing triple valves—in having a certain number of feet of train pipe and then feeding through a 1-32-inch by-pass. In getting up a little plant, for the purpose of testing triple valves, the length of train pipe is an important requisite. If we have a 1-32-inch hole through which to feed air

Mr. Harvey's Air Brake Tools.—Detail Drawings of These Were Given in Our Last Issue.

into a 15-foot train pipe we feed approximately twice as fast as if we had 30 feet, so, in determining the size of the port, if it is 1-32-inch, we should know that we have the necessary length of train pipe to go with it, because the object of this device is to slowly feed the air into the train pipe. Now then if the piston packing ring and bush are in good condition, the 1-32-inch opening will permit air to pass into the train pipe with sufficient flow to operate the triple properly, and when the triple valve will stand that test it is perfectly safe to send it out on the road for service. If we abbreviate that pipe it will permit a more rapid rise in the pressure on the train line side of the triple valve, and may release it; at the same time it may not be in the condition it should be, so that it is very important to have the length of train pipe he suggests, to go with the 1-32-inch opening through the disc.

Another important point is the jet of air that he speaks of as being indispensable in getting rid of dirt and grease.

Waste, as he has pointed out, is a very objectionable thing to use when cleaning or repairing a triple valve, because one thread of waste between the slide valve and the seat may cause it to leak, and presumably when you remove some part of the triple valve to see what caused the leakage this little piece of waste falls out unobserved, and then you are in a quandary as to what caused the leak. You have used ten or fifteen minutes in trying to find out what caused the leakage, and that time is thrown away. Use a cotton rag, as there is no lint or foreign matter left on the triple valve parts. The jet of air gets to every corner and crevice of the triple valve and takes away every particle of foreign matter and the results are bound to be very satisfactory.

I would suggest that all of you make yourselves familiar with every suggestion that Mr. Harvey has made here, and if you observe any improvements that can be made bring them here for the benefit of all, but so long as the suggestions herein contained are followed I know you will observe very satisfactory results and it will save you a good deal of time and correspondence in trying to explain why wheels are slid and all the other annoyances that come with improper working of the air brake.

Vice-President Grieb: It is clearly evident that this is the age of the specialist, and in order to secure good work and secure it economically it is necessary in railway operation, as well as in other lines, to concentrate and centralize and pick out the individual best suited for the various callings and let one or more attend to them so that you are insured of their being done absolutely right at the minimum cost. We all realize that the air brake apparatus in our cars is a very extremely important portion and should be looked after very carefully.

Mr. Kershaw (C. M. & St. P.): The working parts of the triple valve should be centralized at one point as much as possible, and all parts should be tested to meet the requirements that arise in practical service on the road, and the way that Mr. Harvey has illustrated the testing of these parts of the triple valve is, in my opinion, all right. He tells you how to test the slide valve to see that it is tight; he also tells you how to test your check valves to see that they are tight, and your packing ring and your graduating valve. When the engineer applies the brakes to the graduating point, he wants to put so many pounds in the cylinder. If the graduating valve is not tight he cannot tell how much air is going in. Now, in order to have the triple valves in condition you have got to put them under a test as suggested by Mr. Harvey.

Vice-President Grieb: I would like to inquire as to whether, from personal observations, you have found that the recommendations made by Mr. Harvey are carried out in any way.

Mr. Kershaw: I think they are. We test the triple valve on the C. M. & St. P. Ry. in a manner similar to that suggested by Mr. Harvey, and at plants we have fitted up we aim to test triple valves to meet the requirements in road practice. We have provided them with brake valves for the purpose of testing the graduating valves in making a service application and have made provision to let air in the train line slowly, so as to test the packing rings of triple valves by letting air in the train line through a small opening. This will raise the train line pressure slowly, and the air will pass through the miter and by a worn packing ring and not force the triple piston to a release position, where, if the air was admitted in suddenly it would. Now, when we consider the number of cubic inches in a long train that has to be filled by the small main reservoir on the engine, the defect to bushing and packing rings as cited is apt to show up in the way of stuck brakes. Now, the idea to test the triple valves to meet the requirements in practical service is to have an air plant fitted up to make the test to all the working parts in the triple valve, and the importance of locating defective triple valves will warrant more and smaller places being fitted up with air than we have at the present time. It has been our practice to send to car men repaired triple valves in numbers to suit, so as to enable them to remove defective triples when they come to them, and also other repair parts that are necessary to make hasty repairs. We do not expect car men to make repairs to the working parts of the triple valve. I would also add that we centralize the repairs to air pumps, brake valves and pump governors, and men who are engaged in this work also become experts and results are more satisfactory.

Mr. Kidder: There is one thing that I have observed here a little more closely that I would like to speak of. Of course you all realize the fact that in preparing this paper it was impossible for Mr. Harvey to go into detail as to the way to do certain parts of this work; but in speaking about this test through a disc having a 1-32-inch hole: There are two ways of testing a triple valve to find out whether the packing ring of the triple valve piston and its bush are in reasonably fair condition or not. In other words I might say there is one way you can test it, using a 1-32-inch disc, and find the valve apparently all right, and in another way it is found to be all wrong, and I would like to point out the difference. Now then, as you perhaps all know, with 70 pounds train line and auxiliary pressure we get 50 pounds pressure in the brake cylinder on a full service application. In other words, if we reduce the train line from 70 to 50 pounds, we get an equalized pressure of about 50 pounds in the auxiliary reservoir and brake cylinder. That is, we have 50 pounds pressure on the auxiliary reservoir pressure side of the triple valve piston and the same pressure on the train line side. If we make any further reduction in the train pipe the triple valve piston makes its full traverse, and we do not get the results we are after in making this feed-off test because upon making the excessive train pipe reduction the triple valve piston moves from service position and bottoms on a leather gasket and the consequence is it makes an air-tight joint on the gasket, reducing the area exposed to the train pipe pressure possibly 1½ or 2 inches. You have 9 square inches of piston exposed to the auxiliary reservoir pressure, and say 7 square inches to the train line pressure. If we then charge the train line up slowly there is no possibility of the air leaking past the piston packing ring because the piston is solid on the leather gasket and the consequence is the train line pressure increases two or more pounds before we get the necessary differential pressure to start the piston away from the gasket. At the instant of starting the train line pressure expands over the entire area of the piston and that two or more pounds pressure on the train line side in excess of the 50 pounds auxiliary reservoir side of the piston. The brake will then release, regardless of the leakage that may exist because of the defective character of the packing ring or bush.

The proper way of conducting a test of this character is this: First charge up the reservoir to the same pressure as that in the train pipe, then make a service reduction of, say ten pounds, as this will cause the piston to stop in the intermediate position where the packing ring or bush is most susceptible to leakage. Next cut out the direct communication through the train pipe and permit the air to feed to the triple valve through the 1-32-inch disc. If the piston valve responds properly it insures the parts most liable to be worn to be in at least reasonably good condition.

Mr. Bundy (S. R. L.): I have made air brakes somewhat of a study and I approve of the remarks made in Mr. Harvey's paper and of the points made by Mr. Kidder. I think if we did all the air brake work in this manner we would have very few slid wheels.

Mr. P. H. Peck (Belt Ry.): I think there has been one point overlooked. Allowing the air brake hose to hang down and catch sand and dirt causes trouble in the triple. The hose will drag and fill with sand, and in a few days the brakes will work hard. I think the hose should all be coupled up or hung in the dummy couplings.

Mr. Kidder: I will say that from the day the practice was first indulged in of permitting the hose to hang down I have taken very strong grounds against it. It was a surprise to me in the first place that any railroad official would be in favor of endorsing anything of the kind. It also appears to me that while we are saving a little in hose by this practice we are losing a great deal more elsewhere. I might relate one instance that I ran across several years ago, that pretty well satisfied me it was advisable to hang up the hose. I was called over to southern Michigan in the early days of the quick action brake. They had had some trouble with this brake because it would not work. I found a couple of coaches set on the side track, the brakes having become absolutely inoperative. They being somewhat afraid, at that time, of the quick action brake, I was sent for. In taking the pipes down the first thing we found was the small conical strainer clogged up with baked sand, and then a little further investigation revealed the fact that there was quite a sand bank inside the pipe leading across from the train pipe to the triple valve. But before making these examinations I was talking with the superintendent of motive power and asked him if he was using the dummy coupling. "Well," he said, "we did have a few at one time, but we concluded that they were not of much account, so when they got broken we did not replace them; they were no good anyhow." So I took down this piece of pipe, being very careful not to let any of the sand fall out, and took it over to his office, put a piece of paper on his desk and emptied the sand on it. We had pretty near a coffee cup full that came out of that pipe, and from that day to this I have always been a strong advocate of hanging up the hose at all times, and I have never heard one good or sufficient reason why anyone should take any other grounds.

Mr. Bates (C., B. & Q.): We aim to clean our triple valves about every seven or eight months; sometimes they run nearly a year, but we are now able to clean them about every eight or nine months. I might say a few words in regard to the way we formerly handled these triple valves. Three years ago we had four or five men stationed around in different parts of the yard cleaning triple valves. Every man had his own way of doing the work, and the cleaning was usually done under the car. We had no end of correspondence and trouble with slid flat wheels, etc., and when Mr. Cota investigated the matter he found things in a very deplorable condition. He would find that the men would repair triple valves and use a graduating spring too large or too small, and consequently they did not work properly; in fact they were doing all sorts of bad work over the line. Then we decided to have one man do all the triple valve work, and, as stated by Mr. Harvey, this man started in as a green hand but is now an expert in his business and all the tools which he has have been devised by himself. He cleans on an average 25 to 30 valves a day. Now we have five air brake men stationed around the yard changing these triple valves —one man is eight miles from the shop; but we have no trouble in getting valves out and back because we have suburban service and the valves are sent out to him every day and the old ones returned. As long as we have been doing this sort of work we have had practically no slid flat wheels and consequently do not have such a large amount of correspondence to contend with. We find it to be a great benefit to do the work in that way; furthermore, if we run across a car which has been cleaned within three or four months where anything is wrong with the triple valve, we very soon get after the man who did the work, because every triple valve is stencilled so that every man who does bad work must expect to be caught at it.

Mr. Marsh (C., N. Y. & B. Ref. Co.): When I read Mr. Harvey's paper I thought he was about right. Since I have heard the endorsement here tonight I am satisfied he is right.

Mr. Caldwell (A. C. C. O. Co.): I would like to ask Mr. Bates if he handles triple valves on foreign equipment the same as he does on his own cars.

Mr. Bates: We do not clean triple valves on any foreign cars if we possibly can avoid it. We put all the time on our own cars; but where we do clean a foreign car it is handled just the same as our own cars; we put on a clean triple valve and send the dirty one to the shop.

A Question in Dispute.

Vice-President Grieb: It does seem wrong to put an expensive mechanism like the air brake on a car and then not get the full use of it at all times.

If there is nothing further we will take up question No. 3: "A renders a bill for repairs on B's car on stub of repair card, dated June 16, 1900, reading as follows: Two bottom brake rods, 1 lever and fulcrum, 1 dead lever guide and 5 key bolts; reason for making repairs, rods, lever and fulcrum, dead lever guide and key bolts all missing. A charges for the fulcrum, guides and bolts, stating that these are not excepted in the rules concerning missing brake material. Is this charge correct?"

It will be observed that the items charged for are not specifically excepted, and that by reason of this omission A renders his bill. The question is whether the spirit manifested in this Section 7 of Rule 5 should govern, or if an arbitrary and literal interpretation of the rule should form the basis for bill.

Mr. Cather (I. C. R. R.): We would make a charge for the brake fulcrum and the guide under the conditions as outlined in the abstract presented tonight; and I will say further that the point involved has once been before the Arbitration Committee. I am not prepared to give the number, but I know it is almost identical with the case before us tonight. The fulcrum is not excepted from billing except where those parts— the fulcrum, guides, heads, etc.—are missing with the brake beam itself. If the brake beam is missing then no charge should be made for the material with the beam. If, however, any part is missing and the beam remains, a material charge is proper according to the rule and the Arbitration Committee's decision. The key bolts would come under the head of lever and rod connections, and we would make no charge when the levers and rods are missing for the bolts, neither do I believe it is the intent of the rules to make a charge of that nature, although a great many roads do, even though the beam and rods complete are missing.

Mr. Bates: I am inclined to believe that the charge is correct insofar as the lever and guides are concerned. I do not believe it is proper to charge for the bolts and I do not believe the spirit of the rules allows a man to charge for them. However, if the beam is missing it would not be proper to charge for the fulcrum and guides.

Mr. Munsell (C. M. & St. P.): I think that the key bolts are as much a part of the brake as the levers and guides and that it would be correct to charge for all of them.

Mr. Callahan (C., L. S. & E.): I do not believe that there really should be any charge made on that. If the brake lever and rods are gone it stands to reason that the key bolts would be gone. It is very evident that the brake lever guide was either taken off somewhere or else lost between that point and the shop track, and the party handling car should be responsible for all.

It was moved and seconded that the question be laid over until the next meeting in order to look up the arbitration decision referred to.

Another Case in Dispute.

Vice-President Grieb: Question No. 4 is: "A road renders bill against another road for applying one draft timber and four bolts to that same timber, and also four bolts to the companion timber, charging nine hours' labor. Is charge correct?" I thing we are safe to assume that this is what is classed in the code of rules as an ordinary car.

Mr. Bates: In looking over the case I do not really see anything to discuss about it, because the rules allow a labor charge of six hours for renewing one draft timber, and they also allow three hours for renewing four or more draft timber bolts at one end of a car. Now, as these four bolts were renewed in the companion timber it seems to me that three hours is the proper charge for that and six hours is proper for the timber renewed —a total of nine hours. I think the bill is all right.

Mr. Longfellow: I would like to ask if the timber butted up to the transom or extended through the transom.

Mr. Peck: That makes no difference, according to the rules. I think there is no argument on that bill. I think it is right as rendered.

Mr. Longfellow: Were the four broken bolts applied to this timber? As I understand it, there were four bolts applied to one timber and four bolts to the other; then the question comes up in my mind whether the draw timber had been replaced on account of broken bolts. In that case I think the charge should be three hours for applying draw timber bolts.

Mr. Peck: It says "draft timber applied and four bolts applied to the adjoining timber." We can charge for applying a draft timber six hours and for four bolts three hours.

Vice-President Grieb: It occurs to me that the interpretation made by Mr. Peck is the only legitimate one there is. One draft timber is renewed, presumably for some defect in it, and whether or not the bolts in that particular timber were renewed or not would make no particular difference; but four bolts in the companion timber were renewed, and the labor allowance is three hours for replacing four or more draft timber bolts at one end.

Mr. Buker (C. C. C. Co.): It does not state here whether the timber applied was a new one or an old one. If it was a new timber I think it is proper to charge six hours for it, but if the timber was replaced on account of broken bolts it seems to me that the charge is wrong—there should only be a charge for the replacement of bolts.

Mr. Bates: As I understand this case, and as it was presented to the committee, a new timber was applied, with four bolts to the companion timber.

Mr. Cather: I would like to submit a phase of this question as it appeared in an actual occurrence with our road, namely: A new draft timber was applied and four bolts were applied to the companion timber. Nine hours labor were charged. Objections were made, primarily claiming that six hours was the proper charge under those conditions, for the rules allowed only three hours for all bolts at one end of a car. Finally the matter came down to this point:—that assuming that all bolts were applied at one end, or that four bolts were applied at one end to each timber, how much labor would be involved according to the rules, for each timber? There are three hours for all of them, which would be 1½ hours for each timber. Then it came down to a point, technically correct, that 7½ hours was a proper charge under these conditions. A new timber applied and bolts, both to that timber and to the companion timber. Now you apply one draft timber, for which the rules allow six hours, and 1½ hours is allowed, according to the rules, for the other timber, and the argument was made, and I think with merit, that 7½ hours was really the proper charge.

Mr. Peck: There is quite a difference between putting in a new draft timber and in applying draft timber bolts only. In putting in a new timber you have got to take down the old one, take off the draw lugs and apply them to the new timber, and it also requires taking down a portion of the rest of the car. I think the charge is correct as it stands, nine hours.

Mr. Bundy: I believe the charge is correct as it stands, nine hours.

Mr. Munsell: I think the charge is correct.

It was moved, seconded and carried that the charge is correct as stated, nine hours.

In discussing question No. 6 it appeared that a correct statement of the case had not been given, and the secretary was instructed to write to each of the contestants for a joint statement of the facts in the case.

The meeting here adjourned.

*The Car Journal Bearing and Hot Boxes.**

By S. P. Bush.

THE "hot box" always has been and no doubt always will be with us.

Its causes are many. Usually lack of care, sometimes the lubricant, sometimes the quality of bearing metal.

These three, however, have no doubt been the subject of more investigation and discussion than all the others together, and while those specially interested in each may be able to improve conditions, yet after each has done their utmost we still have very much to accomplish.

It is not the expectation of the writer to present a plan for preventing all hot boxes, but on the contrary a portion only.

It is desired to call attention to a condition well known yet lightly regarded, which cannot fail in many instances to produce a hot box.

Take, for example, the M. C. B. standard 60,000 lbs. capacity journal and bearing. The former has a diameter of $4\frac{1}{4}$ inches, while that of the bearing is a trifle greater.

The bearing has a lining or filling of lead or soft composition metal, so that when put together into service, all things being as they should, the bearing very soon adjusts itself to the journal.

But as the journal continues in service it wears until it reaches the limit of $3\frac{3}{4}$ inches, so that it is not far out of the way to say that the average journal under 60,000 lbs. capacity cars is four inches in diameter.

But during the life of the journal many bearings are applied to it, and usually it is the standard bearing, intended properly for a journal $4\frac{1}{4}$ inches diameter. Thus a considerable difference exists in the radii of surfaces that should be nearly alike, and this difference grows constantly greater as the wear of the journal continues. The result of such difference is illustrated in Fig. 1.

While it is expected, and is sometimes the case, that by reason of the soft metal filling the bearing will gradually adjust itself to the journal, yet when we consider the very small bearing area that we must have for some time, and the resultant intensity of pressure per unit of area, is it reasonable to expect that hot boxes should not frequently result, and as a matter of fact do, when new bearings are applied?

Think of these conditions in fast passenger service. Not only is the adjusting of the bearing to the journal in itself an operation likely to give trouble, but in addition, as the adjustment progresses, the journal box, key and bearing move downward with relation to the axle, with the consequent tendency of dropping the packing away from the under side of the journal and thus cutting off the supply of the lubricant.

It is hardly possible in practice to provide satisfactory relations between the worn journal and a new bearing from the beginning, but the writer presents a plan as shown by Figs. 2 and 3, which has been found a decided improvement.

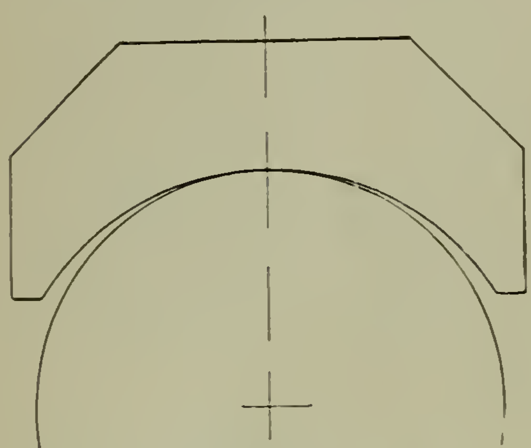


FIGURE 1.

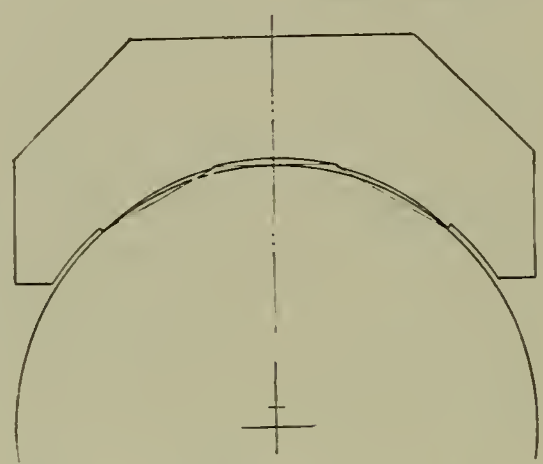


FIGURE 2.

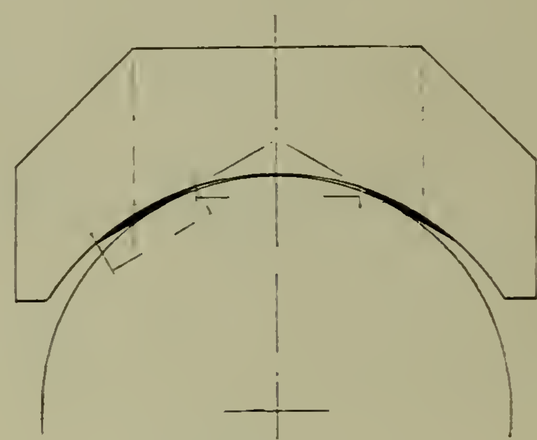


FIGURE 3.

The inner surface of the bearing is provided with a raised strip on either side of center line and parallel with it.

These strips are from $\frac{5}{8}$ to $\frac{3}{4}$ inches wide and directly under the edges of the flat horizontal surfaces of the key and bearing, so that there is little tendency to spread the brass. They are raised above the inner surface enough only to provide these lines of contact between the bearing and journal when the latter is worn to $3\frac{3}{4}$ inches, as per Fig. 3. This gives two lines of contact when the journal is full sized, as shown by Fig. 2.

Engine truck journal bearings on a similar principle have been used for years with great success.

Besides providing a better adjustment more rapidly, a further advantage is gained in preventing so much movement of the axle in the bearing at right angles to its axis such as may be caused by an application of the brake, or in passing around curves, so that the axles are more apt to be maintained parallel with each other.

As a better contact between journal and bearing is provided from the beginning, the tendency for the packing to drop away from the under side of journal is also reduced, and it will thus be seen that the opportunities for hot boxes are lessened.

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*Paper presented at the December meeting of the Western Railway Club.

Locomotive Design*

By W. H. Marshall.

While economies are possible in all directions, it is a fact that nowhere in all the field of railroad expenditures is it possible to effect savings equal to those that can be obtained through the increase of revenue trainload, and this is becoming so thoroughly recognized that the managements of railroad properties are in many instances being judged to-day by the showing they are making in this direction.

This being the direction in which large economies are to be effected, it fully explains the wonderful increase in the size of locomotives witnessed in recent years, and it also points to an important work in which those responsible for the design of locomotives should have a share. If the motive power officials perform their full portion of this work, they will accomplish more in the reduction of expenses for the companies they serve than can be achieved through shop practices and routine work of their departments, important as these are.

When large freight power is wanted, the first question is, how heavy shall the engine be? In the majority of cases the answer to this question is found in the limits imposed by the strength of bridges and track. Sometimes an engine of the maximum weight allowable under existing conditions may be needed to obtain increased revenue out of which to pay for the bridges and track that will carry a still heavier engine. But if the finances will permit it, the spirit of conservatism should not prevent the transition by a single step to the most powerful engine the road can use.

Unless the physical condition of the road establishes other limits, I would say as a general proposition that the road should not only build the largest engine that could be used advantageously to-day, but if possible, should meet the conditions that will prevail in the future, say, five or ten years from to-day. To illustrate, let us assume a low grade road whose business is largely general merchandise. Also, that an engine with 140,000 pounds on drivers can haul all the tonnage that ordinarily can be put in 70 cars, and it is not considered practicable to haul longer trains. Five or ten years from now the 30,000, 40,000 and 50,000 pounds' capacity cars will nearly all be out of service, and with trains composed of 60,000, 80,000 and 100,000 pounds' cars, and possibly containing more than 70 cars, the tonnage will require an engine weighing, say, 170,000 pounds on drivers. Surely the engine that will meet these conditions is the one that should be built. Add to these considerations the fact that everyone is endeavoring to load freight cars better than they have in the past, and it would seem a certainty that within a few years the tonnage that is now carried in an 85-car train will be brought within the length of a 65 or 70 car train. Consequently, long before the locomotive is half worn out, the conditions ought to be such that its full capacity could be utilized. If we consider the average modern locomotive as good for twenty years of service, we certainly ought not to build for to-day but for years in advance.

I believe it is necessary to have three pairs of drivers for heavy work. If correct in this, what form should the engine take? One's thought naturally turns to the 10-wheeled type, and if it were not for the question of providing sufficient grate area, I would assert without qualification that no better type of engine could be built for the service we are considering. But if the driving wheels must be more than 72 inches in diameter, the firebox will have to go between the wheels in the usual way and as it should not be more than 10 feet long (on account of the difficulty of firing a longer box) the grate area is limited to about 36 square feet. This is less than desirable, though many successful designs have no more, and some have as little as 30 square feet. If 72-inch wheels are adopted, the firebox can be placed over them, and any desired grate area obtained. But should wheels larger than 72 inches be required, it would appear as if some other than the common 10-wheeled type must be considered.

So convinced am I of the desirability of combining greater tractive weight with large wheels and the wide firebox, that the Lake Shore is now having built two passenger engines in which it is believed this will be done successfully. These engines will have three pairs of driving wheels, 80 inches in diameter, a two-wheeled leading truck and a two-wheeled trailing truck of the English radial type. The total weight of the engine will be 175,000 pounds, of which 128,000 pounds will be upon the drivers. The grate will be 7 feet square (giving 49 square feet of area) and the heating surface will be about 3,300 square feet.

While we will always have to force a locomotive boiler much beyond anything dreamed of in stationary practice, it certainly behooves us to obtain all the boiler capacity possible in any design of locomotive. Some years ago attempts were made to establish ratios between grate areas, heating surfaces and cylinder capacities; but now there is only one common sense rule, and that is to make the boiler as large as you can.

The weight of the machinery of a locomotive should receive close attention for several reasons: First, the lighter it can be made, the less destructive it is to itself. Second, a reduction in the weight of all the machinery below the springs will reduce the effect upon the tracks. Third, the less the weight of the machinery, the more weight is available for the boiler. The weight which bears directly upon the track without the intervention of springs is a considerable portion of the total engine, and at high speed the effect of this weight upon the track

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*Extracts from an address made at Purdue University.

is certainly much more severe than equal weight placed above the springs, hence every pound that can be taken out of this portion of the engine represents some saving in track maintenance. The chief reason, however, for keeping the weight of machinery down to the minimum is the great advantage that arises in being able to put the weight so saved into the boiler, and it is needed in the latter.

Pressed steel and cast steel permit of a large reduction in the weight of many details formerly made of cast iron, and even when used to replace wrought iron the saving is considerable. In a large passenger engine weighing about 175,000 pounds and having three pairs of 80-inch drivers, neglecting such of the smaller details as the brass work about the engine, cab fittings, the piping, boiler lagging, boiler jackets, etc., the amount of wrought iron in the engine is 16,950 pounds; cast iron, 19,550 pounds, of which 11,350 pounds are in the cylinders and 1,760 pounds in the grates; cast steel, 27,660 pounds, of which about 16,000 pounds are in the driving and truck wheels; pressed steel, 1,650 pounds; rolled steel plates and shapes, 3,770 pounds; forged steel, 11,270 pounds; tire steel, 10,500 pounds; malleable iron, 1,300 pounds and wood, 4,100 pounds. The boiler weighs 47,850 pounds, and the water in the boiler 22,500 pounds, making a total of 167,100 pounds.

When high-grade materials are employed, full advantage should be taken of the higher tensile strength and other superior qualities possessed by them. Unfortunately, some people are going into the use of cast-steel without making any changes in the patterns that were used for cast iron. I recently saw a cast-steel cylinder head for a 20-inch cylinder that was not less than 1½ inches thick in any place. It could have been made not more than ⅝ inch thick in the center and ¾ inch or ⅞ inch thick at the bolt flange, and strengthened with ribs not more than ¾ inch thick in any place. On all four cylinder heads it ought to have been possible to save several hundred pounds. Even where cast steel is used intelligently, designers have not always reduced the weight as much as practicable. A recent case came to my attention, in which the drawings of the driving wheels of a consolidation engine were revised, and 1,600 pounds of the material taken out of the eight wheels. In such work as this one has the satisfaction of knowing that he is not only saving weight, to be used where it counts for more, but he is adding to the beauty of the engine, and is also making the machinery more accessible, an advantage of no small importance where everything is crowded, as in a modern engine.

When proper attention is given to details we find cast-steel quite generally used for driving boxes, crossheads, rock shafts, rock shaft boxes, footplates, frame braces, equalizers and equalizer fulcrums. The material is also used occasionally for eccentric straps, engine truck swing bolsters, driving box saddles, reverse shaft arms, guide yokes, guide yoke knees, cylinder heads, steam chests and steam chest covers, etc. In fact, as already intimated, it is used in almost every place where cast iron was common a few years ago, the only exception of any moment being the cylinders and the grates. Pressed steel should be used for boiler fronts and boiler front doors, cylinder head casings, steam chest casings, sandbox and dome casings. Some railroads favor metal cabs or a combination of metal and wood. Unless the climate is unusually destructive, the wooden cabs are good enough for anyone. A wooden cab was recently substituted for a design calling for part wood and part metal, with a saving of 500 pounds. Cast-iron cab brackets, supporting the rear end of the running board and cab, can be replaced with steel plates, ¼ inch or 5-16 inch in thickness, and strengthened with angle-iron edges, with a saving of about 300 pounds in weight. The cast-iron steampipes in the smokebox of a locomotive are usually none too heavy in the flanges, but much heavier in the body than necessary. Three hundred pounds was recently taken out of a set of these pipes, with no disastrous results. If they had been made of malleable iron another 100 pounds could have been saved. The sandbox base, which is usually of cast iron, can be made of pressed steel, with a saving of about 150 pounds. On engines standing too high to permit the safety valve to be placed in the dome, it is customary to rivet a cast-iron turret on top of the boiler, onto which the safety valves are screwed. The cast-iron turrets can be thrown away and the safety valves put directly into the boiler, saving 250 pounds. There is a difference of more than 1,000 pounds in the weights of well-known boiler coverings on the market, and as some of the best boiler coverings are also among the lightest, there is no need of sacrificing any weight in this direction.

I have seen grate bar patterns so unreasonably heavy that 1,000 to 1,500 pounds could be saved by changes in them. Grate side frames on some recent engines have been made of pressed steel instead of cast iron, and a saving of about 400 pounds effected. The fire door is usually a heavy affair hinged to a cast-iron frame bolted to the boiler. A pressed steel door with a cast-iron liner can be hinged directly to the boiler head with a saving in weight of, say, 250 pounds.

The supports between boilers and frames usually afford some opportunity for a saving. Among the lightest forms of supports between boilers and frames are plates of steel ⅜ inch to ½ inch or 9-16 inch in thickness; they are secured vertically between the frames and the boiler, and they have the advantage of dispensing with all sliding or pin connected supports, the expansion of the boiler simply deflecting the plates slightly.

It may seem to you that many of these items represent comparatively small savings, and yet, in a recent case where it was necessary for me to take three tons of weight out of a proposed consolidation freight engine, the weight of whose details had already received considerable attention, we were enabled to get all of it out of the machinery and the many small accessories of the locomotive, and not one pound of it had to be taken out of the boiler. In the design of the boiler itself, weight is often added without a sufficient return.

The allowable stresses in materials vary greatly in different parts of the engine, and the same is true of pressures upon bearings. On driving boxes the pressure seldom exceeds 200 pounds upon the area represented by the rectangle of the bearing. On the main pins this pressure may be as high as 1,600 pounds per square inch, and no trouble from heating or excessive work will result. The pressure upon the cross head pins may rise to 3,000 pounds per square inch. The allowable stresses, as far as they can be calculated, cover almost as wide a range as do bearing pressures. The only stresses that can be calculated in locomotive frames are those due to steam pressure on the piston, and these may be as low as 2,000 to 3,000 pounds per square inch in some portions of the frames, and yet the latter be none too strong to stand the other stresses to which they are subjected; in fact, locomotive frames can be correctly proportioned only through experience with earlier designs. In the main rod strap the fiber stresses should not exceed 5,000 to 8,000 pounds, whereas in the main rod body the maximum stresses can go to 10,000 pounds per square inch; and so throughout the entire locomotive the limits to calculative stresses have been found by actual experience. No greater mistake can be made in the design of details than to materially exceed the stresses that have been found to be satisfactory in service.

Engine and train crew wages amount to from 10 to 12 per cent of gross earnings, and these are the items that are reduced in inverse ratio to the increase in train load. Repairs of locomotives, and fuel, equal 8 to 10 per cent of gross earnings, and will be reduced to some extent per unit of work done as the average train load is increased. As the total operating expenses are usually between 60 and 65 per cent of gross earnings, there is about 15 per cent of the entire operating expenses on which a large saving can be effected by increasing the average revenue train load, and another 10 per cent on which a smaller but by no means inconsiderable economy will result.

*The Locomotive-Truck Brake.**

SOME years ago, in commenting upon the report of the Massachusetts Railroad Commissioners with reference to a fatal railroad accident that had been subjected to an unusually careful and exhaustive examination, the "Railroad Gazette" said:

"Over and over again, we have the lesson in passenger train accidents that it is the last twenty or thirty feet that kills. One of the clearest of these was a famous accident in 1890, when twenty-three people were killed, and none would have been killed if the train had been stopped forty-five feet sooner."

In the face of such facts as these, it is difficult to understand why railroad managers do not exhaust every resource to obtain the closest approximation to absolute control over their trains by the application of the highest possible braking power to every wheel, which represents the ultimate and therefore the only proper practice in order to accomplish the highest purpose for which brake devices were invented, namely, the preservation of human life. It is only in recent years that the prejudice against the locomotive-driver brake has given way and that this most efficient device for stopping trains has come into general use and gained its proper place in the estimation of all mechanical men. This result came about through the gradual recognition of the principle that the relative efficiency of train brakes is practically the ratio of the weight carried upon the effectively braked wheels to the total weight of the train, and the consequent appreciation of the enormous loss of available braking power through failure to utilize the proportionally great weight of the locomotive for that purpose.

Notwithstanding the clearer understanding of the problems involved in the art of controlling trains, which finally brought about the application of brakes to all the driving wheels of the locomotive, much reluctance has, for a time, been manifested toward the adoption of the locomotive-truck brake—more, we believe, because of an unfounded apprehension that such an appliance would be apt to interfere with the perfectly free movement of the truck than from any failure to realize that this additional step forward is required to consistently extend the principle already set forth to its legitimate conclusion, or from any misunderstanding as to the importance of the gain in braking power by the application of brakes to truck wheels as well as driving wheels. Should any such misunderstanding exist, however, it will certainly be dispelled by a fair consideration of the following facts:

The weight upon a wheel which is available for braking purposes is the least weight with which the wheel may, with certainty, be relied upon at all times to press upon the rail. The available braking weight of a train is, therefore, the total weight of the locomotive, the light weight of the tender, and the light weight of all the cars. That proportion of all this available weight which is carried by the truck of the eight-wheel locomotives customarily employed to haul suburban trains, is much greater than may readily be supposed. Most suburban trains consist of from three to five cars, though they not infrequently consist of but two, or as many as six, or even more. The shorter the train the greater the proportion of available braking weight carried by the locomotive truck; but it will also be seen, by reference to the figures below, that such proportion is still a very important factor upon even the longer trains. Under the conditions of generally prevailing practice, the proportion of the available braking weight carried by the locomotive truck is as follows:

*Bulletin of the Westinghouse Air Brake Co.

For a two-car train, about 15 per cent.
For a three-car train, about 12 per cent.
For a four-car train, about 10½ per cent.
For a five-car train, about 9 per cent.
For a six-car train, about 8 per cent.

Neglecting all the other and more significant figures, and considering the case of a six-car train only, can any one deny that there have been and will be many instances where the sacrifice of eight per cent of the available braking power of a train, thereby increasing the length of stop one-twelfth, accounts for the destruction of valuable property and frequently the loss of invaluable life?

In these days when steam railways are being called upon to face the competition of electric traction railways, particularly in suburban service, much consideration is given to the necessity of a high rate of acceleration in starting, and to this end the short suburban trains are now very generally handled by much heavier locomotives than were formerly employed in this serivce. The corresponding necessity for a high rate of retardation in stopping does not appear to have had equal consideration, and yet it is certainly not less important to shorten the time and distance of making the frequent stops required than to quicken the start, in order to maintain a high average rate of speed between stations. With a given period of time from start to stop, also, the ability to stop quicker means economy in fuel consumption, because of the lower maximum speed necessary to maintain the schedule.

The value of the use of the locomotive-truck brake is not confined to suburban, or, in fact, to passenger service; its efficiency, as a factor of safety, can scarcely be overestimated in cases where locomotives so equipped are required to handle short trains of loaded freight cars, especially upon heavy grades, and where the proportion of total available braking power dependent on the locomotive is therefore especially high. It is also frequently necessary to move freight locomotives over the line without trains, or with only a caboose attached, and in such cases the rate of speed always closely approximates and often exceeds that of passenger trains. Under these conditions, the braking weight carried by the locomotive truck is from 25 to 30 per cent of the entire available braking weight of the train, so that the importance of the use of the truck brake in connection with freight as well as passenger locomotives is manifest.

Briefly returning to the question of possible interference of the truck brake with the perfectly free movement of the truck, experience has demonstrated that it is altogether a question of design. Where the entire locomotive-truck brake mechanism and its operating brake cylinder are attached to the truck frame and connected with the body of the locomotive by means of a flexible hose only, and where such brake gear is compact, carefully proportioned and well constructed, the valuable results above enumerated are most satisfactorily attained without undesirable complication whatever.

The construction of the truck-brake apparatus is so simple and so generally understood from long-continued use upon many railroads, that its illustration appears to be unnecessary in a bulletin upon the subject; but the American Brake Company is prepared, upon application, to submit designs of apparatus suitable for the various styles of locomotive trucks.

*Hot Driving Boxes on Locomotives.**

By M. E. Wells.

THE hot driving box question, from the western standpoint, differs from that in the east, in that we have higher winds, very sandy soil and very little rain. I propose we take the best that we have in the way of present appliances, and then do more in the matter of care and attention, and I feel sure we can accomplish more in this way than we can by continually trying something new. I do not want any one to think from this that I am opposed to trying new appliances, for I am not. But whatever is under discussion or trial should have a fair chance, and I know that the present cast iron driving box with a phosphor bronze brass will give good service if the proper care is given the question of oil and packing.

I am going to advocate a cast iron or cast steel driving box with a phosphor bronze brass. The brass should be pressed in at from 5 to 6 tons pressure and should be plugged with two brass plugs from the top of the box, one on each side. It is a mistake to put a driving brass in a box at a higher pressure than will insure them staying tight. Five or six tons will, with the aid of the brass plugs, keep them tight. A brass put in at 15 or 20 tons, if it heats, will come in very hard on the sides of the journal and very much aggravate the heated condition. The driving journals should be turned true if worn out of round or taper. Then the brasses should be carefully fitted to the journals, and when so fitted the boxes should rock easily with one hand forward and back on the journals.

The old practice of boring a driving box out above the center line and then springing the box in order to let the lips of the brass snap over the journal is a mistake.

I believe in the side oil holes. The first ones tried here came on to the journal only ¾ of an inch above the

*Paper read before the Western Railway Club, January, 1901.

center line. These were altogether too far down, as they would fill with fine particles of waste, as reported in the Railway Age June 24, page 15. These holes are now being put in so they come on to the journal 2½ inches above the center line of the journal. We are now using one on each side in addition to the center hole, with very good results.

The oil cellars should fit tight in order to prevent the driving boxes from closing on the bottom. I think an oil cellar with an opening on the inside end, so the cellar can be packed without removing it, is a good thing. The oil cellar should fit up close to the journal, to prevent dust getting in and waste getting out. The top of the box should have a reasonable amount of waste, not too much, to hold and feed oil down on to the journal. It is a splendid idea to cover this top packing with a piece of galvanized or sheet iron just laid in on top of the packing. This waste on the top of the box should receive the same care and attention as the waste in the cellar.

The cellar should be carefully packed, the waste should be bunched well together and put in at right angles to the journal. Each separate bunch should reach from the bottom of the cellar up to the journal, then the fag ends on either side should be well tucked under each side, to prevent the rolling journal from moving and pulling the waste up on the back side of the journal. A very bad way to pack a cellar is to put a layer of waste in the bottom, and then another layer, and possibly another layer on top of all this along each side of the box to fit upon the sides of the journal. The rolling journal is sure to move this and carry it up on the back or rising side of the journal. It has been demonstrated to us recently that freight and passenger car journals actually carry particles of waste up under the brasses. They call them waste grabs, and I am convinced that many hot boxes on cars are produced by these waste grabs, and there is no question in my mind but that small particles of waste are carried up under the driving brass. When the side oil holes in driving brass were first put very low down I have seen the holes, as well as the grooves, filled with fine particles of waste. All this argues for more care in putting the waste in the driving cellars.

In order to get satisfactory results this packing must be kept in the proper condition as to the position and the proper amount of oil. The only way this can be accomplished is by systematic attention. On 10-wheel engines we find the most trouble with the back boxes, the next with main boxes, and the least with the front boxes. On account of this the packing is examined every 510 miles in the back cellars, every 1,020 miles in the main cellars and every 1,530 miles in the front cellars. This examination does not mean to repack the cellars with new waste. It only means that the condition of the waste is kept the same, and anything is done each time that is necessary to keep the waste in proper position in the cellar, and also that the proper proportion of oil is present.

I want to state in closing that I consider constant, systematic care of the packing of more importance in preventing hot driving boxes than any other half dozen remedies I know of. What is true of driving journals is also true of car journals. It is not a question of more oil and more waste, but more care. It is not enough that you make a careful blue print and write a long bulletin as to how driving boxes should be packed and cared for. But these instructions must be followed up every day and every day. It is not a question of what men are instructed to do. The all important proposition is what are they doing? Are they obeying orders? It costs little effort to write instructions, but it costs a good deal of effort to follow these instructions up and to know that they are carried out.

As a means to an end I am advocating better discipline, and better discipline means more co-operation on the part of the railroad employes. The railroad company that can get the most care and co-operation from its employes will have the fewest number of hot boxes. I am familiar with a division of railroad where, with 75 engines and a total of 623,554 engine miles during a period of two months, there was not one engine delay from hot driving boxes.

Early Motive Power on the Northern Pacific.

Chicago, Ill., Jan. 15, 1901.

To the Editor of the Railway Master Mechanic:

IN the article entitled "Early Days on the Northern Pacific," appearing in the January issue of the Railway Master Mechanic, as auxiliary to "The First Time Card," there occurs, as printed, an error which permit me to correct.

Referring to the four-wheel saddle tank engines, the statement reads two, instead of the correct number, four of them. It should also be said that these four engines, with 10x16 cylinders, did all of the track laying and first work up to the time the track reached Brainerd, Minn., 92 miles, without help of other engines. Two of these engines were transferred to the west division of the road for similar service between Kalama, Wash., on the Columbian river, and Tacoma, Wash., on Puget Sound.

Since the appearance of the statement referred to some critical remark has been made about the use of such light power in the construction of a standard gage road. I am of the opinion, however, that considering the time and place, and also the result of the use of the equipment, on the first division of this road, we have indicated to us the good judgment of those whose counsel prevailed in this matter. Geo. W. Cushing.

The Handy Car.—Interior View.

The Handy Car.

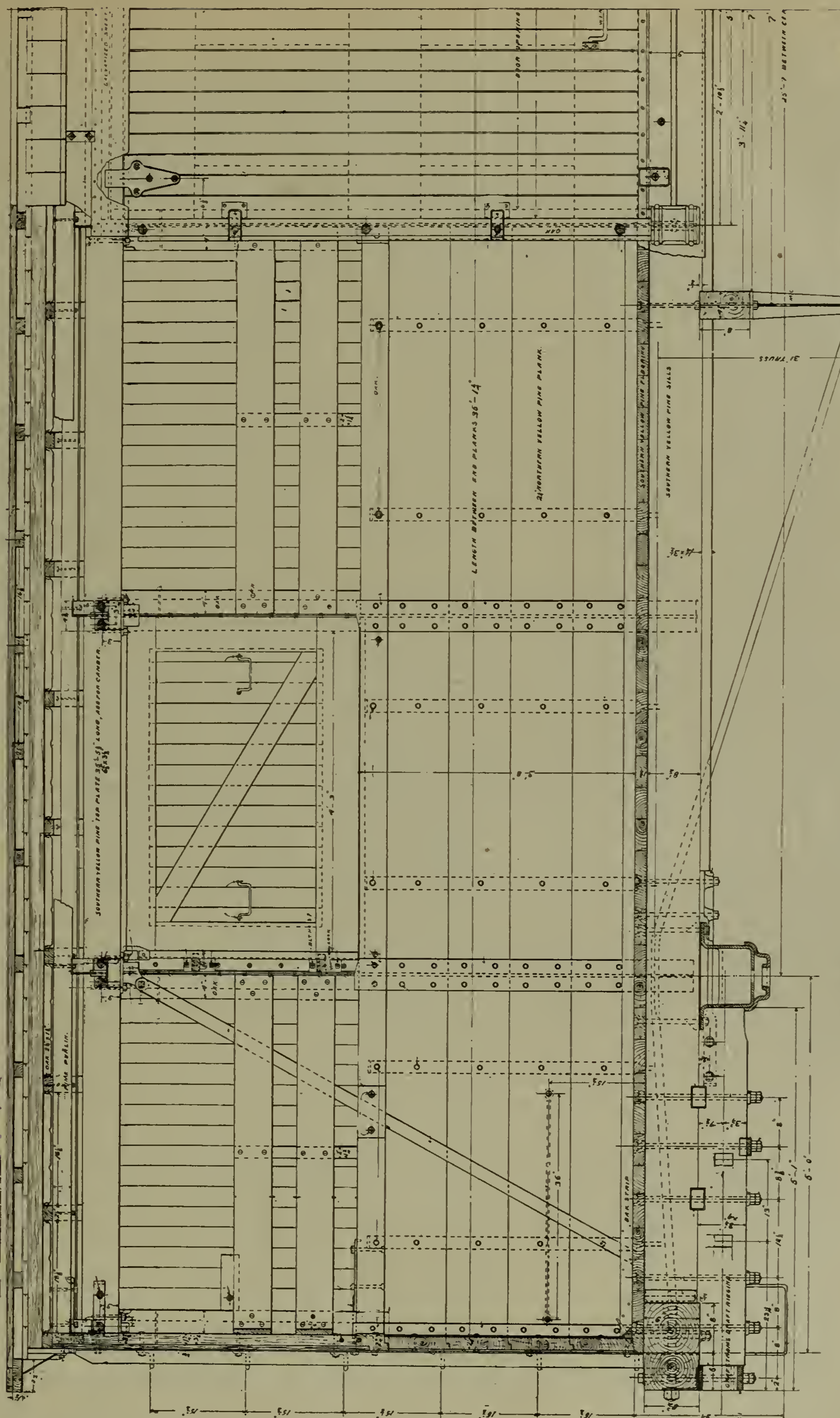
THE reduction of the empty haul of cars is a matter that is always demanding the attention of traffic and operating officers, as it practically costs as much to haul empty cars as it does loaded cars. As the percentage of empty cars hauled to the total is often as high as 30 to 40 per cent, a reduction of 5 or 10 per cent in empty haulage would be a very material one, particularly if it can be accomplished without any extra outlay; that is, without exceeding the ordinary expenses.

One way of reducing the empty haul is to be found in the use of the Handy car; a car much better adapted to general all around purposes than any of our existing types of equipment.

Many railroads are experiencing a condition of great shortage in box car equipment, and at the same time are hauling gondolas, or coal cars, empty in the same direction in which the box car traffic is moving. Some railroads use box cars for carrying such material as coal, brick, ore and other heavy material, so as to prevent empty hauling in either direction, but operate under considerable disadvantage in being obliged to pay more for the loading and unloading of such material into and out of box cars than is the case with gondolas. This extra cost of loading and unloading coal, for instance, amounts to at least 5 cents per ton for loading, and from 1 to 3 cents extra for unloading, the total of which is a fair profit on coal. In addition to this disadvantage of using box cars for this class of trade, the interior lining of a box car is not as substantial and durable as the sides of a gondola and is therefore subject to considerable damage.

A box car has an advantage, however, over a gondola in the matter of coal shipments, in that the coal

The Handy Car.—General View.



THE HANDY CAR—PART ELEVATION.

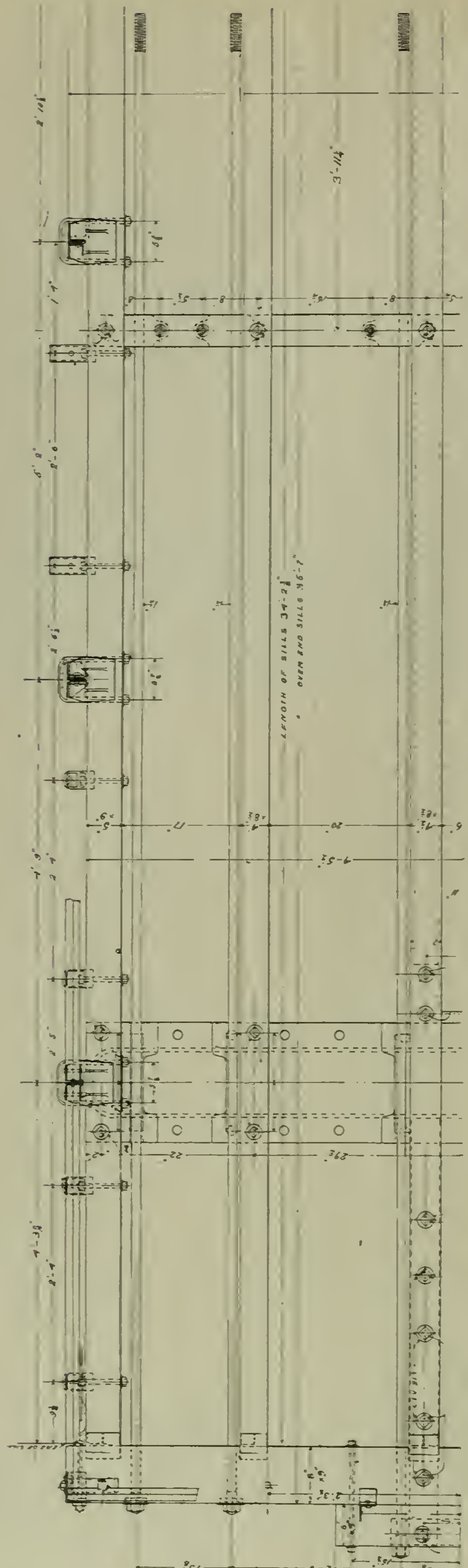
is much better protected from theft and from the weather; and the most important objection to handling coal in box cars is the cost of loading and unloading. The Handy car has been designed to meet this objection to the use of a box car for the shipment of coal and other rough material, with the view, particularly, of reducing the empty haul and making it possible to load and unload such rough material without additional cost as compared with a gondola. But in addition to these the car has other valuable features which make it possible to realize the greatest economies in service, its first cost and its maintenance.

By reference to our engravings it will be seen that the lower part of the car is similar to a gondola car, and that the upper part forms as complete protection to any lading as does a box car. It has auxiliary doorways on either side of the main doorway, whereby it may be loaded with coal by means of a tipple chute, just as readily as a gondola car; and when used for grain it may be more readily loaded at small elevators than ordinary box cars on account of those auxiliary doorways. When used for merchandise it is quite as satisfactory as the ordinary box car.

In addition to these features this car possesses the valuable point of giving at least six inches greater inside width for the same outside dimensions of any box car yet used, and at least 10 inches greater inside width for the same outside dimensions of any gondola yet designed, having flush sides inside. This increase in width affords an increase in the cubical capacity and makes it possible to increase the average lading of cars.

The transportation, or traffic, advantages of the Handy car are therefore: its adaptability to a greater variety of purposes, reduction in cost of loading and unloading materials of certain classes, an increase in the carrying capacity, and a reduction in the empty car mileage. We are assured that the Handy car weighs no more than the ordinary box car.

The extreme simplicity of the Handy car is apparent, and in the case of erecting new cars or making repairs,



The Handy Car, Floor Plan.

the ease with which the same can be done can readily be seen. The material used in the lower panels and in the siding used for the upper housing, being made in short lengths, is approximately $3 per thousand feet cheaper than similar material in ordinary lengths. For repairs, the sides of gondolas and the sheathing of box cars, now either destroyed or used for little purpose, can readily be used by sawing to proper length, so that so far as the sides and the ends of the car are concerned, they can be practically maintained with what is removed from existing equipment.

The steel posts, or standards, also serve as tie rods, and being steel, there will be no shrinkage as is the case with the posts and braces of box cars; therefore, the superstructure should preserve its integrity much better.

The carlins being made of "T" iron or double angles, also perform the function of tie rods and permit of the use of deeper purlins, which makes a lighter roof possible and gives a much stronger roof construction, and reduces the number of carlins by one-half.

The lower, or gondola section is flush both inside and out, which leaves nothing to be torn off on the inside by any movement of the lading. This lower section is made of 2¼-inch stuff and is therefore much more durable than the thin lining of a box car, and quite as durable as the sides of a gondola. The boards which compose this lower section are ship-lapped so as to make them entirely weather proof. Each section between the posts being bolted to the side sills securely, two bolts to each section, makes a very rigid bracing longitudinally for the posts and upper housing.

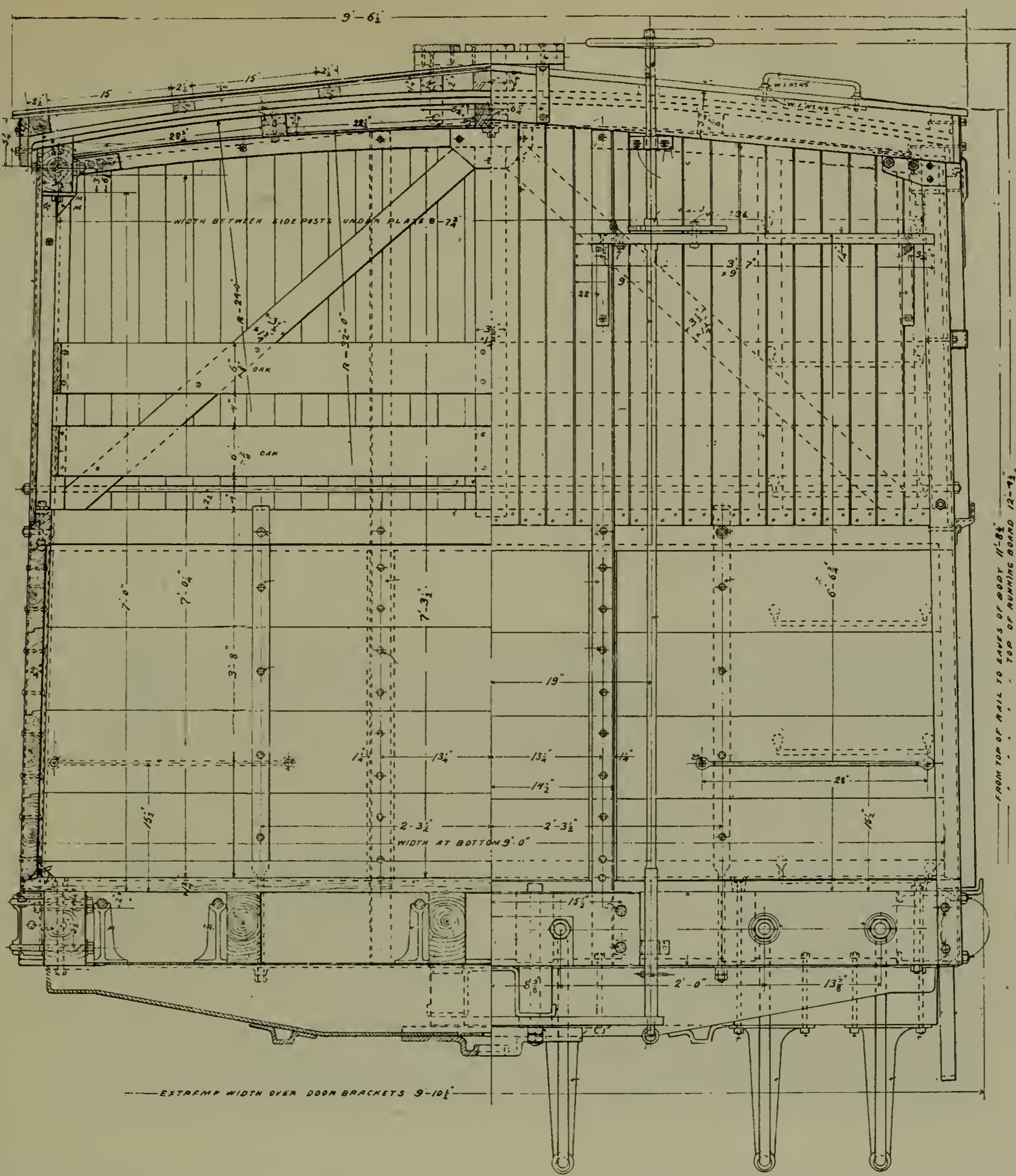
Any ordinary door or fixtures can be used for both the main and auxiliary doors. It is proposed, however, that the auxiliary doors when closed shall lock automatically on the inside with a very simple lock.

The ends of the car are much stronger than the ends of an ordinary box car, and end doorways can be provided if desired.

Any of the posts can be removed and replaced, or any section of the sides can be removed and replaced without disturbing anything else. Any of the carlins can be removed and replaced without disturbing any other carlin, or any other part of the roof. The siding of the upper housing can be put on in sections made to fit in between two posts. Flooring in full lengths can be renewed very readily.

Some of the claims made for the superiority of the Handy car over the ordinary box or coal car are stated as follows:

1. It is more suitable for coal service than an ordinary box car because it is stronger, easier and cheaper to load and unload, and has 8 to 10 per cent greater capacity for the same outside dimensions. 2. It is nearly as good as a gondola car for coal because it is as strong, has greater capacity for the same outside dimensions and is about as convenient to load and unload. 3. It is better than a gondola because it protects the coal. 4. It is better than a gondola for general traffic because it can be used for many kinds of freight that cannot be put into gondolas because of the lack of protection from the weather and from thievery. 5. It is better for all kinds of freight than an ordinary box car because it has at least 10 per cent greater capacity for the same outside dimensions: it is stronger and less liable to damage inside and out: it provides greater facilities for loading and unloading small package freight, and it weighs no more for an equivalent inside cubical capacity. 6. It



THE HANDY CAR—CROSS SECTION AND END ELEVATION.

reduces empty car mileage from 5 to 15 per cent without any additional cost whatsoever and without introducing bothersome novelties, and without increasing total car equipment. 7. It provides a means for reducing the number of cars in use for a given amount of traffic. 8. It provides a means for increasing the paying loads in trains. 9. It provides a way for shortening up train for a given total tonnage. 10. A smaller number of locomotives is required for a given paying or nonpaying tonnage. 11. It provides a means for reducing the number of freight crews for a given tonnage. 12. By reducing the total number of cars it increases the capacity of main lines, switches, yards and shops. 13. It provides a means for hauling coal and ore sheltered from the weather, which is being demanded more and more, and without greater cost for handling it than is the case with gondola cars. 14. It provides a car that can be put into more kinds of service as traffic fluctuates in kind than can a gondola or ordinary box car; thus avoiding the annoyance of storage of cars not in demand. 15. Its use reduces the cost of switching. 16. It costs no more to erect than an ordinary box car of equivalent inside cubical capacity. It costs less to maintain. Its uses a cheaper grade of lumber than is now used and in repairs it uses lumber that is now thrown away. 17. As a coke car it has many advantages over an ordinary box car, having greater tonnage capacity and being more convenient to load and unload and being less liable to damage from the coke. 18. The car is more quickly cleaned out after hauling coal, sand, brick and like material, for the reception of grain than is an ordinary box car. 19. No additional seals are required because of the auxiliary doors. These doors, when closed, are flush and weather tight, and because of the great strength and rigidity of the sides and ends of the car, can be made to fit snugly without fear of their sticking or not closing. The auxiliary doors lock on the inside by a simple and effective gravity bolt, and the doors can neither be unlocked or opened from the outside.

This car is offered by the Handy Car Co., Rookery Building, Chicago, of which company Mr. Charles L. Sullivan is president.

Hot Boxes.

Chicago, Ill., Jan. 26, 1901.

To the Editor:

IN the December report of the proceedings of the Northwest Railway Club there appears a paper on "Hot Boxes in Railway Equipment," by Mr. George Ludford, and in the discussions following are brought out several new points of general interest. The most important of these is mentioned in the remarks of Mr. Max Toltz of the Great Northern Ry., who referred to a fault in the cup form of the new 80,000 and 100,000 capacity oil boxes, M. C. B. pattern. It appears that the revolution of the axle rolls up, to either side, according to its motion, the packing, and in a brief time there is trouble developed in the way of hot boxes.

The remedy, as stated by Mr. Toltz, is the fitting of projecting points or prongs from the bottom of the box to hold the packing in place. He also mentions a change in the bottom. The prongs projecting into the box will certainly hold waste in position, but it seems to introduce an objectionable feature in the subsequent manipulation of packing which had better be avoided.

Should not this matter be well ventilated and facts ascertained to place before the M. C. B. Association for its action if a change in form of oil box is desirable, as seems to be the case in the experience of the Great Northern?

Geo. W. Cushing.

Club Car, B. & O. Railroad

The Baltimore & Ohio Railroad, experiencing the necessity of having a car for the special accommodation of clubs, societies, organizations, etc., conceived some time ago the idea of constructing one unlike anything heretofore produced, and the "club," or "reception" car was the result. The car, designed only for daylight travel, became popular from its inception, and has been in constant use.

One of the modern Royal Blue coaches, which was particularly desirable for a foundation, was dismantled entirely of all of its exterior and interior furnishings, and the entire woodwork, both exterior and interior, was remodeled. The floor was richly carpeted, and instead of the conventional car seats, movable chairs and tables were substituted. Rocking and arm chairs were added to invite the guests to comfort and ease. A number of collapsible side tables were introduced for cards or luncheons, and a large extension table provided, at which thirty persons can be seated at one time. The car is provided with a buffet, fitted up with a broiler and all of the usual utensils, and accommodations can be provided for thirty-five people at lunch at one time.

It has been used by various clubs, organizations and special parties attending conventions or making special trips and has found great favor. It affords a social feature which cannot otherwise be obtained in the ordinary coach or sleeping car, and has become an indispensable adjunct to the passenger service.

Club Car, Baltimore & Ohio R. R.

Train Lighting in Germany

It is stated that electric train lighting is in use in Germany upon a larger scale than in any other country, not excepting Great Britain or the United States. A speaker at a recent meeting of the Electrotechnical Association, held in Berlin, made the statement that in that country about 8,000 railway carriages had been equipped for electric lighting. Consul-General Mason, at Berlin, in a recent report to the Bureau of Foreign Commerce, of the State Department, makes the statement that electric lighting has been adopted since 1893 for the postal cars on the State Railways in Germany, and that electric lighting is all but universal for that class of equipment. Second Assistant Postmaster General Shallenberger was so pleased with what he saw of the electric lighting of the German postal cars that he recommended it in his annual report for adoption in this country for the railway mail service.

Electric lighting of railway carriages is much more general in continental countries than is generally supposed. Besides Germany, Austria has made considerable progress in electric train lighting. Switzerland is quite prominent in this respect and on Swedish and Danish lines it is said to be rather the rule than the exception. France has adopted a system which seems to give satisfaction, and Italy is not far behind in this respect. The two great English speaking countries—the United States and Great Britain—accordingly seem to be far behind in the adaptation of electricity to railway train lighting; but they will no doubt in the early future lead the world in this respect, as they do in most others where mechanical skill has applied the discoveries of science to every day needs.

Personal Mention--Continued from page 37.

Mr. S. H. Jensen, foreman of car shops of the Pennsylvania Railroad at Buffalo, N. Y., died in that city on December 27 at the age of 55 years.

Mr. George Mall has been appointed road foreman of engines of the Philadelphia division of the Philadelphia & Reading.

Mr. J. Piccioli has been appointed division master mechanic of the Colorado & Southern, in charge of the Trinidad shops, and the Trinidad & New Mexico districts.

Mr. H. M. Butts, heretofore supervisor of passenger equipment on the New York Central, has been appointed master car and locomotive painter, with headquarters at the West Albany shops.

Mr. A. C. Hone has been appointed superintendent of the Evansville & Terre Haute with headquarters at Evansville, Ind. Mr. Hone's jurisdiction will embrace the transportation and mechanical department. W. J. McLeish succeeds Mr. Hone as superintendent of motive power and rolling stock, with office at Evansville.

Mr. C. Skinner, master mechanic of the western division of the Chicago & Alton at Slater, Mo., has been appointed road foreman of engines and air brake instructor of the eastern division, and his office of master mechanic has been abolished.

Mr. Harry Bennett has been appointed master mechanic of the Juniata shops of the Pennsylvania Railroad at Altoona, Pa., vice Mr. T. R. Browne, resigned.

Mr. John R. King, master mechanic of the Chattanooga Southern, died at Chattanooga, Tenn., on January 19, aged 61 years.

Spirit of the Railway Press.

Being the Cream of the Literature of Railway Mechanics Appearing During the Past Month.

Diversity of Car Couplers.

(Locomotive Engineering, Jan., 1901.)

It seems to us that it is high time that the Master Car Builders' Association should step in and put a restraint upon the tendency to increase the diversity of coupler knuckles. The M. C. B. coupler has been long enough in use to demonstrate the forms of knuckles that give least trouble in service. That being the case, it is the duty of the M. C. B. Association to select eight or ten of the most satisfactory couplers and admit them as standards of the association. All others should be denied interchange privileges. The M. C. B. Association have refused to recognize brakes that do not meet certain requiremnts. A similar policy ought to be adopted in regard to car couplers.

The Compartment Sleeping Car.

(Railroad Gazette, Jan. 4, 1901.)

The American plan survives because it suits the American people. As every one knows, the compartment plan has been extensively tried in this country, North, South, East and West. The railroads and the sleeping car companies have made reasonable efforts to give it a fair opportunity to recommend itself. Indeed, it continues in use on a few lines doing a large traffic, where the number of persons traveling in parties of two (one of whom is willing to take an upper berth), is large enough to warrant running one such car on a train. And why do Americans, not all of them devoid of taste and refinement, continue to prefer to bunk in with a dozen strangers rather than with a single one? Simply because that is the lesser evil. For the same reason that in a day car, after dark, one feels more at ease with a considerable number of fellow passengers than with a single one. In short, if a gentleman—or lady—must, for a brief time, disregard some of the customs of refined society, he or she prefers to have a crowd present for greater privacy.

The Danger of the Lap Joint.

(Railroad Gazette, Jan. 4, 1901.)

The boiler explosion Dec. 3, which wrecked the power house of the Chicago & Northwestern at Chicago, is found on an examinaton of the plates to be chargeable to the longitudinal lap joints. The danger attending the use of these joints is generally known, and the lap constructon has been abandoned for locomotives, yet cylindrical boilers for stationary purposes are now very often built in this way. In fact, we believe it is rather the exception for cylindrical stationary boilers to be made with butt joints and cover plates as in locomotive practice. The analyses of the plates of the boiler which failed in the Chicago & Northwestern power house are said to show high phosphorus, but in the nature of things it would seem to be merely a matter of time for lap joint boilers to crack near the horizontal seams, and in a place where a defect is difficult to find. That these fractures are not always found is shown by the number of boiler explosions caused by a fracture of the plates along the horizontal seams beneath the lap. One of the largest boiler insurance companies tells us that about 90 per cent of the explosions of cylindrical boilers, coming under its notice, are caused by the sheets cracking near the horizontal lap joints, as in the case of the Chicago & Northwestern boiler. These boilers are continually giving way at the lap in spite of the closest inspection. Doubtless the reasons for continuing the use of the lap joint lies in its cheapness, and the ease with which plates can be joined in this manner. But the objections to the lap joint for horizontal seams should outweigh these. In shaping up the plates the edges which make the lap are usually hammered over, which no doubt weakens the material at the most vital point, and further the lap joint throws the shell out of round with the result that the boiler tends to change its shape under change of pressure. On account of the stiff section at the joint the strains in the sheet, due to changes of pressure, are concentrated a little beyond the lines of rivets and just about where the plates have been most distorted in bending. It is plain to see that stresses set up in this way near the joint may easily start a crack under the lap which cannot be detected until it extends through to the inner surface of the shell. Of course the conditions are made much worse if the rivet holes are punched and the workmanship is poor. If cylindrical boilers are to be used the remedy is to avoid lap joints in the longitudinal seams, and insist on butt joints and cover plates and good workmanship.

Railway Progress.

(Railway Age, Jan. 4, 1901.)

The last year was a fairly good one for the railways, and the last century was the best they ever had. In fact, they never had any other century. They did not begin until the nineteenth century was one-quarter gone, and when its first fifty years had passed railways were still few and small and mean. In all the United States at the end of the year 1850 there were only about 9,000 miles of so-called railway—light rails or strap-iron on wooden stringers, light engines, little cars, miserably heated and lighted, no sleeping cars, no dining cars, no coupon tickets, no through trains, much transfer in a long journey from cars to stage coach or canal boat or steamer, and vice versa, no comfortable statons, no double tracks. There was not even a traffic manager or a general manager or a numerical vice-president or a railroad commissioner, state or national, in the whole primitive country. In spite of these drawbacks, only fifty years ago railways were growing and they grew and grew until now the twentieth century opens with not far from 500,000 miles of steam railways in the world, of which over 195,000 miles are to-day in operation in the United States. And what a change in character in fifty years! Now, double and quadruple tracks, heavy rails, straight lines, low grades, enormous locomotives, luxurious cars for sitting, eating, sleeping reading, writing and bathing, steam heat, gas and electric light, air brakes, automatic couplers, vestibuled platforms—safety, comfort, luxury, speed, provided for at a cost that would have seemed madness and destruction to the early railway managers; and yet transportation, freight and passenger, furnished at a fraction of the prices willingly paid when the men of to-day were boys. The twentieth century is in debt to the nineteenth for all that railways are and have done for the world. Will it continue the wonderful record of progress in this line of activity also?

Swing Beam Trucks.

(Locomotive Engineering, Jan., 1901.)

From various causes there has arisen of late a doubt among many men about the abandoning of the swing beam truck having been as wise a move as it was reputed to be. With increase in the weight of cars and the general introduction of the vertical plane coupler new difficulties in train operating have arisen which some people think might have been obviated by use of a swing-motion truck. There are a great many delays from cars uncoupling in passing curves, and sometimes the cars leave the track owing to the rigid character of the coupler and truck, and it is reasoned that a flexible truck might prevent that. There is also no little trouble from cut wheel flanges and flanges broken off, and the advocates of the flexible truck insist that it would have a remedial effect here also. There are some flexible trucks on the market now that have no more parts than a rigid truck. They have no hangers, no support pins and no sand board. It is possible that some of them may yet largely displace the rigid center truck, especially if experience demonstrates that they will decrease the involuntary uncoupling of cars.

Wide Fire Boxes.

(Railroad Gazette, Jan. 11, 1901.)

The up-to-date engine must now have a wide fire box. In considering wide fire box engines for soft coal two questions arise at once as to what is a sufficient depth of fire box and what grate area is needed. Obviously ideas may change, but for the present at least there seems to be a well defined opinion that a fire box suitable for soft coal should at least be deep enough for a brick arch with still greater depth if the design permits. The wide fire box engines recently built with rear cabs show best the opinions of their designers as to the grate area, and as might be expected there is considerable variation shown. In large engines for passenger and fast freight service there is a foot of grate provided for from 48 to 65 sq. ft. of heating surface, which may be compared with 80 to 85 for recent large passenger engines with narrow fire boxes. Probably the best proportions for the ordinary run of soft coals is one foot of grate for from 50 to 55 sq. ft. of heating surface. At any rate the indications are that engines with such grates are showing fuel savings of from 15 to 20 per cent, which is the important thing for roads which cannot afford to do much experimenting.

"Traveling" Officials.

(Railway Review, Jan. 12, 1901.)

We note a query in one of the railway clubs as to whether or not a traveling boilermaker and a traveling blacksmith would prove a paying investment on a large system. We are hardly prepared to believe that it would. The general experience with "traveling" officials is that they would lose their enthusiasm, get talked out, degenerate into mere gossips or demoralizing meddlers and in all do more harm than good. A better plan would seem to offer itself in providing a systematic interchange of visits between the foremen of different shops. The men appreciate an occasional opportunity for such interchange of ideas and enjoy the relaxation, while the confidence in them shown by such a course leads them to improve their own shop in order to have something to brag about. In such a manner a friendly rivalry is stimulated which gives better results than an engendering of a hostile spirit which the traveling official often arouses. The master mechanics will look after the "standards."

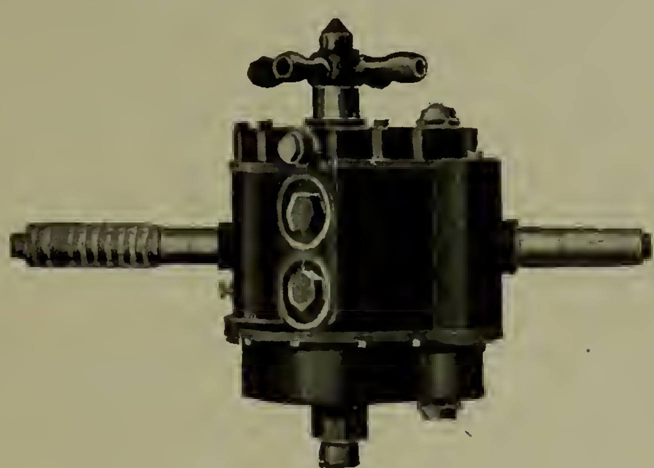
Hydraulic Forging in Railway Shops.

(Railway Review, Jan. 19, 1901.)

At the meeting of the Western Railway Club a side discussion arose on the adaptability of the hydraulic forging press to the larger class of work in railway shops—principally as regards working up axles from scrap. There appeared to be an absence of positive information upon the point. Some members contended that the steam hammer is better suited to the purpose in that it works the dirt out of the iron that a hydraulic press would simply press in. The hydraulic press is nearly, if not quite, as easily controlled as the steam hammer, and in consequence it is possible to work out the impurities in the iron by light blows at first, though such operation would be more slowly performed in the press. At the same time the sustained squeeze of the press would seem to be capable of forcing out impurities after the manner of working under a hammer. The increase in coherency of the iron imparted by the press would very probably give a better axle, but the speed of production would hardly be as great as that of the hammer. Probably a combination of the methods would give best results, viz.: to work out the slabs and the slabs into the axle, under the hammer and finish under the press. The press could be placed near enough to the hammer to avoid reheating. Viewed from another standpoint, however, it is questionable if there would be very much gain in the strength of an hydraulically forged axle. It is simply a question of the pressure brought to bear while forging after the article has been shaped, and the section of car axles is not so great but that steam hammers of the weight used in axle work thoroughly permeate the mass—which is the object sought. The usefulness of a hydraulic press in a railway shop would not be confined, however, to the forging of driving axles alone, for a small but well advised expenditure in dies would permit it to be of the utmost value in economically producing the endless number of forgings which a large railway shop is called upon to manufacture. The very general extent to which steel cars are beginning to be used has already prompted earnest consideration of means of their repair and the presence of this press at the general repair shop would materially assist in handling this sort of work.

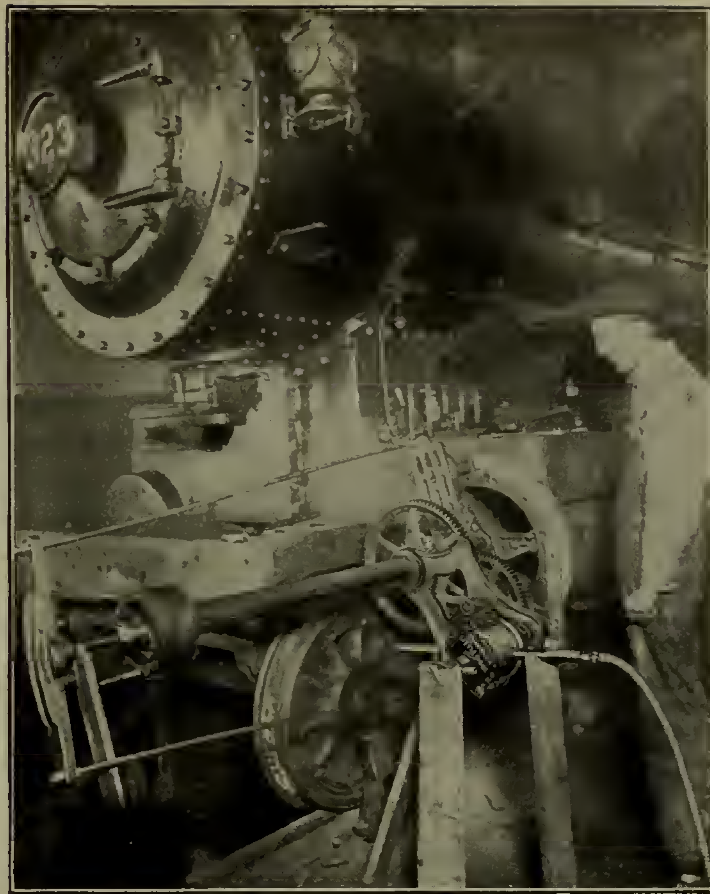
The Little Giant High-Speed Motor.

The Standard Pneumatic Tool Co., of the Marquette building, Chicago, has just gotten out a new "Little Giant" high-speed motor No. 0, which is designed for the heaviest service that a portable machine can perform. It is made on the same mechanical principle as the company's well-known smaller piston air drills, having double balanced piston valves which cut-off at five-eighths of the full stroke, making it possible to run a



Drill and Motor.

large motor economically. It develops 3½ horse-power at 90 pounds air-pressure and weighs 50 pounds. It can be used as a motor. drill and as a reaming and tapping machine. It is especially designed as a powerful motor to bore cylinders of any size and to ream, tap and

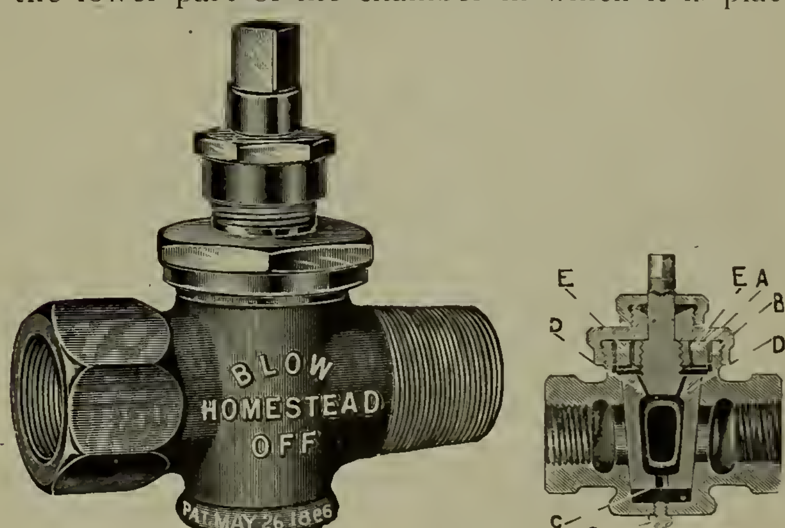


Boring Cylinders.

drill holes in extra-heavy boiler plate. Our smaller cut shows the drill and motor, and our larger cut the motor applied to the work of boring locomotive cylinders. The firm will send a machine on trial and pay charges both ways if it is not satisfactory.

The Homestead Blow-off Valve.

In a comparatively few years the Homestead Valve Manufacturing Company, of Pittsburg, has from a small beginning demonstrated to many railroads and manufacturers the superior merit of its blow-off, which justly claims points of superior excellence. This valve is so constructed that when it is closed it is at the same time forced firmly to its seat. This result is secured by means of the traveling cam "A" through which the stem passes. The cam is prevented from turning with the stem by means of the lugs "B," which move vertically in slots. Supposing the valve to be open, the cam will be in the lower part of the chamber in which it is placed.



The Homestead Blow-off Valve

and the plug will be free to be moved easily. A quarter of a turn in the direction for closing it causes the cam to rise and take a bearing in the upper surface of the chamber, and the only effect of further effort to turn the stem in that direction is to force the plug more firmly to its seat. A slight motion in the other direction immediately releases the cam and the plug turns easily, being arrested at its proper open position by contact of the fingers of the cam at the other end of its travel. "E. D. D." are balancing ports which admit pressure to chambers above and below plug, the upper space predominating, thereby insuring constant contact of the plug to the seat, yet allowing easy manipulation with very slight friction.

The makers report unusual success wherever railroad companies have bad water to contend with, as this valve can be easily opened and closed while the locomotive is in motion, since the quarter turn of the plug enables the lever to be worked from cab or footboard. Among users of Homestead valves are the Pennsylvania Railroad, the Pan Handle Ry., the Big Four Ry., and many other railways; the Baldwin, Brooks, Manchester, Pittsburg, Richmond and Schenectady locomotive works; and a number of leading manufacturers, such as the E. P. Allis Co., Carnegie Steel Co., Illinois Steel Co., Midvale Steel Co., McConway & Torley Co., Westinghouse Air Brake Co., etc.

The Sargent Coupling.

An admirable substitute for the link and pin or the chain or rope in handling cars equipped with M. C. B. couplers on difficult curves is offered in the Sargent coupling. This coupling consists of two cast steel jaws, shown in Fig. 1, which are designed to fit over the coupler arm, directly back of the trunnion, being held in place by the locked knuckle. A one-inch chain, sixteen inches long, connects these two jaws and passes around the inside face of each knuckle (see Fig. 2), thus making a strong and effective coupling. In operation it is independent of everything except the drawbar, can be applied in a few seconds, and is an immense improvement over the link and pin when used for the same purpose. It can be applied equally as well to couplers having either solid faced knuckles or those in which the pin hole and slot remain. This coupling is offered by the Railway Appliances Co., 608 Old Colony Building, Chicago.

FIG. 1.

FIG. 2.

Supply Trade Notes.

The Richmond Locomotive and Machine Works recently received an order from the Wabash R. R. for 50 locomotives, as follows: Thirty-four 19x28-inch two-cylinder compound moguls, six 19x28-inch ten-wheeled passenger engines, six 19x28-inch Atlantic type passenger engines, four 18x24-inch switching locomotives. The general dimensions of these engines are as follows: 19x28-inch moguls, cylinders, 19x28 inches; diameter of driving wheel centers, 56 inches; wheel base of engine, 22 feet 4 inches; rigid wheel base, 14 feet; weight on drivers, about 110,000 pounds; weight on truck, about 20,000 pounds; total weight of engine in working order, about 130,000 pounds; radial stay boiler, 60 inches diameter; length of fire box, 108 inches; width of fire box, 42⅝ inches; tubes, 2 inches diameter, 11 feet 4⅝ inches in length; capacity of tank, 5000 gallons. 18x24-inch switching engines: cylinders, 18x24 inches; diameter of driving wheel centers, 44 inches; wheel base of engine, 10 feet 6 inches; weight on drivers, about 102,000 pounds; radial stay boiler, 60 inches diameter; length of fire box, 84 inches; width of fire box, 33⅜ inches; tubes 2 inches diameter, 10 feet 4½ inches in length; tank capacity, 3000 gallons. 19x28-inch ten-wheeled passenger engines: cylinders, 19x28 inches; diameter of driving wheel centers, 66 inches; driving wheel base, 14 feet; weight on drivers, about 112,000 pounds; weight on truck, about 35,000 pounds; total weight of engine in working order, about 147,000 pounds; radial stay boiler, 62 inches diameter; length of fire box, 120 inches; width of fire box, 42⅝ inches; tank capacity, 5000 gallons.

Mr. F. Hufsmith, superintendent of motive power of the International and Great Northern Ry. Co., has advised the Falls Hollow Staybolt Co. that he has placed an order for fifteen locomotives with the Cooke Locomotive & Machine Co., of Paterson, N. J., and specified Falls Hollow staybolts for same.

Mr. Charles L. Sullivan has resigned as superintendent of the Cloud Steel Truck Co., and has opened an office at 1515 Old Colony Bldg., Chicago, where he will sell railway supplies and the Handy car, a full description of which latter is given elsewhere in this issue.

The Chicago rabbeted grain door is specified on the following line of box cars recently let and in process of construction: "Big Four" Ry., 2200; C., R. I. & Pacific Ry., 1500; Northern Pacific, 3000; "Santa Fe," 2000; Rio Grande Western, 100.

Mr. F. J. McIntosh, recently connected with the Shelby Steel Tube Company, has been appointed superintendent of the Seamless Steel Tubes Company, of Detroit, of which Mr. William Thornburgh is vice-president and general manager. The Seamless Steel Tubes Company now have their plant completed and in operation, and report encouraging prospects for business.

The Richmond Locomotive Works have increased the maximum capital stock of the company from $2,500,000 to $4,500,000.

Mr. E. W. Kimber, secretary and treasurer of the Latrobe Steel Company, died Jan. 20, at his home in Philadelphia, of Bright's disease.

The Simplex Jack Company, 319 The Rookery, have been consolidated with A. M. Crane & Co., 734 Rookery. Mr. W. Templeton, the general manager, has gone to Crane Company as secretary.

The Carbon Steel Company, of Pittsburg, has booked orders for 6000 tons of a high grade of open-hearth acid-steel wire for use on the new East River bridge at New York. The company received the contract in competition with Swedish producers.

Mr. A. C. McCord, general manager of the Illinois Car & Equipment Company, of Chicago, has gone to Europe for a stay of several weeks.

Mr. P. H. Brangs has resigned his position with the Safety Car Heating & Lighting Company, and accepted a position as eastern manager of the Heine Boiler Company, of St. Louis, Mo., with office in the Bowling Green Building, 11 Broadway, New York.

The McConway & Torley Co., of Pittsburg, Pa., issue a descriptive pamphlet concerning their Curtis design of Janney pivotal tender coupler, which is made to order to suit the locomotive framing. In this coupler the pivot pin hole in the coupler head is slotted, which allows the head to travel back against springs interposed between it and the flange, in receiving a buffing shock as in coupling. These springs are extra heavy, and act as buffer springs as well as allowing the head to swing laterally when curving. If a shock sufficiently strong should be received, the head would travel back and strike squarely on the flange, the shock being thus distributed over nearly its entire surface. This construction relieves the pivot pin from buffing shocks and reduces liability of breakage. The center line of the springs interposed between the head and the flange is somewhat below the center line of the coupler head, which keeps the head always in a horizontal position.

Mr. Jas. C. Halladay has resigned as western representative of the Pickering Spring Co., to engage with the Chicago Pneumatic Tool Co.

A company has been formed in Ohio, to be known as the Compressed Air Company of Ohio, to work under the patents of the Compressed Air Company of New York, covering the use of compressed air for railway service. Among the names of those composing the company are mentioned M. E. Ingalls, Perry S. Heath, W. D. Brickell, Myron T. Herrick and others.

Mr. E. A. Lycett has resigned his position with Joseph T. Ryerson & Son, of Chicago, to become sales agent for the American Steel & Wire Company, with office at Cleveland, Ohio.

The Robert Atchison Perforated Metal Co., 303 Dearborn street, Chicago, is busy on orders for perforated metals for use in fanning mills, ice machines, clay screens and cotton seed oil machinery, besides small orders for repair work.

Mr. J. M. Maris, formerly general manager of the Illinois Car & Equipment Co., and later with the Pressed Steel Car Co., became a partner in the firm of A. M. Crane & Co., of Chicago, January 1. The firm deals in spikes, pig iron, steel and scrap, and are agents for the following manufacturers: Morgan Spring Co., springs and wire; Norton Iron Works, steel nails; American Steel Castings Co., couplers and bolsters; Westmoreland Steel & Manufacturing Co., steel bar angles, channels and forgings. Mr. Maris will give special attention to the sale of the "Keystone" cast steel bolster. The firm have just added to their line the Simplex car and track jacks, heretofore manufactured and sold by Mr. Walter B. Templeton.

It is stated that a branch of the Carbon Steel Co., of Pittsburg, has closed negotiations for the lease of the old West Shore shops at East Buffalo, with the intention of establishing a big industry in Buffalo, making use of the old West Shore shops. The name of the expected industry is the Carbon Axle Co. President Robertson, of the Carbon Steel Co., of Pittsburg; Dr. W. Seward Webb, of the Vanderbilt interests, and other capitalists and practical steel and railroad men, are said to be interested. The output of the works will be axles for cars and railroad forgings of all descriptions.

The Consolidated Railway Electric Lighting & Heating Co., of New York, sends out a valuable remembrance in the shape of a desk memorandum book for private telephone calls.

The Pratt & Whitney Company, of Hartford, Conn., has been absorbed by the Niles-Bement-Pond Company. The old stockholders of the Pratt & Whitney Company retain the preferred stock, but the common stock has all passed into the hands of the Niles-Bement-Pond Company or of interests connected therewith. The Pratt & Whitney Company is capitalized at $2,750,000, of which $1,225,000 is preferred and $1,525,000 common stock.

Mr. John G. Sanborn, well known for many years in railway supply circles, notably through his connection for the past six years with the American Brake Beam Co., has associated himself with Mr. Louis Turivas in the formation of the American Railway Supply Co., with offices at No. 402 Monadnock Block, Chicago. This company will handle general railway supplies. Everybody will be glad to know that "John" has gone into business for himself, and also will be glad to see his bluff, hearty countenance as reproduced herewith.

JOHN G. SANBORN.

Mr. Sidney A. Stephens, 22 W. John St., Montreal, Canada, has been appointed agent for the Ashton Valve Co., of Boston, to handle that company's line of pop safety valves and steam gages throughout the Dominion of Canada.

Mr. Charles K. Thomas, who for nearly a year has been connected with the advertising department of The Railway Age, and who for six months past has had charge of that journal's Cleveland office, has resigned to accept the position of general sales agent of the Reliance Machine & Tool Company, of Cleveland. manufacturers of the Morgan patent bolt cutter.

Mr. John W. Harrison, president of the Shickle, Harrison & Howard Iron Company, of St. Louis, has disposed of his entire holdings in the stock of the company, and has retired from business. His nephew, Mr. John M. Harrison, Mr. Clarence H. Howard and Mr. George B. Leighton now own and control the company.

The Chicago Compressed Air Co., a sub-company of the Compressed Air Company of New York, is now receiving subscriptions to its capital stock. It is one of several sub-companies that are in process of organization in Massachusetts, Ohio, Missouri and Illinois, and they will have complete charge of the sales in their respective states. Among those who will serve on the Chicago board of directors are Thomas H. Wickes, vice-president of the Pullman Company; Marvin A. Farr, J. C. Shaffer, Sylvester T. Smith and Newell C. Knight. Mr. Knight is a director of the Compressed Air Company of New York and was a leading factor in the original Compressed Air Motor Company of Chicago, which was combined last year with the American Air Power Company of New York. The Chicago corporation will have a capital of $1,000,000. There will be in its treasury $150,000 par value of the stock, and the funds for its work. The parent company in New York receives no money but a large stock interest for the rights given. The New York company has bought the Rome Locomotive Works and will have them in operation with a capacity of three motors a day. The local companies will not manufacture, but will buy of the parent company at cost, plus a manufacturer's profit, the various motors and appliances. The organization of the sub-companies in Massachusetts, Ohio and Missouri is already well advanced.

The Beaver Dam Malleable Iron Company of Beaver Dam, Wis., has recently equipped its plant with a chemical laboratory, which is in charge of Mr. F. G. Coffeen, formerly for many years connected with the Deering Harvester Company.

The Standard Coupler Company declared a semi-annual dividend of 4 per cent on preferred stock and a dividend of 1 per cent on common stock, payable on January 1.

The National Tube Co. has acquired by purchase a controlling interest in the stock of the Standard Seamless Tube Company, and has reorganized the company by election of a new board of directors, who have in turn elected Mr. F. J. Hearne, president; Mr. William H. Latshaw, secretary and treasurer. For the present the Standard Company will conduct its own business, having removed its general office from the Germania building, Pittsburg, to room 74, Conestoga building. Through this deal the National Tube Co. enjoys the most complete facilities for the manufacture of seamless goods.

Mr. M. S. Harlow, manager of the Boston office of the Ingersoll-Sergeant Drill Co., died Dec. 29 at his home in Malden, Mass. Mr. Harlow had been connected with the Ingersoll-Sergeant Co. for over 15 years, first as salesman and then as manager of its Boston office. The firm feels deeply the loss of one who had served its interests most faithfully—one whom it had looked upon as an upright, loyal man, a faithful employee and a trusted friend. The trade generally joins with Mr. Harlow's firm in an expression of most sincere sorrow over the passing away of one who was not only a good man but a good friend.

An Important Consolidation in the Supply Trade.

Two of our leading railway supply concerns were recently consolidated—the Q. & C. Company and the Railroad Supply Company. The new concern will operate under the name of The Railroad Supply Company, whose staff will be headed by Mr. D. S. Wegg (hitherto president of the Railroad Supply Company), who is chairman of the board, and Mr. C. F. Quincy (hitherto

D. S. Wegg, Chairman.

president of the Q. & C. Company), who is president. The main offices of the company are in the Bedford Building, Chicago. This consolidation forms a very strong concern, not only financially but as regards the personality of its staff and the high character of the lines of supplies which it offers. Both the constituent concerns have been aggressive and successful pushers

C. F. Quincy, President.

for business, and with their joined forces will unquestionably command a heavy trade in the specialties which they control, among which are the following:

Hien double automatic coupler, Hien one-piece draft rigging and buffer, Hien steel center sills, Chicago crossing signal and block signals, "Q. & W." Wolhaupter and Servis tie-plates, Barr vestibules for passenger coaches, Wolhaupter cattle guards, track tools, Q. & C. shop saws, Bryant metal sawing machines, Priest snow flangers, pneumatic tools, Globe ventilators, Q. & C. perfection oil purifier, Q. & C. pressed brake shoe key, Q. & C. journal box lid, Q. & C. Stanwood car step, Q. & C. self-feeding rail drill, Q. & C. compound lever jack, pressed steel specialties, cold drawn seamless boiler and mechanical tubes, dustless roadbed process.

Established 1878.

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

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WALTER D. CROSMAN, Editor.

ALLEN R. COSGROVE, Manager

Vol. XXV. CHICAGO, MARCH, 1901. No. 3.

LITTLE THINGS our old friend J. N. Barr—formerly of the West but now of the East—used to talk about very effectively in club and in convention. Mr. G. W. Rhodes revived the line of thought indicated by the words "little things," with really electric force, at the February meeting of the Western Railway Club. Mr. Rhodes talked particularly about two details of railway practice. His topic was really loose nuts and keys, but he happily introduced it with a few pointed words about what could be done by carefully watching the matter of car oiling. His point on oiling was, that with due attention, the cost, as indicated graphically by diagrams which he displayed, showed on his road a toboggan slide from a somewhat disgraceful figure to a real comfortable figure. He explained that slide by saying that a special inspector was sent out to insure the following of such practice as would reduce costs. It was a good piece of work—one to be thoroughly commended. It was acknowledged that the expert cost something quite handsome, but the saving in oil account, and the saving effected through the expedition of train movement, much more than overcame this cost. Really, the help to train movement seemed to be the biggest end of the stick. The fact is probably that the operating department gains more, directly, and particularly in volume of dollars, by good and effective oiling, than does the mechanical department.

As for the matter of loose nuts—and cotter keys set so far away from nuts as to be practically useless—there can be little here said. Mr. Rhodes, in pointing out bad practice of this nature (with drawings made from actual cases, as he did), awakened things at the club meeting, in a way that will leave a red mark on the calendar of the club's history. He told a few simple truths. He told them frankly as being found in his own daily practice—as being found on his own road. It was this unabashed acknowledgment of what might be called self-error that gave the great strength to what he had to say.

Now these particular "little things"—such as occasional, or more than occasional, poor oiling; or cotter keys misplaced—may or may not amount to so very much in dollars and cents directly (although we think that they do) but it should be remembered that there are lots of other little things. The number of these other little things may perhaps be ascertained, but the aggregate of their value, when neglect brings them into view, is beyond computation. It is through such talks as that of Mr. Rhodes that the importance of watching little things can be brought home.

Recurring to the point made about reducing oiling costs; while not in the least attempting to deprecate the value of the gains in oil costs proper, to be made by careful use of oil and of waste, the question must naturally arise as to the labor cost that is bound to come in when an intelligent and insistent handling of journal boxes is attempted. With, say, 60 per cent of the cost of oiling on a highly intelligent plane of practice given to labor—as it has been and is being done—the net oiling account goes up a bit. It represents money well spent—but it means that oiling accounts do not always represent what they seem to. Meanwhile the good work is going on.

A suggestion made by Mr. Rhodes, at this meeting, as to supervision of work and performance by a specialist is worthy of note. The well known practice of the Galena Oil Co. in keeping experts on the road constantly to insure the best results in oiling, and the constant attention given by the Westinghouse Air Brake Co. to air brake practice, have shown what can be accomplished by persistent effort on these lines. It is unquestionable that on our large railway systems specialists could be employed, with decided advantage, to supervise practice in various lines. But perhaps a more satisfactory method would be to have the organization of the mechanical department include a "general master mechanic." Nowadays a superintendent of motive power is kept so closely confined to office work and the higher executive duties that he simply cannot get down to the details of shop work and of road performance. If he were given a general master mechanic—one to go over the whole system constantly to see that all shop and road work was fully up to the mark—he would feel much better assured that his motive power and rolling stock were properly built and maintained.

IN the shipment of 600 cars now being forwarded by the Pressed Steel Car Company is noted a pressed steel car for the Chesapeake & Ohio Railroad. This car attracts particular attention on account of its being somewhat different in shape from the other large cars turned out by this firm. It is a self-clearing type of car, although the hoppers do not go down in an angle as in most hopper cars, but the load is dropped by means of drop doors operated in a manner similar to the doors on a flat-bottom gondola car. This given the car an appearance similar to the high side flat-bottom gondola car. The car has a carrying capacity of 55 tons of bituminous coal, the light weight being 38,200 lbs. The capacity level full is 1,900 cubic feet; and with a 10-inch average heap it is 2,122 cubic fet. The car was designed specially to meet the local conditions of the Chesapeake & Ohio Railway, especially in connection with the dumping of the load at Newport News, Va. The cars will be used exclusively for the shipments of coal between the coal mines of the Chesapeake & Ohio Railway and Newport News, from which point large shipments of coal are made by water. Many of our war vessels receive their supply of coal from the Chesapeake & Ohio tipple at that point, the coal being discharged direct from the cars to the vessels. The cubic capacity of these cars is greater than any similar car built, as will be noted in the statement that it has a capacity of 55 tons of bituminous coal. The general dimensions are as follows: 29 feet 6 inches long, 10 feet wide, and 11 feet 2 inches high. The truck frames are of the standard pressed steel diamond type. Cast iron chilled wheels are used, M. C. B. standard axles and journal bearings, pressed steel brake beams and the Schoen draft rigging.

IT is gratifying to know that still another educational institution is to have a real locomotive for its students to "play with"—this term is used, although every one knows that the "play" in such cases is very serious and very profitable work. The University of West Virginia is to be thus favored, the Baltimore & Ohio Railway having presented it with an eight-wheel passenger locomotive for use in the instruction of the men in the mechanical engineering department.

A Suggestive Interchange Question.

Contributed.

A QUESTION of considerable importance was under discussion at the last meeting of the Chicago Car Foremen's Association, the proceedings of which are printed in this issue. The question was:

"Is a joint evidence card, covering two draft timbers and one deadwood, signed by a switching road and a railroad, proper authority for rendering bill by another switching road who makes repairs some time later, at which time numerous other repairs are made indicating rough usage—the car having been delivered back and forth three times in the interim?"

It is to be regretted that the discussion did not compass both phases of the question. It will be observed from the proceedings that the discussion was limited to the consideration of the question, whether the joint evidence card had been issued by the proper authorities and is valid in accordance with the provisions of Section 29 of Rule 5.

Unfortunately, we find a number of cases in which repairs are made, which, if considered as a whole, would be properly classified as "unfair usage" on account of the combinations being violated; still bill is presented for a portion of the items on the claim that the combination damage denoting rough usage was not brought into evidence at one and the same time, and therefore the repairs charged for are owner's.

The case in question represents a car starting out on its migratory movements with certain defects, which if repaired in season would be chargeable to the owner, but which on account of not receiving attention at the proper time lead to other damage, which, taken as a whole, constitute "rough usage." It is simply a case of neglecting to put in the stitch in time and thereby saving the other nine.

The car was five months out of the possession of the owner, who in this manner sustained many times greater expense from loss of service of the car than the bill for the entire repairs amounted to. In this respect it recalls to us the practice in vogue previous to the time the rules were revised according to Mr. Barr's new interchange agreement, and resolves itself into a single refuge to back records, by the aid of which the party possessing the car attempts to separate the time in which the various defects occurred, in order to escape the responsibility for combination damage.

It is clearly evident that the framers of the rules, as they exist at present, intended that the car itself should present the record of its condition, and therefore it seems entirely wrong for anyone to attempt to escape responsibility by reference to records of the condition of car on days preceeding that on which repairs are made. Companies handling cars should understand that they owe it to the owners, as well as to themselves, to maintain cars in safe condition for transit, and if they neglect to make what repairs are necessary in order to move cars safely and avoid further damage, that the responsibility, therefore, must rest entirely upon themselves.

Under the present rules, a car is held in trust by the party handling it, so far as its maintenance in serviceable condition is concerned, and viewed from this standpoint, a foreign car in one's possession should be treated the same as one's own, so far as making the necessary repairs is concerned. No one will advocate the policy of running his own cars with certain defects, which must of necessity develop and be followed by other and more serious damage in consequence. Therefore, the inference seems to be entirely logical, that companies failing to make repairs to certain parts in time to prevent failure of other parts, which follows as a natural consequence, should be held for the entire damage.

It is the writer's opinion that if more effort was made to maintain cars in efficient condition, and if the money which is expended in attempting to collect bills for charges under these conditions, was applied to repairing cars, more happy results would be experienced and less heavy damage done to cars.

A Disinterested Observer.

Personal Mention.

Mr. Henry Bitters has been appointed master car builder of the Duluth, South Shore & Atlantic, with office at Marquette, Mich., vice Mr. D. C. Mulvihill.

Mr. C. W. Lee, foreman of locomotive repairs of the Southern Railway at Greensboro, N. C., has been appointed master mechanic of the Seaboard Air Line at Raleigh, N. C.

Mr. Chas. Everhardt has been appointed traveling engineer on the Chicago & Eastern Illinois with headquarters at Chicago.

Mr. Geo. W. Smith, master mechanic of the Santa Fe Pacific, has removed his headquarters from Albuquerque to San Bernardino, Cal.

Mr. J. D. Coffey, heretofore road foreman of engines in the Atchison, Topeka & Santa Fe, has been made devision trainmaster on the same road, with office at Newton, Kan.

Mr. H. C. Pearce has been appointed purchasing agent of the Soo Line, vice Mr. J. E. Shaughnessy resigned.

Mr. E. W. Jerome, formerly master mechanic of the Zanesville & Ohio, died at Albany, N. Y., early in February.

Mr. T. F. Brady has been appointed master mechanic of the Mexico Central at Chihuahua, vice H. W. Ridgway resigned.

Mr. C. H. Putnam has been appointed superintendent of the Spokane shops of the Great Northern vice Mr. J. A. Stute resigned.

Mr. David Brown has been appointed assistant superintendent of motive power and machinery of the Delaware, Lackawana & Western, with office at Scranton, Pa.

Mr. C. W. Lee has been appointed master mechanic of the Seaboard Air Line at Fernandina, Fla.

Mr. D. J. Timlin has been appointed master mechanic of the Texas Central at Walnut Springs, Texas, vice W. B. Warren.

On the Clover Leaf, W. O. Thompson has been appointed division master mechanic at Delphos, O.; and E. Eden, division master mechanic at Charleston.

Mr. Chas. Geisking has been appointed general car foreman of the Pennsylvania Lines at Columbus, O., vice W. F. Eberle appointed general foreman of car inspectors, with office at Altoona, Pa.

Mr. Joseph Fauver, foreman erecting department of the Grand Trunk shops of Montreal, has resigned.

Mr. H. M. Perry, for many years identified with car manufacture, both as a contract car man, and as a railway official, has opened an office at 1023 Monadnock Block, Chicago, where, as a consulting engineer, he will attend particularly to expert car designing work, inspection of new and old equipment, etc. Mr. Perry will be well remembered as having contributed practical articles from time to time, to our columns, and as the author of the widely known manual on the "Cost of Car Repairs." By life-long training and practical contact with all phases of car designing and maintenance, Mr. Perry is particularly well qualified to enter upon his present venture—in which scores of old time friends wish him success.

Mr. Chas. A. Moore.
Honored by the French Government.

In our last issue we gave portraits of four recipients of the decoration of the Legion of Honor from the French government. We are now enabled to give the portrait of a fifth member of the fortunate group of Americans so honored—that of Mr. Chas. A. Moore, of the firm of Manning, Maxwell & Moore, of New York. Mr. Moore is one of our best known railway supply men In addition to his membership in the firm above named, he is also president of the Shaw Electric Crane Co., of Muskegon, Mich.; the Ashcroft Mfg. Co., of Bridgeport, Conn.; the Consolidated Safety Valve Co., of Bridgeport, Conn.; the Hayden & Derby Mfg. Co., of Bridgeport, Conn.; the Hancock Inspirator Co. of Boston, Mass.; and the Pedrick & Ayer Co., of Philadelphia, Pa. Mr. Moore is also a director in several corporations, banking, insurance, and other than in the machinery business.

On the Grand Trunk Mr. J. E. Muhlfeld has been appointed master mechanic, succeeding A. G. Elvin, of Montreal, resigned. E. D. Jameson becomes master mechanic of the Western Division, with headquarters at Battle Creek, Mich., having jurisdiction over all matters pertaining to this department, excepting those at Fort Gratiot Shops and Port Huron Tunnel Pumping Station. J. McGrath becomes master mechanic in charge of the Fort Gratiot Shops and Port Huron and Sarina Pumping Stations.

Mr. M. M. Martin, superintendent of the car department of the Wabash Railroad, died February 12, aged 69 years. Mr. Martin was born May 31, 1831, at Sussex, England. He entered railway service in 1851, on the Michigan Southern & Northern Indiana road as foreman at Adrian, Mich. He held this position until 1888, when he became car builder of the St. Louis, Alton & Terre Haute Rd; from 1865 to 1872, he was master car builder of the Ohio & Mississippi Rd; from 1872 to 1873, superintendent of the Indianapolis Junction Rd; from 1874 to 1876, superintendent of the Litchfield Car Works, Litchfield, Ill.; from 1877 to 1879 master car builder of the Southern Lines Illinois Central Rd, at McComb City, Miss.; from 1880 to 1884, vice-president Litchfield Car & Machine Co.; and from 1884 to date, superintendent car department Wabash Road. Mr. Martin was for many years a member of the M. C. B. arbitration committee.

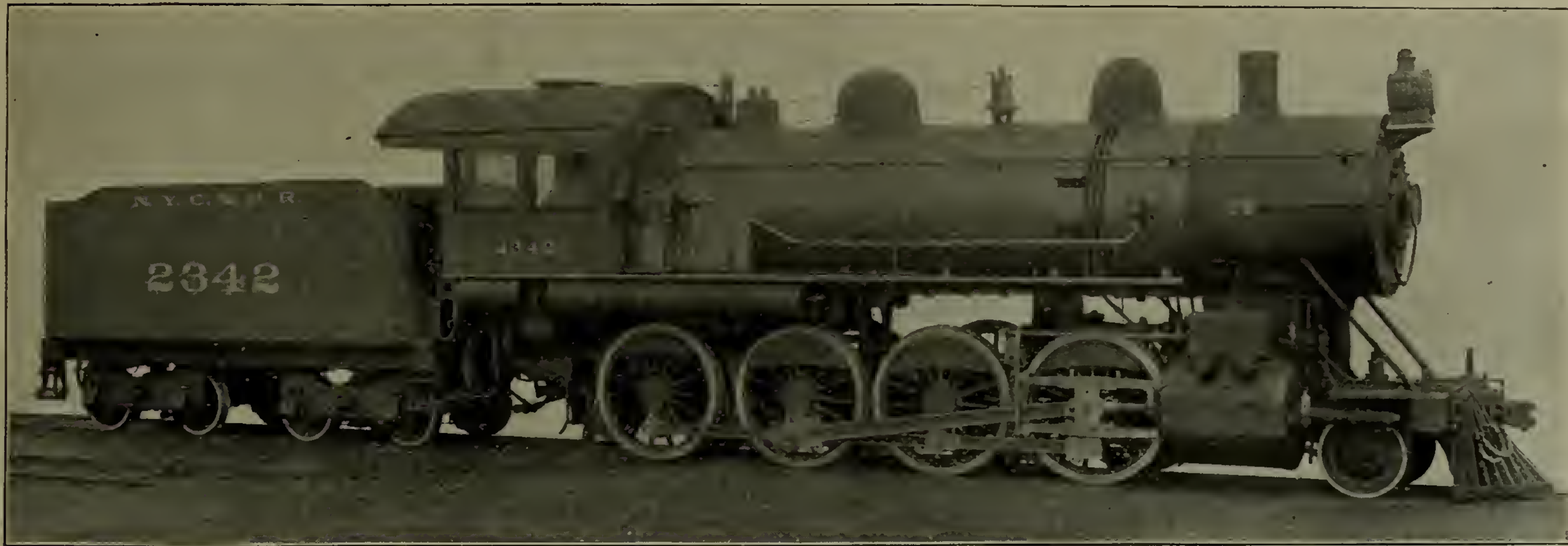
Mr. M. M. Martin.

On the New York Central & Hudson River the following changes have been made in the mechanical department: F. W. Chaffee, heretofore master car builder at West Albany, has been appointed general inspector for the car department, with headquarters at Albany Passenger Station, and will have supervision of all car inspection points on the road, and the condition of car equipment in service, reporting to the assistant superintendent of rolling stock. The position formerly held by Mr. Chaffee is abolished. James Buchanan, division superintendent of motive power at West Albany, has resigned and, until further notice, reports and correspondence regarding locomotive department matters on the Middle and Hudson divisions, also reports and correspondence regarding car department matters on the Middle division, will be sent to E. E. Davis, assistant superintendent motive power, at West Albany, who will assume direct supervision of the locomotive and car shops at West Albany, in addition to his other duties, conferring in matters pertaining to the car department, with the assistant superintendent rolling stock. John Howard heretofore acting division superintendent motive power of the Pennsylvania division, has been appointed division superintendent motive power, succeeding George Thompson, resigned.

Mr. G. W. Guess has been appointed purchasing agent of the Waycross Air Line, with office at Waycross, Ga.

On the Wabash Mr. Geo. Barrett has been appointed general foreman of shops at Montpelier, and W. A. Bell, foreman of shops at Ashley.

Two New Schenectady Locomotives.



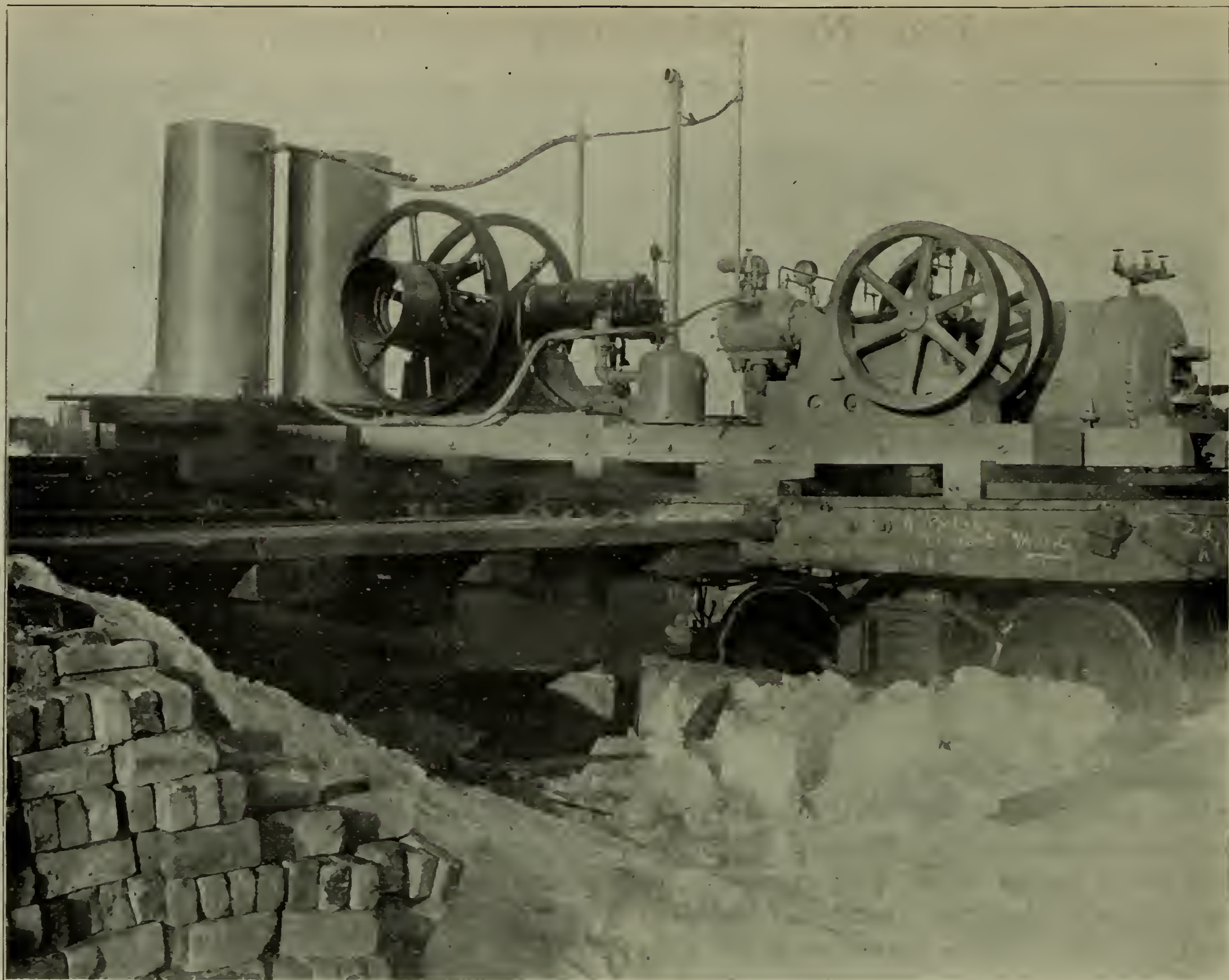
SCHENECTADY CONSOLIDATION FOR THE NEW YORK CENTRAL & HUDSON RIVER R. R.

Two of the latest locomotives turned out by the Schenectady Locomotive Works are here illustrated. The large engraving shows a compound consolidation built for the New York Central & Hudson River road. This engine weighs 190,000 pounds, of which 164,000 pounds are on the drivers; it has cylinders 23 and 35x32 inches; 63 inch drivers; a straight top boiler with wide firebox, the boiler being 70 inches in diameter, and designed to carry 210 pounds; a fire box 96 inches long and 75⅜ inches wide; a heating surface of 3,217.13 square feet, of which 3,040.81 square feet is tube, 28.27 square feet water tube, and 148.05 square feet fire-box surface; grate area of of 50.31 square feet. The special equipment of the engine includes U. S. Metallic packing on piston rods and valve stems; piston valve on high pressure and Allen-Richardson balanced valves on low pressure valves; cast steel drivers centers; carbon fire box steel; Nathan monitor injectors; Fox pressed steel tender trucks, bolster type; Westinghouse-American combined brakes on drivers, tender and for train; Westinghouse 9½ inches L. H. air pump; Westinghouse engineer's air signal; Lappin brake shoes on driving and tender wheels; Consolidated steam heating apparatus with McLaughlin flexible joints and Mason reducing valve; three 2½ inches Consolidated muffled safety valves; National Hollow brake beams on tender; Franklin sectional lagging on boiler and cylinders; Leach sand feeding apparatus; water scoop on tender.

The six coupled switch engine is for the Colorado Springs and Cripple Creek District Ry. This engine weighs 133,000 pounds, of which 106,000 pounds are on the drivers; it has 19x24 inch cylinders; 51 inch drivers; two 2-wheel swing bolster trucks one at each end of engine; a straight, 66¼ inch boiler, carrying 180 pounds pressure; 1,748.94 square feet of heating surface, of which 148.47 square feet is fire box and 1,600.47 square feet tube surface; and grate area of 22.13 square feet. The special equipment includes U. S. metallic packing; Richardson balanced valves; Nathan monitor injectors; Westinghouse-American combined brakes on drivers, tender and for train; 9½ inch Westinghouse air pump; Le Chatelier water brake on cylinders; Magnesia sectional lagging on boiler and cylinders; two 3-inch Coales safety valves, 1 muffled and 1 open pop; McIntosh blow-off cock; Leach sand feeding apparatus; Tower coupler at front of engine and rear of tender; Sterlingworth, Marden patent, tender brake beams.

THE department of railway mechanical engineering of the University of Illinois has arranged to exhibit the new railway test car, recently completed by the Illinois Central Railroad and equipped by this department, at the next meeting of the Western Railway Club in Chicago. It will be placed on the Illinois Central tracks near the Auditorium, where the meetings of this club are held, and Mr. E. C Schmidt, assisted by several students of the College of Engineering, will receive members of the club and explain the construction and methods of operating the car.

SCHENECTADY SWITCHER FOR THE COLORADO SPRINGS & CRIPPLE CREEK DISTRICT RY.



A Pneumatic Tool Car.

Chicago and Northwestern Railway.

The very suggestive picture which we give of a pneumatic tool car will be of distinct interest not only to bridge men—for whose use it was primarily designed—but to motive power men as well, for the uses to which this portable plant can be put are almost without limit. Every point on the road where something can be best handled by air—that is not already served by a stationary plant—can be admirably served by this car. This car was recently designed and fitted up by Mr. W. H. Finley, principal assistant engineer of the Chicago & Northwestern Railway.

The outfit consists of one 15 H. P. Otto gasoline engine; one 6x8 horizontal Ingersoll-Sergeant compressor; one air tank; two cooling tanks; and one gasoline tank; all mounted on a flat car as shown.

The photograph from which our engraving is made was taken before the car was housed in, so as to afford a chance to give a better view. With the equipment above noted there was also furnished some 600 feet of hose and piping, with connections to the air tank, so that three sets of tools could be used at once. The tools consist of three Boyer hammers and other tools furnished by the Chicago Pneumatic Tool Co. The drills, hammers, chippers, etc., are of the latest and largest capacity.

The car is so arranged that the machinery may be removed from the car and placed at one side of a bridge abutment; or if the character of the ground will permit, the car can be side-tracked and the work done from that point. In addition to the great value of a tool car of this kind in making repairs upon bridges, it is also evident that it would be very convenient for the erection of new bridge work; as well as for the painting of all depots, bridges, or anything requiring painting or whitewashing. The compressor has a capacity for running three of the largest tools at once. In the intermittent way in which work is usually done, it is estimated that four or five leads of hose can be attached to tools at the same time and still have supplied a plentiful amount of air.

The control of both the engine and the compressor is automatic and the plant therefore requires no particular attention except as to lubrication.

The Success of American Locomotives in Japan.

By W. H. Crawford, Jr.

"Do the Japanese make good locomotive engineers?" This question has probably been in the mind of many a railroad man, especially of late years, since our products have been going abroad to such an extent. American locomotives have been finding their way into all quarters of the globe, in some instances replacing those of European build that had originally held the field, and again, going into countries where the railroad came as an entirely new institution. Japan is an example of the former, and Palestine an instance where American locomotives did the pioneer work.

Japan is doubly interesting to Americans in this respect, because of the fact that, as the people of that country advanced in knowledge of railroad matters and became in a measure able to perform conclusions for themselves, they gradually fell away from the early European practices and adopted American methods, together with American locomotives and rolling stock. There was a time when English engines alone were to be found on Japanese railways, while nowadays the American type has become a standard. The significance of this victory on an entirely neutral field is, of course, limited to the value of the opinions held by these people, and an answer to the question, "Do the Japanese make good locomotive engineers?" is essential to any discussion.

I have been in the cab with engineers on many roads in this country and have also travelled many a mile on locomotives in Japan, and my observations have been most complimentary to the little yellow skinned men, whom we are apt to look upon as new in the business, and hence beneath a comparison. By their very inborn characteristics the Japanese are suited to good, careful and practical locomotive running. To start with, there is no profanity in Japan Not a profane word in the language. Hence there must be no occasion for the use of same, or they would have coined words long ago. To understand this properly we must realize that the Japanese are fatalists in the full sense of the word. To them, whatever is, is. And they seem just as resolved to fate (no matter how unkind) as though all things had come of their own choice and fancy. It is exasperating, of course, to the quick acting and impulsive Caucasian, when this sublime resignation is met with, but there is no use trying to make the Japs follow our plan, for they look upon an impatient man as being irrational; and a man in a rage as simply suffering from temporary insanity In such cases the Jap will simply stop everything and wait for the unfortunate to recover, and they always seem to look so sorry for you.

Now, it can be understood that they do their work in a cool, methodical and deliberate way, and with a dignified politeness that one can't help admiring. With them there is no unnecessary jerking, banging or slipping the engine, as is often seen here. No blustering and swearing. Their actions are deliberate and they seem to do what is required of them with the least possible effort.

An example of their ability as engineers was shown at a comparative test which was made between an American (Baldwin) and an English locomotive on Gotemba Hill, the longest and steepest grade in Japan operated by ordinary adhesion. This trial was of ten days' duration, and on its results depended the placing of a large order. An English locomotive engineer, who had been in the employ of the Japanese Government Railways for many years, ran the English machine on all her trips. The American engine was handled, for the first pull, by a representative of the Baldwin interests, but he immediately turned things over to the little man who seems to know it all, and relied on him confidently to win success. And it was indeed interesting to watch the two men as they followed each other in making the final pulls.

The English engineer worked as hard as his engine, and had one man to operate the sand lever, another to handle the injector, and yet another to superintend the Japanese firemen. When the Japanese engineer on the American locomotive commenced his final pull, he was cool, quiet and deliberate. Before starting he opened the sand lever just enough for a fine stream to run out on the track and then marked the position of the rod by tying a white rag around it, and then pushed it shut. He had a sharp look around, to see that there was nothing wrong, and gave a few directions to the men firing for him. When the train was under way and the grade reached, he was leaning out of the window, calmly smoking a cigarette, with as much indifference as though he had been merely an onlooker. He carefully pulled the sand lever back to the economical position indicated by the white rag, and continued puffing away at his cigarette. She worked hard but never slipped a wheel, and the little Jap didn't intend that she should. When within two miles of the summit, and all hands were feeling that victory was in sight, but yet too fearful of some unforseen complication to let this idea find expression, Mr. Jap walked out on the running board and called to two men who had been riding on the front end of the engine. They immediately came back with a big bag of sand apiece, which were emptied into the box on the boiler; and so the engine climbed to the top of the grade without letting go of the rails once. The American engine pulled 10 per cent more load with 4 per cent less fuel than the English engine, and the latter had two tons more weight on her driving wheels and 20 pounds more steam per square inch, although her cylinder was one inch less in diameter. However, it was largely due to the handling, and the result seemed quite natural when one compared the deliberation and skill of the Jap, with the spasmodic actions of the Englishman. Had the American engine stalled right at the top of the hill, or anything else gone wrong to cause defeat, the manner of the Jap would not have changed in the least. He would simply have climbed down from his seat and, rolling a fresh cigarette, let fall that word which takes the place of all the profanity in the English language There is little use in giving it in the Japanese form, "Chatagani," but translated it means "It can't be helped," and that is the key note of all their actions. They do their best and let the result be what it may without a murmur.

Being such close observers of detail it stands to reason that the railway equipment is well kept up, and nowhere does one find engines in such good repair and looking so fresh and new as in Japan. They, of course, have never been required to make the same high rate of speed as is maintained in this and other countries, nor do they handle such heavy trains, but I am sure that, when the time comes for them to put forth greater efforts, they will be right on hand with the necessary nerve and inventive genius.

There is one other point which, though hardly to be quoted as a good qualification, according to our standard of thinking, is eminently characteristic of the Japanese. It is not an example that we can follow, however, any more than we could take up with the Japanese idea of self-destruction when things go wrong, instead of seeking the life of the other fellow.

Their politeness is known the world over, but who would think that one of the best places to observe it is in railroading No more dignity or respect to authority was ever shown on a war-ship in commission than can be noticed any day in a Japanese railroad yard

There is none of this rough talk between engineer and fireman across the boiler head; but instead, a respectful silence, until it is necessary to say something, when the speaker will salute his companion by politely touching his hat (if not removing it altogether), and saying what he has to say in just as few words as possible. Imagine, if you can, a fireman touching his hat and making a polite bow to his engineer before saying: "Sir, do you wish to take water at Baba?" and the engineer returning the salute in just the same manner (for he would show lack of good breeding if he failed to duplicate each of the former's actions) and saying: "If you please, we will." But they are not used to anything else, and it would be just as impossible for them to get along without this formality as it would be to introduce such a code on the B. & O. But why should there not be just as much respect for authority on a railroad as we have in steamship service? It might be better for us if there was less familiarity. I have been in the cab of an engine on one of our roads that runs down through the South, when the engineer has called to his fireman (and a colored man at that): "Jack, get that watermelon out of the box," and in a few minutes the three of us were back on the tank disposing of big slices, regardless of the fact that we were on the front end of a fast express making between thirty-five and forty miles per hour. Of course, the road was straight and there was no particular risk incurred, but the mere fact that this sort of thing exists in our country, and that it would be impossible in Japan, goes to show how much more careful and business-like they are.

The engineer is the most important man on board the train, the rest of the crew consisting of two firemen and two guardsmen. The station masters are the highest authorities along the line and they do much of the work that is performed here by conductors. It is interesting to watch the engineer, guardsmen, and station master after a train has pulled into a terminal. They meet in a little group and after respectful salutes are exchanged, according to the prescribed formulae, they go about their business in a way that certainly commands admiration. Now, all this can certainly result in nothing but good to the service, just as perfect discipline and careful management is essential in any public institution.

The Japanese have the money to get the best of anything that is desired, and they have the ability to determine what is best suited to their requirements; so that it is a decided compliment to American locomotive builders when, after nearly thirty years of experience, we find our engines adopted as their standard type.

70,000 Pounds Capacity Flat Car, Northern Pacific Railroad.

IN the large order for freight cars recently placed with the American Car and Foundry Company by the Northern Pacific Railroad, there is a lot of 800 flat cars which possess some interesting features. The designs for these cars were prepared under the supervision of Mr. Alfred Lovell, superintendent of motive power of the Northern Pacific.

The cars are of 70,000-pounds capacity and are 41 feet in length. The body is carried so low that no draft timbers are necessary, the draft rigging being fastened directly to the center sills. This gives a deck height of only 42 inches, and yet, through the placing of the intermediate sills nearer the center sills than usual, there is no interference of sills with the swiveling of the trucks.

In figure 1 this sill spacing is shown; it was adopted for convenience in applying the cast steel body bolster, shown in figure 4, which we will refer to presently. A tandem spring draft rigging is employed; this design

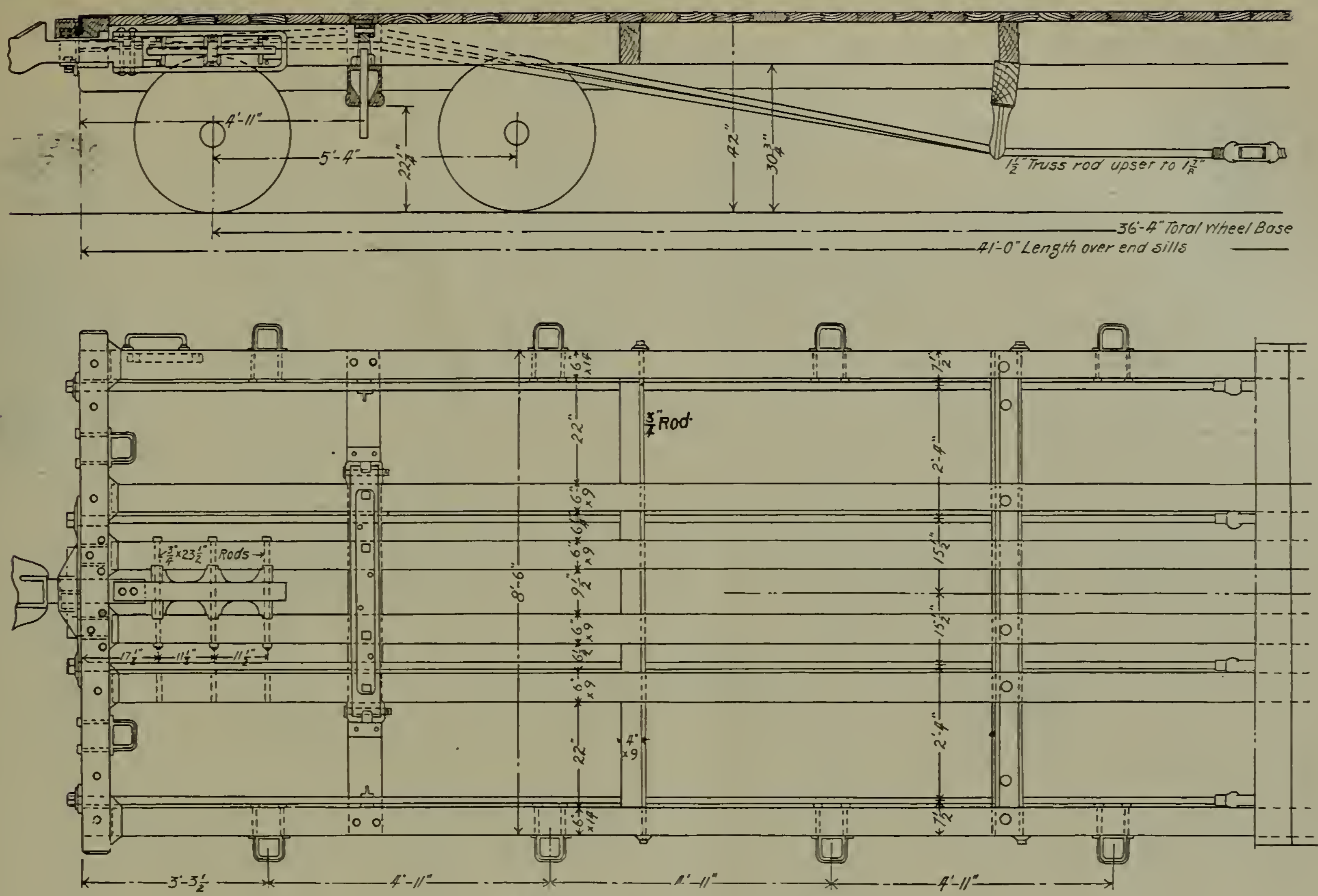


FIGURE 1—NORTHERN PACIFIC 70,000-LB. FLAT CAR.

was worked out jointly by Mr. Lovell and Mr. E. Posson, of St. Paul. The details of this arrangement are shown in figure 3, and the bolts of the novel draft lugs are, as shown in figure 1, inserted through the intermediate sills. This arrangement of draft rigging has permitted the use of a malleable casting in which is combined the dead block, buffer block and draw head carrier, as shown in figure 2. In this latter figure is also shown the swiveling step for the drop brake shaft.

In figure 4 is shown the novel cast steel body bolster used. The upper portion of this cut shows the disposition and dimensions of the sills. By reference to the upper outer corners of the intermediate sills it will be seen that the bolster consists of two parts, the upper member of which lies across and on top of the center and intermediate sills and at either end is connected by a pin to the lower, or body, member of the bolster. The profile of the lower member shows quite clearly its composition, as regards truss rod saddles, center bearing, and the peculiar shaping effected in order to suitably receive the sills. At the center it will be noted that there is a bridge over the center pin opening in order to receive a center lug connection with the upper, tie, member. The lower details of this cut show the form of this tie member, and by way of explanation it should be said that the end shoulders and holes of this member are machined, and that they are fitted into the receiving recesses of the main member in such a manner as to eradicate practical load deflection.

The truck for these cars is shown in figure 5. The truck bolster therein shown has, however, been abandoned in favor of the accepted design of one-piece cast steel bolster, shown in figure 6; accordingly the latter should be considered as in place while viewing the truck as a whole. On account of the conveniently low deck height of the car, obtained by the system of construction already pointed out, the truck has been designed with very low vertical dimensions. The leading feature of the truck will, however, be seen to be the utilization

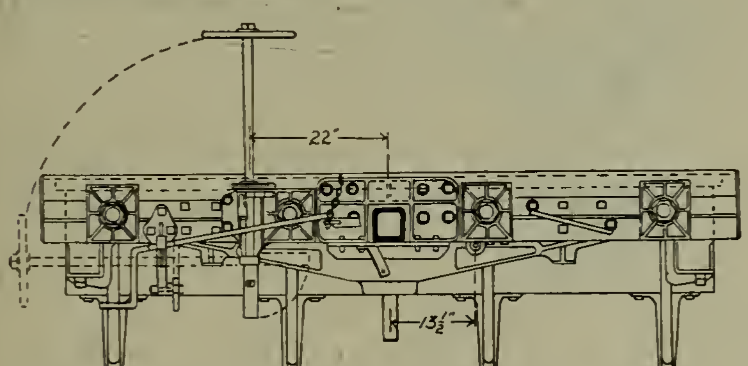


FIGURE 2—NORTHERN PACIFIC FLAT CAR.

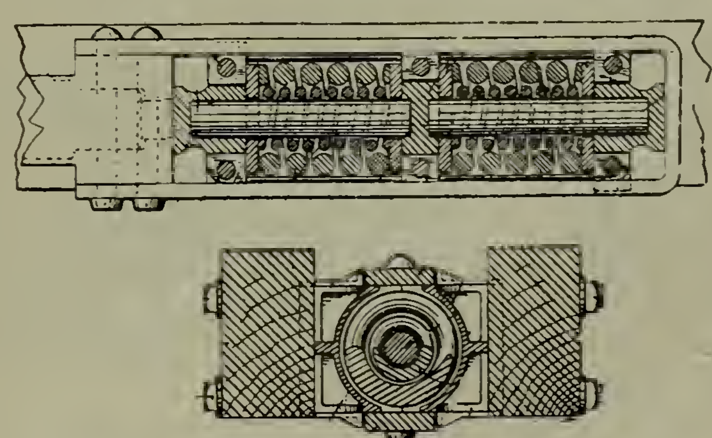


FIGURE 3—NORTHERN PACIFIC FLAT CAR.

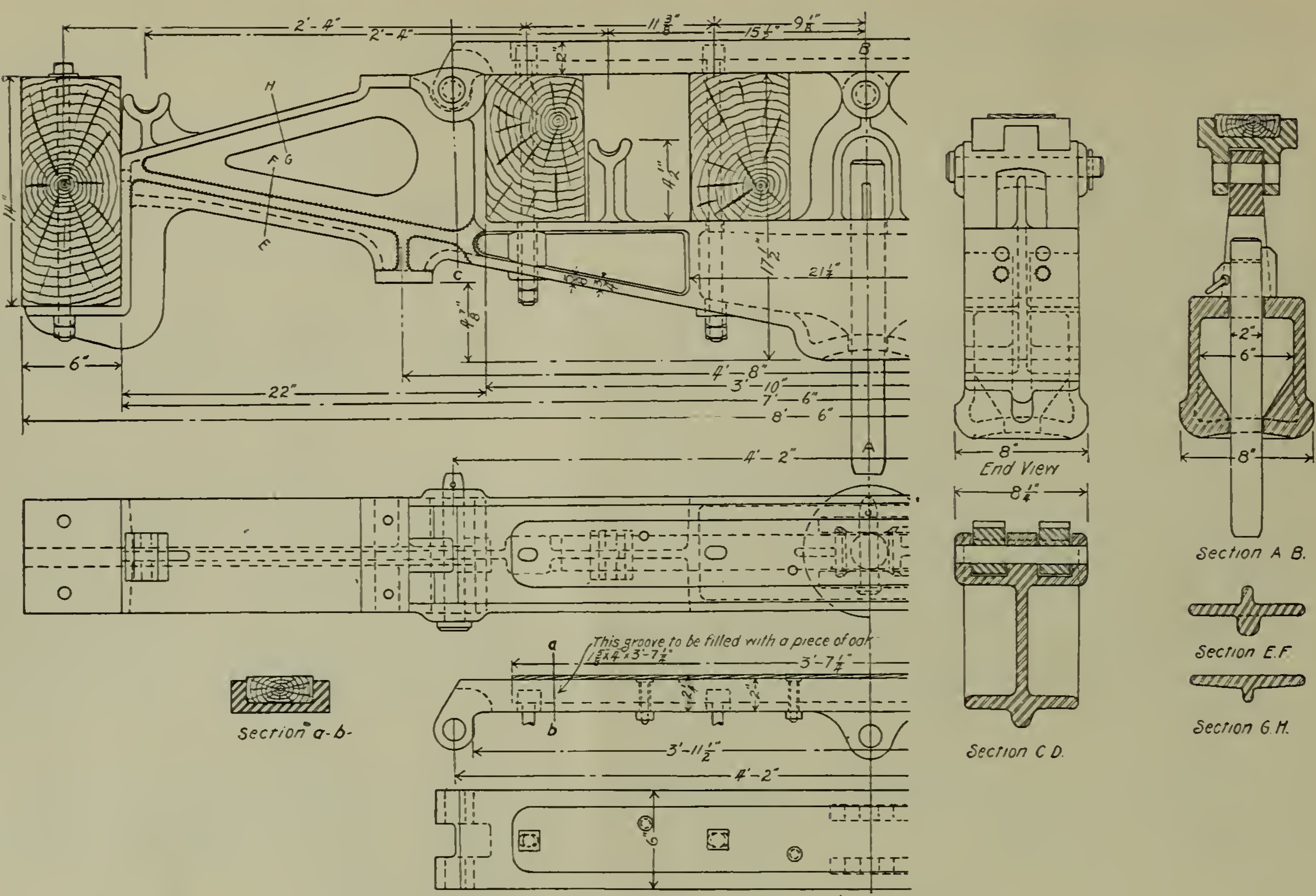


FIGURE 4—NORTHERN PACIFIC 70,000-LB. FLAT CAR.

of a modification of the Barber roller motion to provide that certain amount of lateral bolster swing which is conceded to be highly desirable as the load capacity is increased. Recent discussions in various railway clubs have pointed out the fact that the wear of wheel flanges has increased in proportion to the increase in the load capacity of cars. Those whose interest in the subject has led them to follow this matter up concede that the practical amelioration of this increase of wear may be effected by keeping the side bearing clearances exact, and by providing a limited (not a comparatively unrestricted) amount of flexibility in the truck. In the present case the first point is covered by the freedom from deflection attending the use of cast steel for the bolsters of both body and truck. The second point—that of avoiding a certain amount of lateral bolster swing—is obtained by employing the well-known Barber design. The adaptation of this feature to the present case seems peculiarly apt, as the path which the rollers travel tends

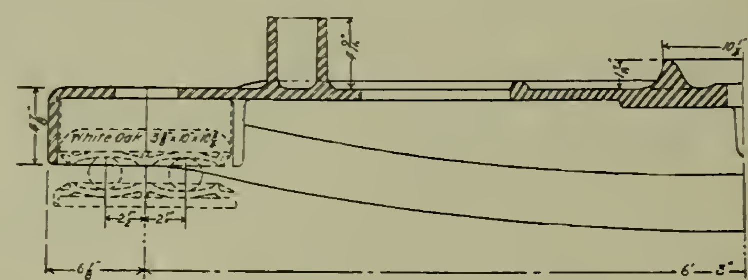


FIGURE 6—NORTHERN PACIFIC FLAT CAR.

strongly to the attainment of the object desired. Another feature in this connection is that the oak block into which the upper bearing-plate beds constitutes the spring dampener which is thought of so highly.

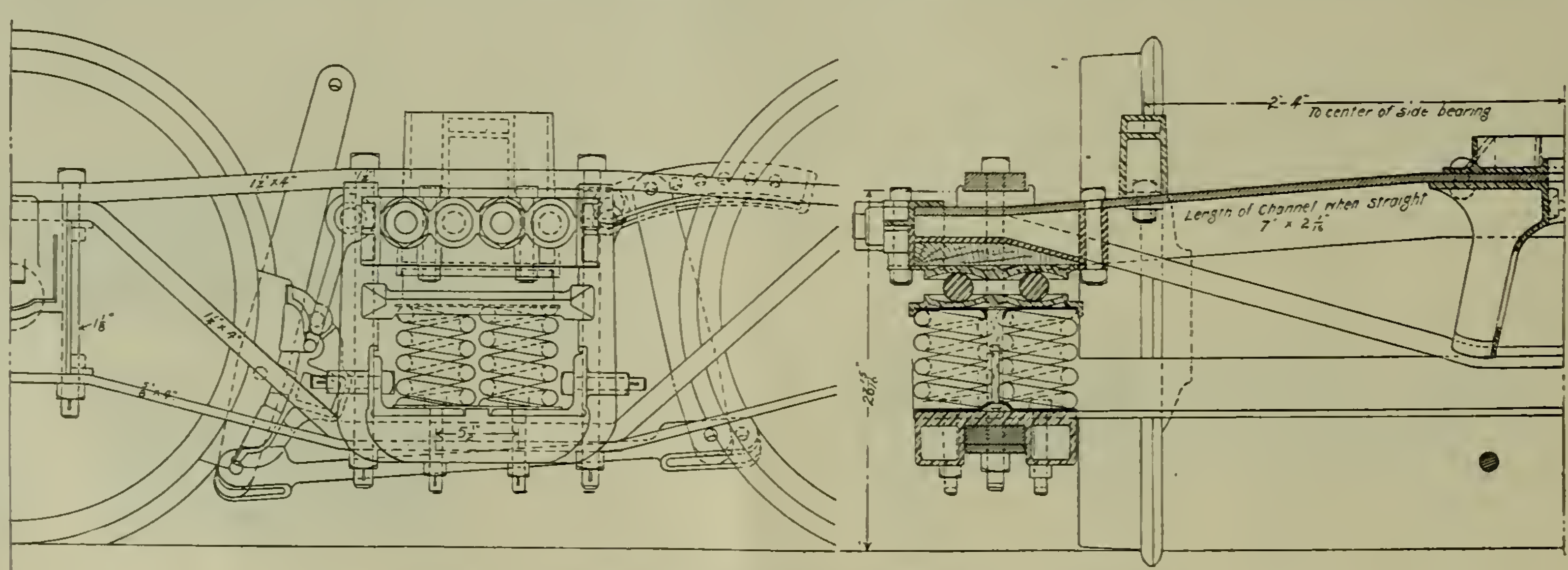


FIGURE 5—NORTHERN PACIFIC 70,000-LB. FLAT CAR.

Safety Appliances in the United States.

THE fourteenth annual report of the Interstate Commerce Commission states that the safety appliance act in all its provisions became effective on the 1st of August last, and that as far as can be ascertained, practically all roads in the United States have since then been using automatic couplers and air brakes in the operation of their trains. That portion of the law which fixed the standard height of drawbars and made necessary the application of hand holds and grab irons has been in operation for almost five years, and, as said by the Commission in former reports, the state of equipment in those particulars has shown approximately perfect compliance with the statute.

When consideration is given to the fact that during the time the railroads were equipping their cars with automatic couplers, the demands made upon them by an enormous traffic were constantly increasing, and that they were seriously embarrassed in their efforts to supply the needs of the shipping public, it is surprising to observe what the roads have accomplished in his direction; and when we take into account the vast amount of work made necessary and the rapidity with which the change from old appliances has been made without friction or cessation of business, the undertaking of the railroads stands as a monument to their energy and marks an epoch in railway development.

It must be borne in mind that the Master Car Builders' Association and the American Railway Association had, prior to the passage of the law, urged the adoption of appliances which are in geneal use today. These organizations made new recommendations each succeeding year for the safety of employees and the economical operation of the roads.

The Government has not undertaken to decide either the particular coupler with which freight cars should be equipped, the number or location of hand holds and grab irons, the height of drawbars, or the number of cars to be provided with air brakes for the proper control of trains. All these matters were left to the determination of the carriers.

The law having been in full operation only about four months, its benefit in preserving the life and limb of employees can not yet be determined with much accuracy. From such of the public prints as were accessible, it is found that up to the 1st of December there were 864 casualties, 255 of which were fatal. Of the total number it would appear that 618 were either purely accidental or resulted from apparent carelessness, 229 were caused by defective appliances, and in 17 the causes were not indicated by the statements made; 482 occurred in the yards and 341 upon the road. Of these, 90 occurred in switching, and 234 in the operation of coupling. These, of course, are only a portion of the accidents which have occurred throughout the country, and it is hoped that the publication of these facts will impress upon railroad employees the necessity of exercising due caution in performing their work.

The making up and movement of trains will always be a very hazardous business, and death and injury thereby caused cannot be wholly avoided. In this connection the Commission desires to invite attention to what was said in its last report to Congress, for the Commission believes it as necessary to inculcate care on the part of the men as it is for the railroads to keep their equipment in order. It was recently decided by the supreme court of Kansas that where there were two ways of doing a given thing connected with the operation of a train of which the employee had knowledge, it was the duty of the employee to adopt that method which was the least hazardous, and that his failure to adopt the safer method relieved the employer from liability for his injury unless the employer had knowledge or apprehension of the employee's perilious position and made no effort to avoid injuring him.

In this case a workman, who had knowledge of a grossly negligent and wantonly reckless habit of his employer, voluntarily placed himself unnecessarily in a dangerous position whereby he received injuries resulting fatally, when there was a safer way to perform the duty known to the employee. The court held him guilty of contributory negligence. (Beal vs. A., T. & S. F. Ry. Co., 62 Pac. Rep., 321.) It will thus be seen that this court held that the rule of nonliability for contributory negligence in case of injuries recklessly inflicted does not apply when the injured person had or should have had knowledge of the grossly negligent habit or the impending reckless act and could have avoided the injury to himself by prudence and caution upon his part.

On June 30, 1899, there were 928,924 persons on the pay rolls of the railways of the United States. During the year ending on that date accidents occurred to railway employees which resulted in death to 2,210 and in injuries of more or less serious character to 34,923.

In previous reports the opinion has been expressed that the relative number of casualties to railway employees engaged in certain lines of duty would continue to diminish on account of the use of safety appliances on railway equipment and of other means of protection to life and limb. Confining the statement to accidents incurred in coupling and uncoupling cars, it appears that the number of employees killed during the year ending June 30, 1899, was 260, showing a decrease of 19 from the previous year, and that the number injured was 6,765, showing a decrease of 223, or a reduction of 242 in total casualties of this class.

For present purposes of comparison the following ratios have been obtained, in which it should be understood the word "trainmen" does not include enginemen and firemen, but does include switchmen, flagmen, and watchmen. Thus defined, the number of trainmen employed in 1893 to 1 killed was 349; to 1 injured, 13. The corresponding ratios for 1899 were—killed, 1 to 563, and injured, 1 to 22.

Since full returns of railways have not been made for the year ending June 30, 1900, certain data for 89 selected roads, representing roughly 70 per cent of the total operated mileage of the country, have been compiled, showing that the number of employees killed in coupling and uncoupling cars was 231, making an increase of 32 in the number killed as compared with returns for the corresponding roads for 1899. The injuries resulting from this cause, however, were only 4,019, showing a decrease as compared with the previous year of nearly 25 per cent., the injuries for 1899 having been 5,339.

In last year's report mention was made of the large number of persons killed or injured by falling from trains. The casualties from this cause during the year ending June 30, 1898, were, killed, 473; injured, 3,859. For 1899 the fatal accidents were 459, as compared with 644 for 1893. The injuries not fatal were 3,970, as compared with 3,780 for the year 1893. It is believed that the accidents resulting from falling from trains will be greatly reduced in time through the general use of the train brake.

The large increase in railway traffic has made great demands upon the equipment of the railways, resulting in the use of cars of inferior character and the increase in business has also made necessary the employment of many additional men, a large proportion of whom are doubtless inexperienced and thus more liable to accident than those regularly employed. The average number of tons carried per man employed in 1899 was 1,033, the corresponding figure for 1893 having been 853.

To the end that every precaution may be taken and that no careless, or indifferent, ignorant, or selfish individual may be permitted to endanger his fellows, a system of public supervision should be maintained and a close inspection made of the rolling stock in service, so that no wear or breakage may go unnoticed and unremedied. It is not proposed that such public inspection shall in any respect interfere with the duties of the operating companies respecting repairs, but that the inspectors shall see that cars in use are equipped with safety appliances, and those appliances kept in the condition contemplated by the provisions of law intended to promote the safety of traveler and employee. Such inspection will require some expenditure of money—small, however, in comparison with the interests affected. Recognizing that a law of this character can only be made effective by a system of supervision and inspection, Congress appropriated $15,000 at its last session to enable the Commission to keep informed regarding compliance with the safety-appliance act and to render its requirements effective. This sum is mainly expended in the employment of inspectors.

These men have been engaged only after the strictest inquiry into their knowledge of the subject and their capabilities for this particular work; each of them has had several years' experience in the operation of trains. Their duties require them to inspect personally the equipment of all the roads, as far as the limited number of inspectors will permit, and to report to the Commission not only failures to comply with the law, but all imperfections in railway equipment which relate to the requirements for the safety of employees established by the Master Car Builders Association and the American Railway Association. One prerequisite of the employment of such inspectors is intimate knowledge of the requirements which the railroads, through their associations, have established. The reports made by the inspectors are not, therefore, solely confined to failures to comply with the law; they include everything which tends, in their opinion, to increase the risk of the people employed.

When received these reports are immediately transmitted to the presidents of the railroad companies concerned, and their attention called to any neglect of their subordinates to conform with the requirements of the law or the rules established by themselves. This course of procedure has proved highly salutary, for in every case these communications have received favorable replies, while subsequent examination of the equipment has shown that the defects have been repaired and more stringent orders issued by the railroad officials. The inspectors have been instructed to make suggestions and statements regarding the condition of equipment and anything relative thereto which they believe to be of value. From these reports the following conclusions have been drawn:

The inspections have served to give a general idea of the conditions existing, and this has been of great value. The inspectors' reports indicate that violations of the law consist chiefly in failure to keep the equipment up to the required standard, including automatic couplers which are operative and in such working order that the men need not go between the cars. Inspection by the Government has undoubtedly proved beneficial not only to the employees interested, but also to the railroad companies. It has acquainted the railway presidents with conditions existing on their respective roads, of which they probably would not have been apprised in any other way. The air brake and the automatic coupler are not merely measures of safety. Without them the heavy freight train of today could not be successfully handled and the decreased cost of operation which has resulted from the use of larger cars and more powerful locomotives would not have been attained. Consequently these appliances have been most potent agencies in bringing about the great increase in the capacity of railroad trains during the past decade.

It is reported that probably 20 per cent of the couplers now used become nonautomatic through failure to keep them in proper repair. While in such condition it is agreed that they are far more dangerous to the men employed in handling the cars than the old link and pin coupler. When an accident in coupling now occurs it is said there is more probability of its resulting fatally. Again, when it was known that the men had to go between the cars to couple or uncouple it is claimed that engineers exercised greater care than they do now with couplers in use which are supposed to work automatically. These considerations indicate the necessity for most careful attention to the condition and repair of the appliances provided.

When railway officials reach the point of requiring car inspectors to reject any car having defective couplers or other defective safety appliances, as they now do on account of imperfect running gear, the dangers of railway operation will be largely reduced. It is understood that the most common defects in couplers are disconnected pin chains and loose brackets.

From the inspectors' report it is learned that upon many of the roads the smaller parts of the automatic couplers are neglected—such as cotter keys, clevis chains and knuckle pins—and the opinion is expressed that the tail end of the knuckle and the locking pin or block should be lubricated. This practice would result in less force being required to couple by impact and would extend the life of these parts.

Among the defects observed are the following: Coupler chains too long or too short; rods not adjusted to locks, and often no locks at all; short handles; rods placed on wrong side of the car, and coupler not properly secured to the car. One report recommends that deadblocks on each side of drawheads be dispensed with and that engineers be compelled to give warning signal before putting on air brakes. Failure to give such warning is alleged to be the cause of so many brakemen being thrown from the cars.

It is also stated that numerous accidents occur from carelessness due to men going between cars unnecessarily to raise the chain with their hands; that men have got into the habit of doing this instead of using the lever because many of the chains are too long; that many roads use chains made of split links and S hooks, which should be discontinued for the solid link with the clevis.

It is further reported that with too many kinds of couplers, the parts of which are not interchangeable by reason of being out of order, the link and pin must be used; that the practice of carding defects furnishes the men with an opportunity to be negligent; that the practice of not using more than 40 per cent of air in trains and scattering air-brake cars through the train instead of placing them next to the engine, should be condemned. Suggestion is also made that all trains should be inspected by an air-brake inspector and not by the ordinary trainman; that more care should be taken, not only in the inspections, but in repairing defects when found, and, further, that a larger percentage of cars should be equipped with air brakes. These are not recommendations of the Commission, but are deemed worthy of consideration by those interested as suggestions of men familiar with railway equipment.

There has been criticism of the couplers now in general use for the alleged reason that they are not really automatic in many conditions and circumstances of railway operation and because failure to make proper repairs renders the coupler a menace to the employee rather than an instrument of safety. Already an agitation has been begun for the use of other and better appliances. With this end in view the Commission has been asked to order tests of automatic couplers in order to decide which coupler is best adapted to the requirements of operation. The Commission has given no encouragement to such requests and has replied that no provision is found in the law for such examination or any authority to decide in favor of a particular device, that the law has only recently gone into full operation, and that there are as yet no sufficient data to show the alleged inefficiency of the devices now in use, and that further time is necessary to determine the truth or falsity of the statements made by those who are taking part in this movement. It is proper to state that none of the agitation in this respect or suggestions of change have come from organizations of railway employees or from any of the men whose employment renders them personally interested. It is believed that the complaints made result largely from the fact that these appliances, as before stated, are not maintained in proper condition; but we are confident that the system of inspection which has been adopted will result ultimately in greatly remedying trouble in this respect.

In any estimate of reduction in the number of accidents due to the adoption of these safety appliances the changes in conditions since 1893, when the law was enacted, must be taken into account. At that time the average train load was about 184 tons. In 1899 it had risen to an average of 243½ tons. The small cars and lighter locomotives then in general use have given place to much heavier equipment. The weight and speed of freight trains have been constantly increasing. Steel cars have been introduced, capable of carrying 50 tons each. The use of heavy cars and engines in the same trains with old wooden and lighter cars subjects the draft rigging and couplers of these lighter cars to unusual strain, and results in many accidents which formerly would not have occurred. Of course the risk to the men employed in handling trains of cars of mixed capacity and greatly varying strength is greatly increased, and this was a risk the employee was not called upon to take in 1893, when the law was enacted. The law can only reach its highest value and efficiency when all interested—the railroads, the employes, and the Commission—are working to the common end of securing from its operation the greatest practical benefits.

A Model Oil House.

Chicago and Northwestern Railway.

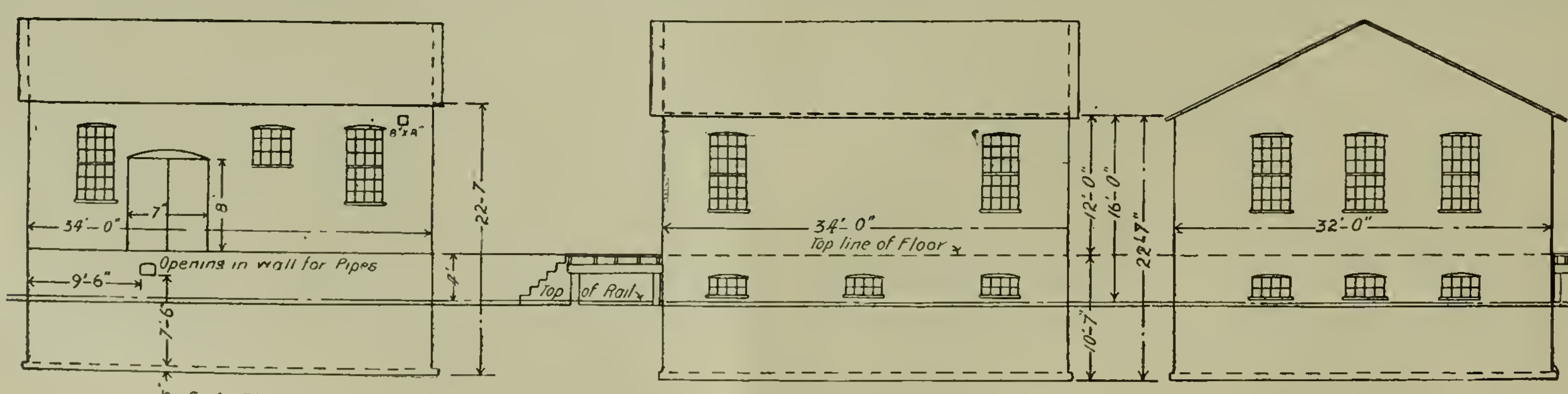
IN our issue of September, 1900, we gave an illustrated account of the new roundhouse built by the Chicago & Northwestern Ry., at Clinton, Iowa, and at the time referred to the model oil house forming a part of the plant. We now illustrate in considerable detail this oil house, which was especially designed by Mr. Robert Quayle, superintendent of motive power of the Northwestern System. It will be seen that the house is very well adapted to its purposes and that while it is compact it still can store a large amount of oil in a space that might surprise those who have not given full study to the question of economical oil storage.

It will be seen from our engravings that oil is unloaded by direct gravity when received from tank cars, through pipe lines, as shown. When received in barrels the latter are placed over the opening of the tanks, the bung knocked out, and the contents allowed to flow in. A strainer is, of course, placed on top of the hole in the tank to capture any shavings or other foreign matter that might be in the barrel.

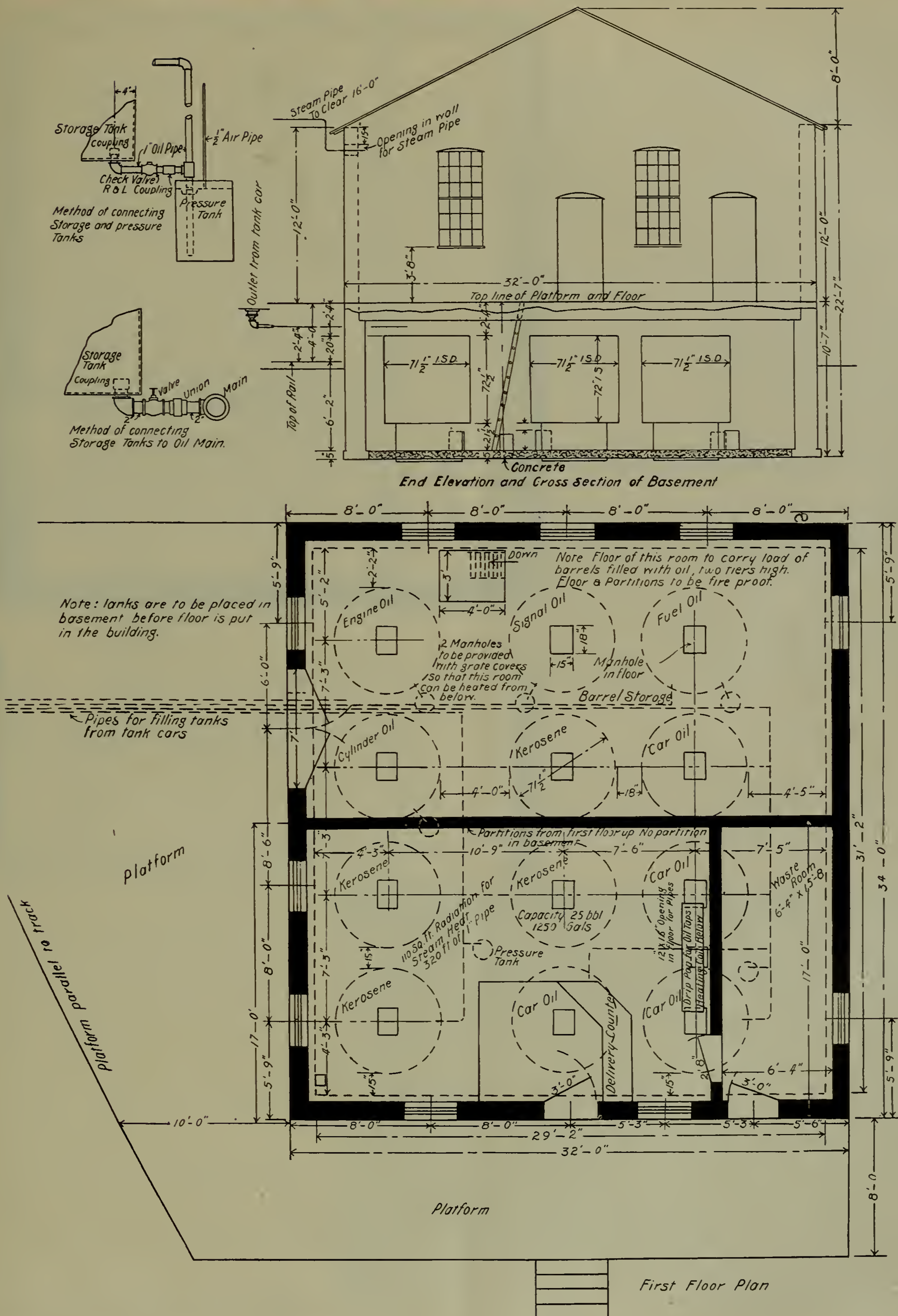
The oil is raised for service by air pressure, this air pressure coming into a small, auxiliary tank which is below the level of the large tank, and which fills automatically whenever the air is released, by means of a check. This plan has the advantage of raising the oil to the faucets, and also of relieving the large tanks of the air pressure, which makes it feasible to have the large tanks made much more cheaply than would be the case if they were called upon to carry the pressure necessary to raise the oil. This further admits of a larger tank being made and also of a tank with an open top, as no pressure is carried upon it. In this connection it should be said that oil can be drawn from a tank constructed in this manner at the same time the tank is being filled—a very important feature.

Another good point is that a divisional drip-pan is used. This is divided off into as many parts as there are faucets. This concentration of faucets to one point has the advantage of enabling the man who handles the oil to have control of the oils from all the tanks without moving to all parts of the house, as used to be customary.

The tanks in the cellar are placed upon stone piers, and these are so arranged as to admit of steam-pipe coils being placed underneath the tanks to keep the oil warm. This is better than having the pipes down inside, so that if any repairs are necessary they can be made much



A Model Oil House—C. & N. W. Ry.



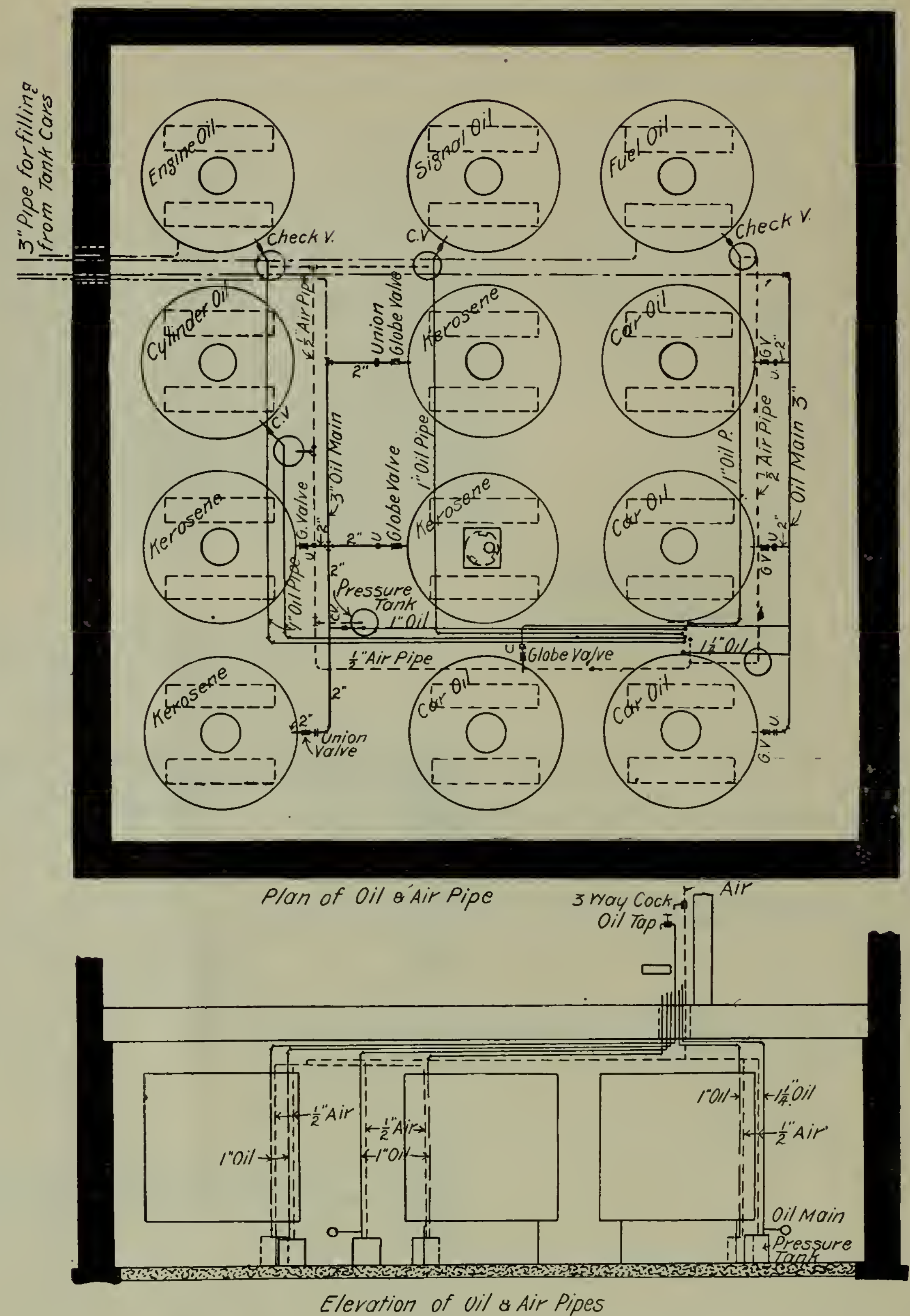
A Model Oil House—C. & N. W. Ry.

more easily, and this arrangement also precludes the possibility of water getting into the oil in case of leakage in the pipes.

Each tank is of uniform size, and, in the case of car oil, where more oil is needed than of other kinds of oil, two or more are connected together. This is done to maintain a standard tank.

It will be observed that one of the manholes is provided with grate instead of a solid cover. This is to allow the warm air from the cellar to pass up into the room above, to keep up circulation.

The tanks being placed below admits of storage capacity for full barrels above.



A Model Oil House—C. & N. W. Ry.

Round House Design.

The Master Mechanics' committee on "What should be the Arrangements and Accessories of an Up-to-Date Roundhouse" has issued its circular of inquiry. It is so suggestive that we give it in full as indicating the lines upon which a consideration of roundhouse designs should be followed:

Please give dimensions or furnish drawings of your most improved up-to-date round-house, showing the general dimensions, size of doors, windows, sky lights, location of smoke jacks, etc.

Furnish drawings or description of an ideal roundhouse, considering the future development of the locomotive.

What is the best depth and length of roundhouse pits? Furnish drawings showing fastening of rails and drainage from floor to pits; also drainage of the floor of the pit. State best method of drainage in the roundhouse and turntable pit.

What is the best roundhouse floor, considering cost, durability, ease of repairs, ease of trucking, etc.? If experienced with more than one kind, give comparative figures.

Please give location of all the pipes, viz.: Steam pipes, air pipes, blower pipes, blow-off pipes and wash-out pipes; including mains, branches and terminals of these with relation to the pits.

Are your roundhouses supplied with steam? If so, for what purposes and what pressure is recommended?

Are your roundhouses supplied with compressed air, and what pressure do you recommend?

What uses do you make of the compressed air in the roundhouse?

What is the best method of heating roundhouses—direct radiation from pipes, or by heated air blown into the pits?

What is the best kind and arrangement of artificial lights? If electric incandescent how much candle-power is satisfactory?

What is the best design of smoke jack? Should the outside stack be made of tile, cast iron or wood or other material?

Should the portion in the house be adjustable to varying heights of engine stacks?

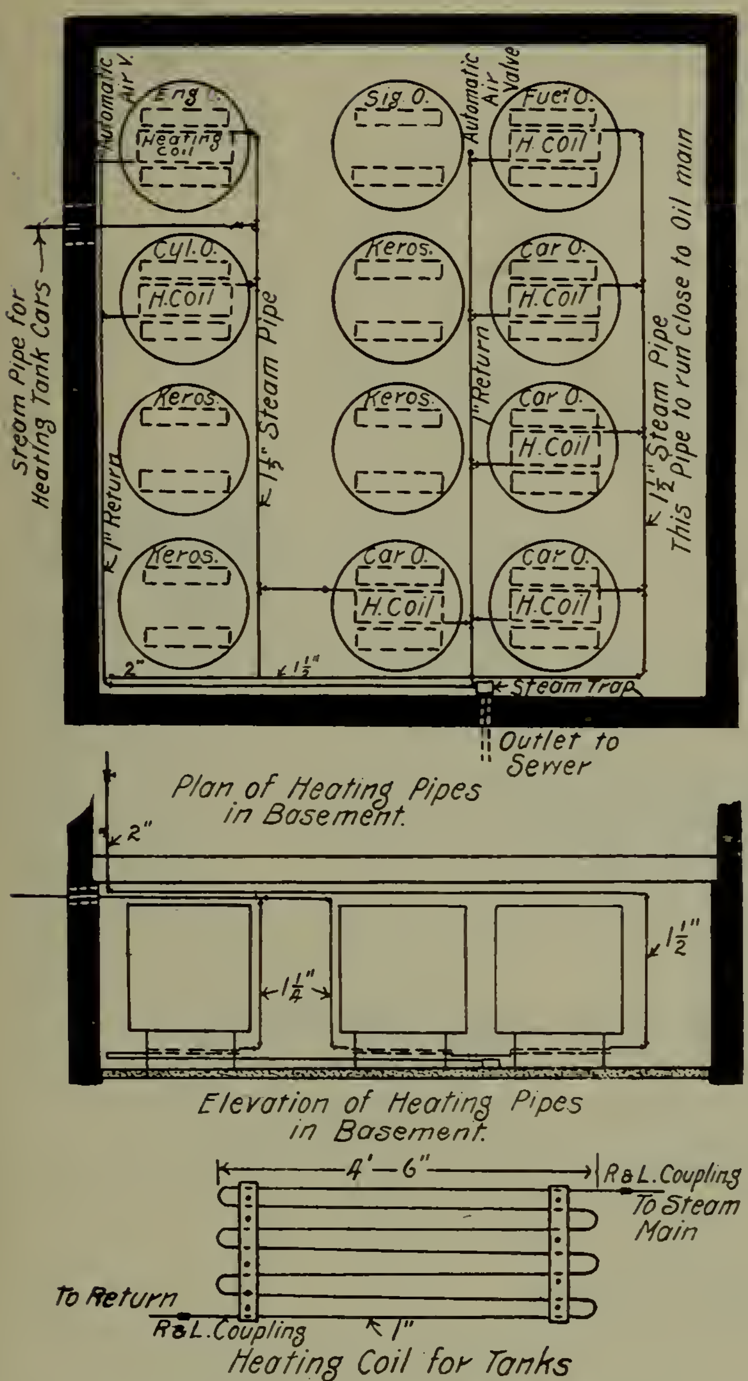
Should it be designed to swing to prevent damage if engine is moved?

Should it have a damper?

Do you have drop pits for removing driving and truck wheels?

Do the pits extend into the adjoining space between the pits? Please furnish drawing showing size and arrangement.

What power is used for raising and lowering the



Model Oil House—C. & N. W. Ry.

wheels in the drop pits, and transferring the wheels from the pit to the space adjoining?

Is the best turntable made of cast steel, cast iron or structural steel, and what kind of a center has it? Give size and general characteristics.

Are your turntables turned by hand or power? If by power, do you use compressed air, electricity or steam?

What is the best form of a roundhouse work bench, and how is the number of benches proportioned to the number of stalls? Location?

Do you have a tool room for the care and storage of hand tools and supplies?

Give a list, with sizes, of machine tools for roundhouse that are best adapted for making running repairs.

What portable tools to you consider a necessary part of a roundhouse equipment?

Are wrenches, jacks, levers, and heavy tools kept in the spaces about the house, or taken to the tool room when not in use?

What is the best roundhouse coaling arrangement, considering economy in handling coal, rapidity in coaling engines, and storage capacity?

What is the best location of water tanks or stand pipes?

What method do you use for handling cinders? Please furnish drawings if possible.

What kind of cars do you use to load cinders into?

What do you consider the best form of sand dryers? Please furnish drawings.

What do you consider the best arrangement for sanding engines? Please furnish drawings.

What methods do you use in fire kindling?

Do you use fuel oil fire kindlers, and what kind? What are their advantages or disadvantages as compared with other methods?

What water pressure do you use for washing out locomotives? If hot water, how is it heated? Give location of hot well or tank and size.

What means do you use for keeping the record of the boiler washing so that the engine carries its own record?

Do you also keep a book record in the roundhouse of the dates for washing out?

What are your methods of testing stay bolts, and what records do you keep regarding it?

What system do you employ for having engineers report running repairs on engines? First: A book kept at the roundhouse. Second: A book kept on the engine and going from house to house with it. Third: Separate slips filled out at each roundhouse.

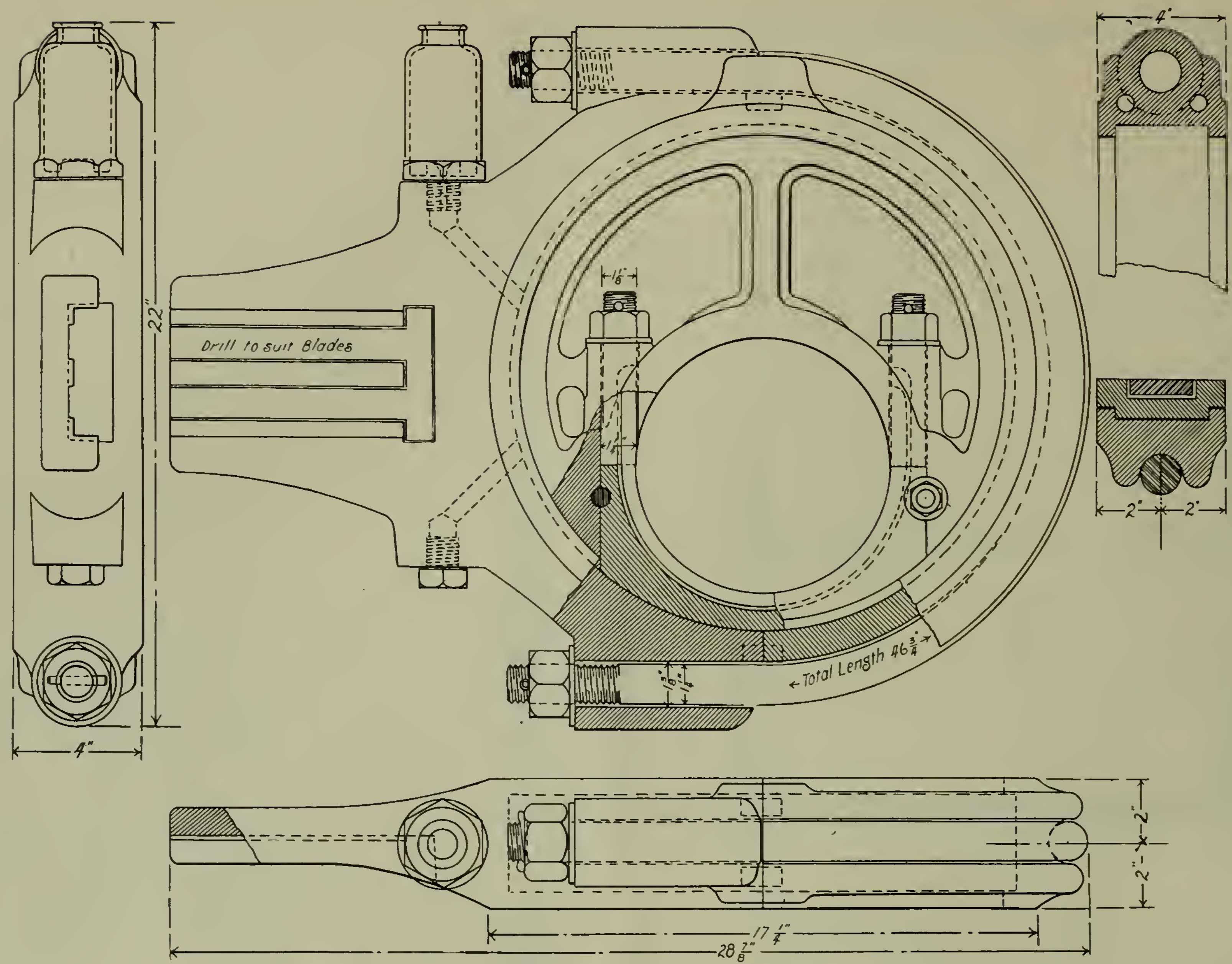
What method have you for doing running repairs at roundhouses? Is it specialized making each man responsible for the certain part of the engine which he inspects and repairs, or is inspection done by one man?

Are roundhouse foremen selected from engineers or machinists?

Is any of your roundhouse work done by piecework, and if so what?

Replies are requested to be sent to Robert Quayle, Superintendent M. P. & M., Chicago & North-Western Ry. Co., Chicago, Ill. The full committee is: Robert Quayle, Chairman, V. B. Lang, D. Van Alstine.

A Model Oil House—A Corner of the Oil Room.



A New Eccentric and Strap.

The accompanying sketch illustrates a new method of fastening the eccentric strap over the eccentric, and also of attaching the eccentric to the driving axle. It will be noticed that the strap is made in halves, and that in place of the usual method of employing lugs and bolts, only one bolt is used and that passes around and encircles the back half of the strap. It will be noticed further, that each end of the bolt passes through two extra strong lugs on the front half of the strap, thus permitting the two parts to be securely and rigidly fastened together, and at the same time permitting a free and easy movement of the eccentric within the strap.

The eccentric, as is seen in the sketch, is light and at the same time very strong. The eccentric is made in two parts and, as shown in the drawing, is clamped to the axle very securely by the yoke passing around the driving axle, thus drawing the eccentric tight to the axle, in place of forcing it away as is the case with set screws and keys. The smaller, lower portion of the eccentric merely provides a continuous bearing for the strap and also acts as a cover for the yoke clamp, the smaller piece being kept in place by the bolts shown transversely through the eccentric.

This strap and eccentric is now and has been used on the Yazoo & Mississippi Valley Railroad, and is giving the best of satisfaction.

There is very little machinery on the strap and eccentric, as the holes and grooves are cast in the pieces, it only being necessary to bore out the strap, and face the joints, and face and turn off the eccentric. The facing of the eccentric joints is done on a planer by clamping 24 together on the platen of the planer, thus planing all at one cut.

It is easy to see these parts, as here designed, are very easy to cast, easy to machine, easy to apply, and, in the care of the eccentric, very easy to adjust.

If properly designed there is no possible chance to slip, for when the yoke clamp is tight it holds the eccentric so close to the axle that it would break in two before it could slip. In fact, it has been used upon the Yazoo & Mississippi for the past year, and not one has ever slipped.

The eccentric strap possesses superior strength, and in case of accident its clamping bolt, owing to its shape, would hold the halves together long enough for the engineer to stop the locomotive. Another good point is that the nuts on the clamping bolt are well to the front, where they can be easily seen by the engineer and any defect readily detected. It is also worthy of note that the oil cup, which is seen to be of ample size, is very easy of access

The eccentric is the invention of Mr. Charles Linstrom, master mechanic of the Yazoo & Mississippi Valley Railway, and was patented by him in August, 1896, and is now used on an increasing number of roads, and is being placed on the market by the Western Ry. Equipment Co., of St. Louis.

The eccentric strap is also the invention of Mr. Linstrom, on which he is now obtaining a patent, and it will probably be placed on the market at an early date.

The Car Foremen's Association of Chicago.

February Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Wednesday evening, Feb. 13. Owing to the illness of President Sharp, Vice-President Grieb presided.

Among those present were the following:

Ackerman, J.
Aley, David.
Baasch, H.
Blohm, Theo.
Borrowdale, J. M.
Bossert, Chas.
Bates, Geo. M.
Cope, Thos
Cather, C. C.
Cardwell, J. R.
Clark, I. N.
Carey, C. H.
Chadwick, A. B.
Cook, Roy O.
Cornwall, J. R.
Cook, W. C.
Carter, W. A.
Doidge, B. H.
Evans, W. H.
Earle, Ralph.
Etten, L.
Elkin, I. L.
Gruhlke, Edw.
Grieb, J. C.
Guthenberg, B.
Hedrick, Elias.
Harvey, H. H.
Hirlehy, J
Hughes, Chas.
Heelin, Chas.
Johannes, A.
Jones, R. R.
Julian, J. B.
Johnson, A. G.
Kershaw, J. A.
Kroff, F. C.
Ketchum, I. J.
Kline, Aaron.
Lidgett, J. H.
Lockrey, J. F
Lovering, Anton.
La Rue, H.
Mileham, C. M.
Metz, C.
Monahan, Jas.
Murray, D
Marsh, Hugh.
McGrath, C. A.
McAlpine, A. R.
Nordquist, Chas.
Peck, P. H
Perry, A. R.
Powell, Chas. R.
Richardson, Wm.
Stimson, O. M.
Spees, W. F.
Sielaff, R.
Snyder, R. H.
Swift, C. E.
Shaw, M.
Schultz, Aug.
Stagg, C. S.
Stewart, H. A.
Shackford, J. M.
Thiverge, Jos.
Terry, O. N
Williams, Thos.
Watson, S. J.
Wessell, W. W.
Wensley, W. H.
Wolfe, Chas.

The minutes of the previous meeting were approved as printed in the Railway Master Mechanic. Secretary Kline announced that the following have made application for membership:

R. R. Alderson, clerk, Swift Ref. Line, Chicago; Ackerman, J., clerk, L. S. & M. S. Ry., Chicago; G. H. Brown, district M. M., C., M. & St. P. Ry., Dubuque, Ia.; Aaron B. Combs, foreman C., B. & Q. R. R., Red Oak, Ia.; H. Deterling, foreman, C., B. & O. R. R., Creston, Ia.; Louis Erbes, car inspector, C., B. & O. R. R., Red Oak, Ia.; John Freytag, foreman, C., B. & Q. R. R., Creston, Ia.; Alden Foote, car inspector, C., L. C. & E. Ry., Whiting, Ind.; P. J. Fraley, foreman, D., L. & W. R. R., Wilkesbarre, Pa.; F. J. Gillett, foreman, C., L. S. & E. Ry., South Chicago; Wm J. Galvin, clerk, Swift Ref. Line, Chicago; Chas. Heelin, air brake man, C., L. S. & E. Ry., South Chicago; J. J. Harty, clerk, Swift Ref. Line, Chicago; Jos. Halla, car inspector, C. T. T. R. R., Chicago; Olaf Johnson, foreman, C., L. S. & E. Ry., Chicago; I. J. Ketchum, general car inspector, C., R. I. & P. Ry., Chicago; Anton Lovering, car repairer, C., L. S. & E. Ry., Chicago; Jas. Marsh, triple valve repairer, C., B. & Q. R. R., Chicago; James Murray, car inspector, C., L. S. & E. Ry., Chicago; Jos. Mullen, clerk, B. & O. R. R., Chicago; Fred Mathews, car inspector, P., C., C. & St. L. Ry., Chicago; W. J. B. McCullough, draughtsman, Swift Ref. Line, Chicago; Aug. Norden, assistant foreman, C., L. S. & E. Ry., South Chicago; Frederick Nissen, car repairer, C., L. S. & E. Ry., South Chicago; Fred Oliver, carsmith, C., L. S. & E. Ry. Chicago; D. L. Phipps, clerk, Swift Ref. Line, Chicago; Albert Peters, car inspector, C., L. S. & E. Ry., South Chicago; Chas. O. Peterson, air brake man, C., L. S. & E. Ry., Chicago; G. J. Powers, car inspector, C., L. S. & E. Ry., Chicago; Aug. Peterson, car inspector, C., L. S. & E. Ry., Chicago; B. C. Pennington, foreman, C., B. & Q. R. R., West Burlington, Ia.; A. L. Snyder, foreman, B. & O. R. R., Chicago Junction, O.; R. T. Shea, general car inspector, C., B. & Q. R. R., Chicago; F. H. Stoimker general foreman, B. & M. R. R. R., Plattsmouth, Neb.; Chris Wuellner, assistant foreman, C., B. & Q. R. R., Burlington, Ia.; W. R. Winter, inspector of oiling, C., B. & Q. R. R., Chicago; Wm. Brown, foreman, C., M. & St. P., North McGregor, Ia.

Secretary Kline reported that the subscriptions from railroads for 1901 were coming in rapidly, he having already received six. He also quoted extracts from letters from the contributors, commending the work of the association very highly.

Vice-President Grieb: We will now consider the first question, "Is a joint evidence card covering two draft timbers and one deadwood, signed by a switching road and a railroad, proper authority for rendering bill by another switching road who makes repairs some time later, at which time numerous other repairs are made, indicating rough usage, the car having been delivered back and forth three times in the interim?" This is a question originating in Chicago, and we would like to hear it freely discussed.

Mr. Marsh (C., N. Y. & B. R. Co.): I think Section 29 of Rule 5 fully covers the case. As the joint evidence card is not procured by the switching road making the repairs from the railroad delivering the car to it, I do not think it is proper authority for bill.

Mr. Kroff (P., F. W. & C.): Was the joint evidence card signed by the switching road and the owner of the car?

Mr. Cather (I. C.): No; neither of the parties to the joint evidence card had anything to do with the car itself. The railroad signing it does not represent the owner of the car.

Mr. Kroff: I think, then, if that is the case, the joint evidence card is no good and is not authority for bill. I think Rule 5, Section 29, explains itself fully.

Mr. Bates (C., B. & Q.): I think Mr. Kroff is a little mistaken. In signing joint evidence cards for defects chargeable to the owners it is not necessary for the owner to sign; but he is right in his position that the owner must sign when joint evidence is to be procured for wrong repairs. This question here is simply this: Is a joint evidence card properly signed by a railroad and a switching road authority for a bill, and it seems to me that it is. I do not see how you are going to get around it. The fact that the second switching road makes the repairs does not cut any figure. The defects existed when the car was delivered to the first switching road and were caused by a railroad, and it seems to me that a joint evidence card, procured from that railroad, showing that they did the damage, is authority for a bill against the owner.

Mr. Grieb: I would like to ask Mr. Bates whether the opinion he has just rendered should apply under all circumstances. This case states that at the time repairs were made there were other defects in existence that indicated rough usage.

Mr. Bates: I do not think that that makes any difference, for the simple reason that the party making these repairs did not charge the owner for any additional defects. He simply charged for the defects that existed at the time the railroad company delivered it to the switching road, and as I said before, I think the bill is all right. It is only a small matter, anyway, and switching roads must have some protection, otherwise they would be justified in refusing a car having any defects.

Mr. Peck (Belt Ry.): I think Mr. Bates is perfectly right in that. A switching road cannot collect bills from a railroad company unless they use the joint evidence card. A joint evidence card between two railroads can only be used to trace for wrong repairs, but to a switching road it is the same as an M. C. B. defect card. In the 1896 rules, Rule 5, Section 25, gives the switching roads no authority whatever to render a bill. Shortly after the rules were adopted it was discovered that this rule, governing switching roads, was imperfect, for the reason that they could make no repairs and would have to return all defective cars and could block all the roads of the country; therefore leaflet No. 1 was issued by the Arbitration Committee 16 days after the rules went into effect, and that made a great amount of labor for the railroads, because they would have to issue an M. C. B. defect card to the switching road; they would bill the road delivering the car, and they in turn would bill the owners for any wrong repairs. In many cases the bills were disputed, and they had to wait several months before getting the money from the owners of the car. Then the clause in the rules of 1898 was added that they could bill owners direct by giving a joint evidence card. There was some discussion before the committee on the rules, but they preferred to use a different kind of card, but of the same value to a switching road as an M. C. B. defect card to a railroad, and the rule has been working very nicely ever since, very little trouble having been experienced. An M. C. B. defect card is not always asked for immediately the car is delivered by a railroad, but in most of the cases after the car has gone forward and has been probably repaired also. By issuing an M. C. B. defect card it is not always necessary to make the repairs at once. Frequently you will see an M. C. B. card for defects which have been on a car for several months, the defects then not having been repaired. I claim the same for a joint evidence card. We do not ask for joint evidence cards for more than one car out of every one hundred that we handle. We only ask for cards when it is necessary for repairs to be made to make cars safe to handle, and this is the first case I have ever had disputed. There were no repairs made on this car but what, if the Northwestern had made them, they could have billed against the Illinois Central, and they would have had to pay it. As to repairs not being made for some time later, the car got "snowed in" on a side track and was forgotten until a tracer came after it; but as far as repairs on this car is concerned, we delivered it loaded after the repairs were all made, but there was no objection to any repairs made when car was delivered.

Mr. Grieb: Is it the practice of the Belt Ry., or any switching road, to get joint evidence, except in cases where repairs are actually made and bill rendered?

Mr. Peck: No, sir. We do not ask for joint evidence card unless we repair the car.

Mr. Grieb: I would understand that the joint evidence card in your hands serves as a voucher for bill only, not as a medium for moving car.

Mr. Peck: The joint evidence card to a switching road is the same as an M. C. B. defect card to a railroad and is used for the same purposes.

Mr. Grieb: Was there any objection raised by the road to whom the car was offered after it was repaired, in the line of additional defects, possibly? The case, as it is written up here, says that when these repairs were made to the two draft timbers and deadwoods there were other repairs indicating rough usage.

Mr. Peck: In regard to the other repairs—the C. & N. W. carded for a missing bottom brake rod. The C. T. T. R. R. carded the car for one draft timber and one deadwood broken, and furnished joint evidence card for two draft timbers and one deadwood. We broke one draft timber, which we repaired, and did not make any bill. We billed on the cards, of course. All we asked the owners to pay for was the defects existing when the switching road received it from a railroad.

Mr. Grieb: We must get a definite statement of the case before we can discuss it on its merits, and I would like to invite every one to ask any questions they like, in order to obtain a thorough and full understanding of the case before we discuss it further.

Mr. Cardwell: As I understand from Mr. Peck, he presents the subject to us, stating that there were no repairs on the car indicating rough usage. The subject, as presented in our program, shows that there were other repairs indicating rough usage, which fact materially affects the question. If that is the case, I would like to know if we should consider the question other than as on our program. If the question on our program is not correct, we should defer it until the next meeting.

Mr. Peck: The repairs, as I have already stated, were the only repairs made and car went into service after repairs were made and no question arose afterwards.

Mr. Grieb: You will see that it is rather unfortunate that we have not been able to arrive at a definite statement of the case. There is a discrepancy here, as stated by Mr. Peck, who is one party to the dispute, as to whether there were other defects, the whole of which would constitute unfair usage, and unless we are able to clear this up, in order to consider it at all, we will have to consider it without unfair usage and then consider it literally as presented here, with unfair usage.

Mr. La Rue (C., R. I. & P.): Even if we change our views here, those who are absent, when they get the Master Mechanic, will consider that the decision was rendered on the case as presented. It would be my view that the matter should be laid over until the next meeting.

Mr. Cather: As one of the parties interested in this matter, I wish to ask Mr. Peck this question: Supposing that the defects existing at the time repairs were made did indicate rough usage according to the rules, would your bill, in view of what you have already said regarding the validity of the joint evidence card, be correct as rendered?

Mr. Peck: I would say it would. Supposing the car had an M. C. B. defect card on for two broken timbers. I take that car and break two center sills and make repairs to all the defects. I can take that M. C. B. defect card and bill for the draft timbers and, as I consider the joint evidence card to a switching road the same as an M. C. B. defect card to a railroad, the bill would still be proper.

Mr. Cather: Supposing that the only defects on the car when delivered to you were those as stated on the joint evidence card, two draft timbers and one deadwood, and that after the car had been in your possession the end sill and longitudinal sills were broken, would you then still consider that you were at liberty to bill on the owner, on joint evidence card covering the defects existing when car was received?

Mr. Peck: Yes, sir.

Mr. Grieb: That puts the question in the same light as presented in our program and we can so discuss it.

Mr. Cather: Now, I wish to say further in this matter, in order to clear up the apparent discrepancy between the two statements as presented to the secretary of the association, that my statement was based on an inspection record presented by the Belt Ry. Co., of Chicago, and as read here, is an exact and literal copy, and I want you, Mr. Peck, later on to see where we got our information. However, the facts of the matter show three deliveries, and with each delivery an accumulation of defects, also that the delivery of the car to the owners by the Chicago Terminal Ry., after repairs had been made, shows no defects existing. That is right; there were no defects on the end sills and everything was in absolutely good condition. Now, the question arises, can one road render bill against the owner on a joint evidence card existing between two other roads. The M. C. B. rules do not grant any such authority. Section 29 of Rule 5 says, as to switching roads, "they will be allowed to render bill direct against car owners on all car owners' defects on cars received by them from a railroad company, provided they procure joint evidence from the delivering road that such owners' defects did exist, the joint evidence card being used as authority for bill against car owner." Now, in this case, the Belt Ry. renders bill on a joint evidence card existing between the C. T. T. R. R. and the C. & N. W. Ry. Is that right? Another question: Is a joint evidence card that is executed four or five months prior to the last delivery to the road making repairs, to be used as the basis for making repairs? For instance, if the Illinois Central should receive a car to-day having certain defects upon it. That car may be handled in interchange between the C., M. & St. P. and the I. C., or some other road, three or four times and the last receipt will show defects denoting rough usage. Have we a right to go back to the receipt three or four months before and render bill for those defects? The Arbitration Committee has decided, in cases 534, 535 and 585. that a road receiving car with certain defects, even at that time owners defects, if the repairs are not promptly made and later on the defects existing form a combination denoting rough usage it is considered as having occurred at one time, a combination does exist and applies to all the defects at issue.

Mr. Peck: I am very glad he takes that stand. I have a case now between the Illinois Central and the C., M. & St. P. The Illinois Central got the car from us with one broken sill and returned the car with three broken sills, and when I asked them for a card, they said the two sills were owners' defects. We took the car and broke another sill. We card for the sill we broke, but the Illinois Central claim the two sills are owners' defects. They received the car with one sill broken, gave it to us with three broken and we gave it to the C., M. & St. P. with four broken.

Mr. Wensley (C. & E.): Where we have a car from delivering line with defects on it, if we do not make the repairs and further damage the car, we become responsible.

Mr. Marsh: I still believe that the question before the house is whether or not a joint evidence card issued between delivering road No. 1 and switching road No. 2 is proper authority for switching road No. 3 to render bill for repairs. I think that Section 29 of Rule 5 says it is not, for it specifically states they may make the repairs and bill the owners, provided they procure joint evidence card from the delivering road that such car owners defects existed when delivered by a railroad company to them. Switching road No. 2 could have made the repairs at the time and rendered bill for it, but switching road No. 3 cannot make repairs and bill on the joint evidence card existing between two other companies.

Mr. Stimson (S. R. L.): I think this question has been very thoroughly discussed and is thoroughly understood by all present, and I can only emphasize what Mr. Marsh has said. Personally, I think that by a strict construction of the rules, the switching road referred to is not permitted to bill against the car owner, and for this reason—if the C. T. T. R. R., who had received the car, had handled it in the manner as Mr. Peck has done, they would have been permitted to bill against the Illinois Central for the damage, but when the car was delivered by the C. T. T., a switching road, to the Belt Ry., of Chicago, also a switching road, the Belt Ry. loses its privilege of rendering bill, and I move you that it is the sense of this meeting that, according to the construction of Rule 5, Section 29, the Belt (switching railroad) is not permitted to bill against the owner for these defects, for the reason that it did not receive the car from a railroad. (Motion seconded.)

Mr. Bates (C., B. & Q.): I do not quite agree with Mr. Stimson and Mr. Marsh, for this reason: It is a well known fact that all railroads take records of defects on cars, and what do they do it for? They do it to protect themselves. There is not a railroad in this town or country that does not trace cars for defects, and I do not see why the switching road does not have a right to trace for defects not made on its own line. In this case the joint evidence shows that the defects were made by a railroad and the car was delivered with these defects to a switching road. That switching road did not see fit to make repairs, and delivered the car to another switching road. The second switching road made repairs to those defects, and to a lot of other defects, but made no bill for the other repairs, and it does not seem right that it should be deprived of its right to render a bill for the owners' defects which had previously been caused by a railroad. They are not supposed to be responsible for anything they do not personally do. I think the bill of the Belt Ry. is correct and proper and should be paid without any question, because if we are going to draw the line there it is going to stop business.

Mr. Stimson: I wish to correct any wrong impression I may have made. Personally, I think that from an equity standpoint he may be entitled to bill for the repairs, but we are not going to settle these points as to our feelings in the matter, nor do I believe it is the intention of the association to argue points as to their personal feeling, but as to how they interpret the rules; and in my judgment, according to the rules, they are not entitled to render bill.

Mr. Cardwell (A. C. O. Co.): It seems to me that we are rather drifting from the original question. If these repairs were made by a switching road and other repairs on the car at the same time indicated rough usage—if a railroad company had made the repairs they would not be entitled to make bill.

Mr. Stimson's motion was here put and lost by a rising vote.

Vice-President Grieb: We will now take up Question No. 2, "Discussion of report of committee on labor for applying draft timbers to refrigerator cars."

Mr. Marsh: With due respect for our committee and a personal appreciation of the efforts made by them to arrive at a satisfactory conclusion of the work given them to perform, I wish to indorse their report in part, and shall attempt to explain why I cannot indorse their report as submitted. Our committee finds, through those who made answer to their circular letter sent out to members of this association, that the majority find that it requires more time to renew draft timbers on a refrigerator car than on the ordinary car, and yet they recommend that the present M. C. B. labor allowance of 10 hours for two timbers be reduced to 9 hours for short timbers; also that the charge for renewing draft timber bolts be increased; and further, that a charge of 11 hours be made for long draft timbers on refrigerator cars. The recommendation of 9 hours for short timbers on refrigerator cars is the same as that charged for ordinary cars. It is given out that the cause for the extra labor is on account of the rusted condition of the bolts. Now, if these bolts are not so rusty as to make the renewal of draft timbers worth more money, then I can not see why the labor allowance for renewing draft timber bolts should be increased, for it is the removal of the bolts which is the difficult part in renewing draft timbers to any car. If the labor charge for renewing draft timber bolts is to be increased in order to show a distinction between refrigerator cars and ordinary cars, then (based upon the recommendation of the committee that the labor allowance for renewing draft timbers be reduced to 9 hours instead of 10 hours). I would suggest that the present labor allowance for renewing draft timber bolts on ordinary cars be reduced to show the desired distinction. Also that the renewal of draft timbers be reduced accordingly, for it must be the case that if it requires more labor to renew draft timbers on refrigerator cars than on ordinary cars, and the present labor allowance is more than sufficient to cover the same, then the labor allowance at present is more than it should be for ordinary cars. I would suggest that the present labor allowance for renewing draft timbers on ordinary cars be reduced for the short timbers; and that 2 hours be added to the reduced charge for long timbers, which is the same increase as recommended for refrigerator cars by our committee. Also that the present labor allowance for renewing draft timber bolts on ordinary cars be reduced according to any reduction which may be made for the renewal of draft timbers on ordinary cars. I believe this arrangement would be satisfactory to owners of refrigerator and ordinary cars, and would show the distinction which our committee found to exist between the two classes of cars.

Mr. Grieb: I would say for the information of Mr. Marsh that it was the opinion of the committee that the present allowance for labor in renewing draft timber bolts and draft timbers to ordinary cars was more than ample. However, it was not within the scope of the committee to consider any but refrigerator cars.

Mr. Elkin (S. R. C. Co.): It strikes me that the remarks of Mr. Marsh are well grounded in practice. Now, from a practical standpoint, it is well known that all this discussion is caused by the false assumption that in refrigerator cars all the draft timber bolts in the draft timbers are rusted from salt water. There never was a more erroneous idea in the world. As to the time allowance for the bolts removed from refrigerator cars, I will guarantee that there is not a practical car man here but what will bear me out in the statement that more time is consumed in the removal of bolts from coal and flat cars than is consumed in removing bolts from draft timbers in refrigerator cars, and if the committee would take into consideration the matter of time allowance, the only thing for them to do is to recommend in the M. C. B. rules that a less allowance for time in ordinary cars be made, because the railroads are amply protected in time allowance for all the time they put in renewing bolts and time put in renewing draft timbers in refrigerator cars.

Mr. Cook (S. R. L.): Since this question was brought up there has been a committee appointed by the chair to draft recommendations on the proposed changes in the M. C. B. rules, to be presented to the Arbitration Committee, and it seems to me this would be a proper subject to be handled by them. Any changes to be recommended would be handled by them properly, and if it would be in order, I would make a motion that the subject be referred to them for disposal.

Mr. Grieb: I do not think it is necessary to direct the attention of the committee on revision of the M. C. B. rules to this matter of renewal of draft timbers and draft timber bolts. It will no doubt be considered by them if they see fit. We will now take up Question No. 3: "A renders a bill for repairs to B's car on stub of repair card dated June 16, 1900, reading as follows: 2 bottom brake rods, 1 lever and fulcrum, 1 dead lever guide and 5 key bolts. Reason for making repairs: rods, lever and fulcrum, dead lever and key bolts all missing. A charges for the fulcrum, guides and bolts, stating that these are not excepted in the rules concerning missing brake material. Is this charge correct?"

Mr. Bates: This question was partially discussed at the last meeting, but some one stated that there was an Arbitration Decision that covered the point involved, and this was to be looked up.

Mr. Cather: Decision 568 is the one I referred to, and covers the points involved.

This decision was read by the secretary, and it was the unanimous opinion that charge for the fulcrum, guide and bolts replaced in connection with brake beam and attachments missing, was a proper charge according to Section 7 of Rule 5, and in accordance with Arbitration Decision 568.

Mr. Grieb: We now come to Question No. 4: "Is the use of a cotter pin in the knuckle pin necessary or desirable?" a question that has probably been brought out by the inspectors of the Interstate Commerce Commission.

Mr. Wensley: I would say that the cotter pin is necessary in the knuckle pin, especially in the Janney coupler. We put them in in all cases.

Mr. Cardwell: I do not think there is any question in this matter and would make a motion that the cotter pin is necessary in the knuckle pin.

The motion was carried.

Mr. Grieb: We will now take up Question No. 5: "In connection with Question No. 4, if a foreign car is received with a knuckle pin so short that a cotter pin could not be used, should a longer knuckle pin be applied? If so, what authority is necessary for bill?"

Mr. Elkin: We settled that in deciding No. 4, that the cotter pin is necessary. You can replace that pin and bill the owner.

Mr. Bates: That is a wrong pin, and I would like to know how you are going to bill the owner for wrong repairs.

Mr. Cather: The question brought up here is that the car was delivered with a short knuckle pin. Assuming that it was necessary to apply a longer pin, should the delivering company be held responsible for the wrong pin or is it an owners' defect?

Mr. Bates: If the C., B. & Q. delivered a car to a foreign line with a wrong knuckle pin, I am pretty sure they would not furnish authority to charge for making standard repairs unless they made them.

Mr. Elkin: It behooves the road receiving the car to say that this defect did exist. It occurs to me that the car owner ought to have some rights.

A Member: The car owner can protect himself by watching the repair bills from the different companies. By having a joint evidence card he can make bill against the company who made the wrong repairs.

Mr. Kroff: We have not heard much as to why that cotter pin is necessary. The point I am trying to get at is, if the cotter pin is necessary there, is it to make the coupler operative or what benefit is it to have the cotter pin in there. Now, if the omission of the cotter pin makes the coupler inoperative, the delivering road is responsible, according to Section 37 of Rule 3.

Mr. Bates: I certainly do not agree with Mr. Kroff. The section he has quoted refers entirely to the uncoupling lever and its attachments. It has nothing whatever to do with the knuckle pin.

Mr. Stimson: I think, with Mr. Kroff, that we decided Question No. 4 too quick, because in one breath we say a cotter pin is necessary and in another we say it does not affect the coupler if it is missing. If it is necessary, then it must affect the coupler if it is missing.

Mr. La Rue: I think that Mr. Kroff places the matter before us in a different light from what we understood it at first, and that No. 4 and No. 5 should have been considered together. I do not think it is possible to decide one without deciding the other, and certainly if it is the unanimous opinion of the association that the cotter pin is necessary, they ought to consider No. 5 settled.

Mr. Evans (B. & O.): Just as a matter of information I think we ought to dwell a little more on that cotter pin, and I would like to have the benefit of the association's views as to how much that cotter pin in the knuckle pin—that is, the pivot that the knuckle pin revolves on—is necessary.

Mr. Marsh: I take the stand that the cotter key in the knuckle pin is necessary for the reason that it is put there for the purpose of preventing the pin from working out, causing the train to part and causing loss to property and perhaps to life. If it was not considered necessary there is not one coupler maker to-day who would put that amount of extra steel onto the pin for the cotter key. From the point of safety to trains on the road I think it is absolutely necessary to use the cotter key, so that the knuckle pin can not work out from any cause.

Mr. Bates: I am of the same opinion that Mr. Marsh is, and furthermore, I will say that the Interstate Commerce Commission has decided that it is necessary and its inspectors are reporting all cars as having defective couplers when the cotter pin is missing

Mr. Peck: There are quite a number of things in the M. C. B. couplers that the manufacturers never adopted that we find good. Oiling knuckles, for instance. We have found the knuckles working stiff and by using a little oil on them find that they work all right. I have yet to see the first time that a knuckle pin has worked up. They never work up. They break in the middle and the lower part drops out and the upper part pulls the top lug off. On our engines we had a great many top lugs pulled off, and in taking the matter up with the engine men, they said they could not see whether the pin was broken or not. I have had long pins made so that they would stick through, and if the men cannot see the pin they know it is broken and put in a new one.

Mr. Cather: The question as to whether a wrong knuckle pin is a delivering road's defect or an owner's defect is entirely distinct from Question No. 4, and as a matter of fact, according to the M. C. B. rules, it is not a delivering road's defect because the rules clearly state that the delivering road is not responsible for wrong repairs not made by them, that is, unless you can consider this as being inoperative.

Mr. Grieb: I would like to ask Mr. Stimson whether he considers the cotter in the knuckle pin necessary and that the absence of it would in any way affect the operation of the coupler?

Mr. Stimson: Can anybody decide that the cotter pin is absolutely necessary and then say that the coupler is not affected by the absence of that cotter pin? If it is necessary it is for some reason—to make the coupler more perfect, if possible, more effective, and on that interpretation, as I understand it, I certainly would not say that the pin is necessary and then say that the coupler was just as efficient without it.

Mr. Kroff: Mr. Bates states that the Interstate Commerce inspectors make report of the cotter pins missing, reporting that such couplers are defective. Now, then, if that is a defective coupler, it is inoperative, and the two questions should go together and be decided as one, because one covers the other.

Mr. Harvey (C., B. & Q.): As I understand Question No. 4, it is whether the cotter pin is necessary or desirable—whether we should use it or not. In Question No. 5, if the cotter pin is necessary, the question is, who is to pay the bill for making proper repairs.

Mr. Marsh: I believe that as an association we have a right to say whether or not we believe the cotter key in the knuckle pin is necessary for the safety of life and property. I do not believe there is a rule existing now set forth by the M. C. B. association to the effect that a coupler is defective without the cotter key in the knuckle pin, and we have no right to condense the two questions and dispose of them in that way. As for authority to make bill for correcting wrong repairs on foreign cars, where a knuckle pin is applied in place of a short one, I believe this will have to be handled the same as any other bill for wrong repairs; the car owner should be furnished with joint evidence showing such wrong repairs to exist. then he must locate the parties making the wrong repairs and get card from the same if he can.

Mr. Bates: We cannot make the party responsible by passing a resolution here, or anything of that kind, when he did not make the repairs; therefore, it is useless to pass a motion as outlined by Mr. Stimson. It seems to me that the correct way would be to put in a proper pin, then get joint evidence and send it to the owners, and if anybody makes a bill he is not out anything, as he can bill back on the joint evidence card. It seems to me that is fair enough, and I would make a motion that it is the opinion of the Car Foremen's Association of Chicago that where a wrong knuckle pin is found in a car received from a foreign line, proper repairs be made and bill rendered against owners, and a joint evidence card procured and sent to the owner for his protection.

This motion was carried.

The meeting then adjourned.

Owing to the lateness of the hour Mr. Shannon's paper was not read, but was ordered printed with the proceedings, to be discussed at the next meeting. Mr. Shannon's paper is as follows:

Inspection of Draft Attachments.

With the universal use of the M. C. B. couplers for all cars now in service, and the fact that no mechanical genius has been able as yet to invent a device to prevent them from falling between the rails in case they do pull out, the necessity for closer inspection and repairs to the draft attachment becomes necessary in order to avoid accidents.

With the link and pin bars, usually, there was no liability of damage to other cars when draw bars or draft timbers pulled out, as they hung to the cars to which they were coupled and did not fall on the track. Now it is different, as they fall between the rails and if the train is moving at a fair rate of speed we have derailments, broken spring planks and brake beams, and probably a bad wreck. It generally develops that the cause of the trouble was careless inspection of the draft bolts or the coupler attachments. In fact, I have never seen a case when the draft timbers pulled out but what a number of the draft bolts had been broken, old. If accidents were the only evil in this connection, it seems to me it would pay to have closer attention given to draft rigging, especially the draft bolts; but they are not. I think it will be admitted that more through freight is transferred at junction points for this defect than all others combined. Then there is the delay resulting from the transfer, with a probable claim for damage to the contents. Such being the case, is the car department watching this feature as closely as it should? I am satisfied that it is not; and I think an inspection of the cars in any of the large railway yards at Chicago will demonstrate forcibly that the draft rigging and car bodies are badly neglected. I have seen cars, recently out of the owner's shops, having undergone extensive repairs, with half the draft bolts broken, old, and not a bolt or rod tightened up except those applied in making the repairs. I have seen cars about a year from the builders where nearly every nut on the body was loose and could be turned by hand. The number of cars where the draft timbers are down below the safety limit is enormous; and as it is necessary and essential to the life of a car to have all parts kept tightened up, I think the Car Foremen's Association should take the initial step in the direction of checking the evil.

In this connection I would call attention to the fact that there is no provision in the rules for a labor charge for tightening up draft timber or car bodies and I think this omission in the rules has a good deal to do with the neglected condition of some cars; and right here is where we should inaugurate a uniform practice and have some proper labor charge for tightening up draft bolts that are down below the limit on foreign cars; also, other parts of the body that need attention in the way of tightening up. I never saw a repair card attached to any of the cars belonging to the company I represent covering this class of work, which indicates that the breakages are all that are repaired on foreign cars.

Now, what is the remedy?

1. More repairmen should be placed at the large loading points, who should test the draft bolts, especially those in short timbers, before the cars are loaded. This should be done on the inside by striking the bolt heads with a hammer. If any are broken, the heads will jump up. It will be found more economical to apply a few bolts at the right time than to have the cars in your shop later on with the ends pulled out, and, after transferring the load, repair them at a cost of $15 or $20. By having more men at these points, fewer will be needed in the shops, and more cars will be kept in service.

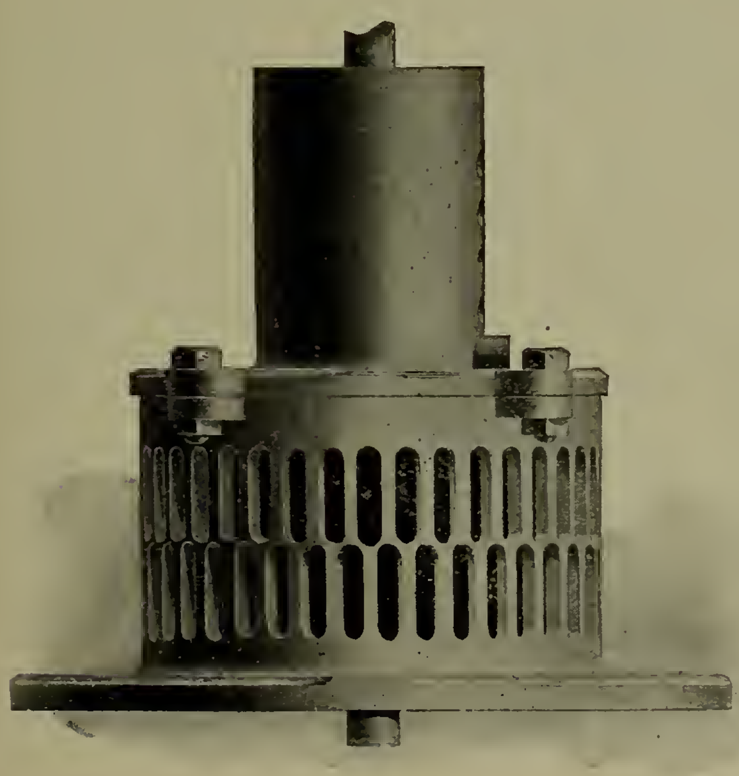
2. All new cars when in service six months should receive a general tightening up.

3. Owners should be assessed heavily in the way of a labor charge for tightening up draft timbers and car bodies as a penalty for not doing the work themselves.

In conclusion, I would like to ascertain if it is the practice on any road to make a labor charge against owners for tightening up draft timbers where no bolts are renewed.

A New Tank Outlet Valve.

Modern progress in railway tank design, calling for quick delivery of large quantities of water to locomotive tenders through enlarged outlet pipes, has not been kept pace with in the design of some of the fixtures. The old



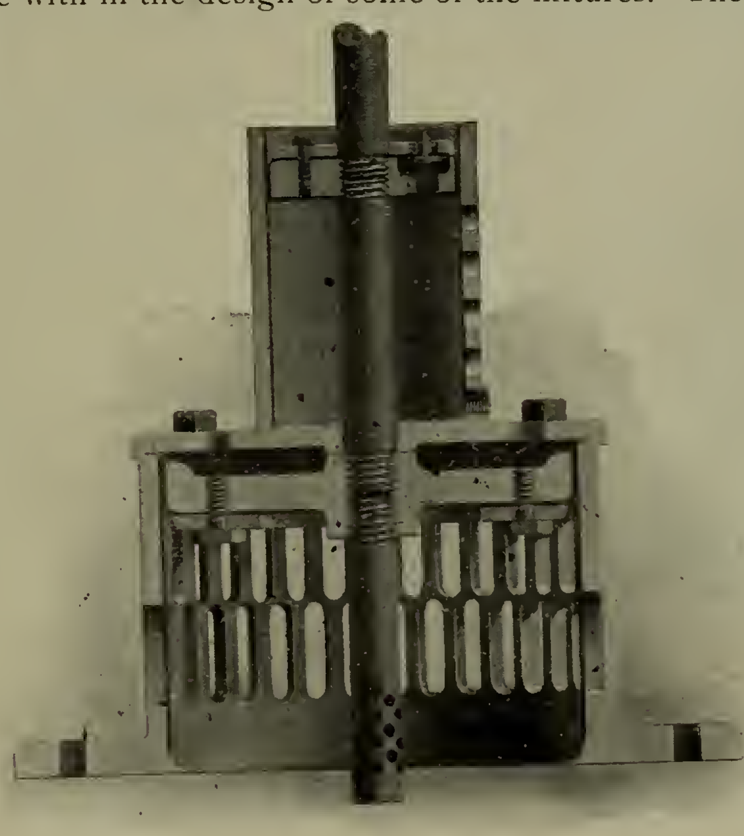


FIGURE 2. A NEW TANK OUTLET VALVE. FIGURE 3.

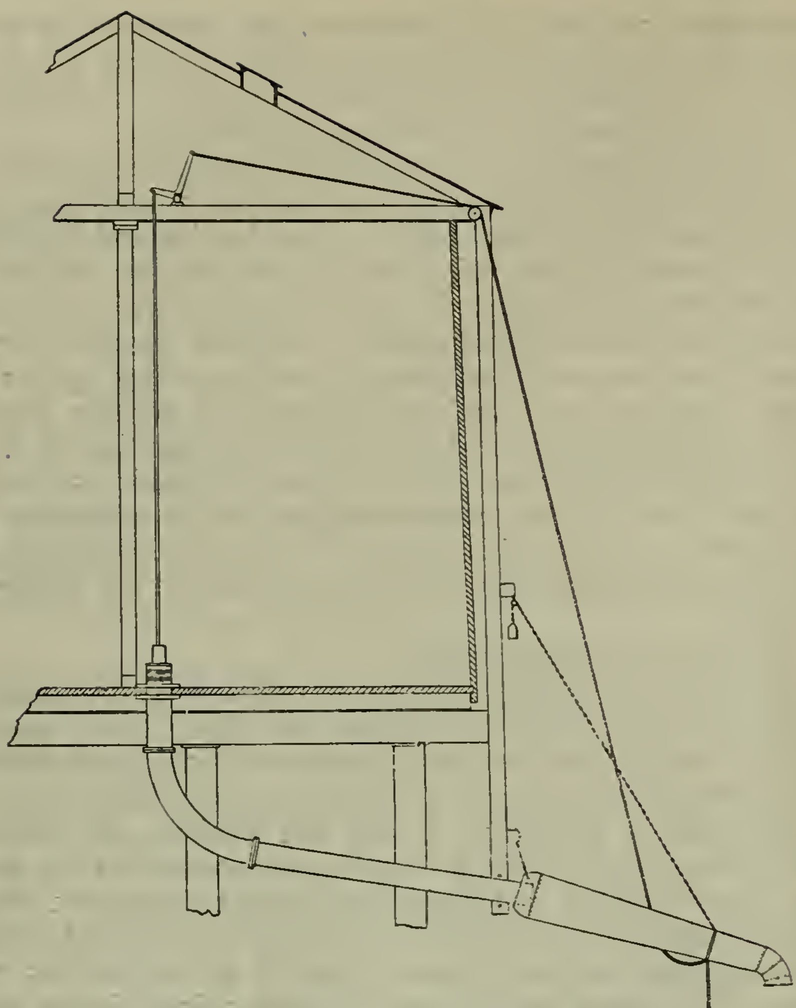


Figure 1—Tank Outlet Valve.

designs, particularly those of outlet valves, have become very expensive to maintain because of the heavier strains imposed upon them by the larger areas of discharge now employed. The superimposed water column has hammered the valves down in most destructive manner, thus rapidly destroying the valve rubbers and distorting levers. With these facts in view, the valve shown herewith has been designed. Figure 1 shows in a somewhat sketchy manner the method of application of the valve. Figure 2 is a perspective view of the valve, showing its general appearance, its compactness of form, and its neatness of design. In Figure 3, a sectional view of the valve, its details, and the theory of its operation, are revealed. The idea followed in designing this valve was to eliminate all jar to the valve and its attachments, and to insure speedy discharge of the water remaining in the discharge pipe when the valve closes.

The valve consists of the discharge valve proper below, and of the controlling or cushioning valve above. In our sectional engraving it is shown in the open position. The port openings admitting water have a 100 per cent excess area, thus providing rapid and free flow. The piston is provided with a cup leather packing, which is, unfortunately, not shown in the engraving. In the upper chamber the same valve stem carries a smaller piston, the function of which is to insure a gradual seating of the discharge valve to the closed position. This is effected by the aid of the vertical row of ports opening out from this chamber, which ports are shown in both the perspective and sectional views. When the valve stem is raised this upper chamber, of course, fills with water, and the gradual escape of this water through these ports, when the valve is forced down by the superincumbent body of water pressing upon the upper piston, furnishes a perfect cushion, while not materially retarding the needed quick closure. Thus, the lower or main valve is gently seated without pound or strain. In the upper piston will be noted check valves, which, with the first upward motion of the valve stem, open and, relieving the downward pressure of water, allow a free movement. The areas of the two pistons are carefully calculated to insure the best results in the way of release in opening, and of cushioning in closing.

The valve stem, which is of gas pipe, is perforated at its lower end, and thus air passes down through the stem, destroying the vacuum which would otherwise hold the column of water that is left in the discharge pipe after the valve closes.

This valve has been designed and patented by Mr. T. W. Snow, of No. 360 Dearborn St., Chicago, the well-known expert in water tank construction, in collaboration with Mr. Frederick S. Milne, of Batavia, Ill.

A Brake Beam Problem.

By H. M. Perry.

SOON after the application of air brakes to car equipment it was found that the brake attachments, levers, pins, rods, hangers, etc., were not strong enough to stand the additional work to which they were subjected, so the M. C. B. Association took the matter in hand and, after considerable discussion, recommended for adoption our present standards for these parts.

The wooden brake beams, which were largely in use at that time, owing to their great amount of deflection, could not possibly supply the results desired, so different forms of trussed or plated wood beams were substituted, many of which are in use at the present time; but the maximum efficiency of the air brake was never obtained until metal brake beams came into general use.

Since that time very little attention has been paid to the matter, notwithstanding the fact that the weights and capacities of cars and the speed of trains have been very much increased, without any corresponding increase in the strength of these attachments.

In order to throw additional light on this subject, the writer was employed some time ago to make a careful investigation and report on the condition of all brakes, brake beams and attachments in service, their comparative efficiency, causes of failure, possible improvements, etc.

After several months spent in the different railroad yards of the country, and in the inspection of thousands of brake beams and attachments under all conditions of service, it was noted that certain types of beams showed a much greater proportion of failures than those of other types, notwithstanding they were all in the same general service, and exposed to the same danger of accident. After thoroughly demonstrating this fact the question naturally arose, what was the cause of this condition of affairs. A long series of laboratory tests were made of all the different types of beams and the results carefully noted; these tests proved that the same beams that failed in service developed a similar weakness under the tests, although any of them would support more than twice the usually estimated load required of them under the heaviest freight equipment. Another peculiar feature shown in the tests was the action of certain beams under load; when these beams were loaded beyond their elastic limit they invariably assumed the same shapes as those failing in service.

These facts naturally raised the question, was it possible that an unknown force was developed, under certain conditions, when the brakes were applied to a car, sufficient to cause this damage? And if such was the case, what was the cause and how could it be prevented?

In watching a train coming to a stop under brakes, almost every man has noticed that just before the cars stop the back brake shoes seem to grip the wheels and ride up as far as the slack in the hangers will allow, the amount of this lift depending on the condition of the brakes and hangers and averaging from one to three inches on almost any pattern of outside hung brakes. On laying out a full size drawing of the ordinary standard outside hung brake, it will be noted that, with the brakes hung 13 inches above the rail, if one of the shoes is raised an inch upon the face of the wheel, the bottom connection rod will have to be lengthened one quarter inch, while if the beams are hung from 10½ to 12 inches above the rail, as many are, the increase in length of the connection rod is very much greater.

Now, when the brakes are applied at the maximum pressure, the front shoes are drawn down to the lowest point by the friction on the wheels; just the instant before the car stops the back shoes grip the wheels, and lift up from one to two or three inches, with the result that something has to give way; here was a theoretical solution of the problem.

Referring to our brake beam tests we found that certain beams which failed when loaded beyond their elastic limit, required a deflection of only about one quarter of an inch to cause this failure; it was also noted that it required from 15,000 to 20,000 pounds load to deflect these beams one quarter inch, while the maximum brake leverage in freight service seldom ever exceeds 7,500 pounds per beam; consequently it was very evident that an additional force of almost 100 per cent over the initial pressure was developed under certain conditions, which caused this damage.

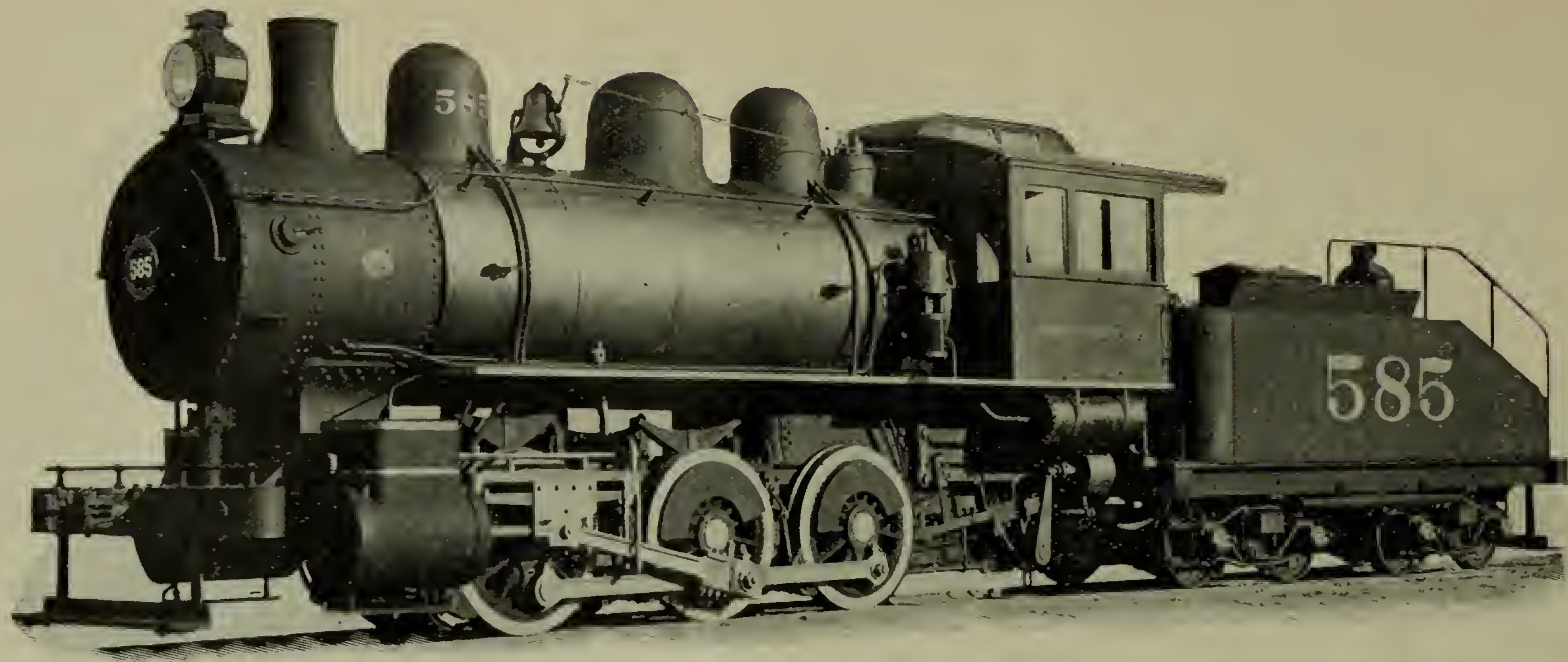
After considerable trouble and expense a dynamometer brake beam was designed and built to measure the pressures on the brake beams, and after a long series of tests under all the different conditions of service it was demonstrated beyond any question that this force was developed as claimed. As this seemed to be a subject of importance to the railway mechanical men, the matter was referred to Professor L. P. Breckenridge, of the University of Illinois, who kindly offered to have a series of tests made by the engineering department of the University, and report their conclusions. These tests were made at Urbana, Ill., on the line of the Cleveland, Cincinnati, Chicago & St. Louis Railway, and a complete report of the same was published in the Railroad Gazette, July 27, 1900.

By reference to this report we find that under certain conditions, which often occur in ordinary service, an additional force of from 50 to 120 per cent over the initial brake beam pressure, is often developed, due to the brake shoes riding up on the wheels, and when we take into account the fact that a brakeman, by using a club, can set up a brake to a presure of from 8,000 to 9,000 pounds per beam (which was done several times during these tests), it can readily be seen that an additional force of less than 100 per cent would buckle many of the beams in service. This, of course, applies principally to the outside hung brakes, although the same condition exists to a much lesser degree on inside hung brakes, and only adds another point in favor of hanging brakes inside the wheels.

One of the most important features of this test was the destruction of the brake attachments, particularly the hanger and hanger eyes, which conclusively proves that many of these accidents occurring in regular service, sometimes causing bad wrecks, were due to the development of this force on application of the brakes, especially when applied by hand in the manner stated.

The best remedy for this condition of affairs is to hang the brakes to the trucks, as before stated, paying special attention to the brake hangers and hanger eyes to prevent any lost motion, which will allow the shoes to lift up on the wheels. This same suggestion also applies to the outside hung brakes, but is more difficult to meet, owing to the increased length of the hangers and also to the tendency to lift part of the weight of the load on the springs.

But as this is a matter which can only be brought out by a special investigation, with special appliances, made for the purpose, it is doubtful if anything further in the matter will be done, unless the question is taken up by some of the railway clubs and, through them, brought to the attention of the M. C. B. Association.



Heavy Cooke Switcher for the Oregon Short Line.

The Cooke Locomotive Works recently turned out five remarkable heavy switching locomotives for the Oregon Short Line. These engines weigh 137,300 pounds. They have 21x26 inch cylinders; a straight top boiler, 67⅝ inches in diameter, and designed to carry 180 pounds; a heating surface of 1,748.88 square feet, of which 160 square feet is fire box and 1,588.88 square feet tube surface. The fire box is 112 inches long and 41 inches wide. The special equipment of these engines includes Lukens boiler shell steel, Carbon firebox steel, Latrobe driving wheel tires, Ohio injectors, Ashcroft steam gauges, Buck headlights, Leach sanders, Scott springs, Franklin boiler lagging, Curtis swing-head couplers, Nathan lubricators, Ashton safety valves, Cooke whistles, Gollmar bell-ringer, United States metallic packing, Solid brakebeams and Westinghouse-American quick action brakes. The tender has a coal capacity of six tons and a water capacity of 4,000 gallons.

Steel Cars for Manufacturing Plants.

AMONG the recent shipments made by the Pressed Steel Car Company are consignments of large pressed steel hopper cars, and flat cars for the American Steel Company, the flat cars going out February 15. A few days ago, the Oliver Iron & Steel Company received a consignment of flat cars and flat bottom gondolas with removable sides. We are also informed that McKeefrey & Company, of Leetonia, Ohio, have given the Pressed Steel Car Company an order for flat cars. wide, and weigh about 29,900 pounds each. The capacity of the cars is 110,000 pounds.

These are only a few instances of the material interest of local firms in this new type of railroad equipment. Several of the largest manufacturing concerns in Pittsburg are now utilizing pressed steel cars, among them being Jones & Laughlins, the Pittsburg Plate Glass Company, the American Steel & Wire Company and the Etna Iron Works.

All of this illustrates the fact that these cars stand ahead of all others for general utility around a furnace or a manufacturing plant. Not only are the cars available for the transportation of extremely heavy material to different parts of the plant, but the question of demurrage is avoided by the use of individual cars in this way.

As the results of the demonstration of these facts, orders for cars are coming in from manufacturing firms in all parts of the country, among these being the Bethlehem Steel Company, the Lorain Steel Company, the Lebanon Furnaces, the New Jersey Zinc Company, Carnegie Steel Company, and the Reading Iron Works.

Spirit of the Railway Press.

Being the Cream of the Literature of Railway Mechanics Appearing During the Past Month.

Throttling.

(Locomotive Engineering, February, 1901.)

A correspondent writing from Bridgeport, Conn., and giving no name, writes us on the well-worn topic of whether it is best to run with a throttle wide open or to have it partly closed. In a general way it is better to run with the throttle wide open, but there are circumstances where it is not so economical as running with the steam partly throttled. The matter must to a great extent be left to the judgment of the engineer. If an engine uses more water when hooked up, say, to a cut-off at 6 inches, and the throttle wide open, than she would do when working at, say, 8 inches with the steam partly throttled, it is not good economy to run at the shorter cut-off.

It used to be that steam engineers insisted that as short as possible cut-off and an open throttle was the most economical way to run an engine. Experienced engineers of observing habits doubted the correctness of this, however, and a short time ago their belief that a full-open throttle was not always the best way to work an engine was corroborated by Chas. T. Porter, one of the most accomplished steam engineers in the world. He made a series of careful tests, which convinced him that under certain circumstances more steam was used when a throttle was run wide open than what happened when the steam was partly throttled.

Cast Iron Wheels far Heavy Coal Cars.

(American Engineer, February, 1901.)

Present experience with coal and ore cars of large capacity seems to indicate that the limit of the cast iron wheel has been reached, unless a change in form is made or the wheel flanges are in some way relieved in service. The breakage of wheels, and particularly of flanges, under 50-ton cars has created a great deal of anxiety of late, and the question of the necessity for steel-tired wheels for this service is now seriously raised. It has been said that the cars are too heavy and that there will be a general reduction from 50 tons to 40 tons as the maximum capacity. This probably will not be done as long as railroad managements are able to obtain the benefits of 50-ton loads in one or both directions in cars making an average of 2,000 to 2,600 total miles per month, which is now being done. There seems to be no question of the firm establishment of the 50-ton car, and the wheels must be made to carry them. Cast iron wheels for these cars have been strengthened at the hub to the point of withstanding a wheel press pressure of 110 tons upon a mandrel, and they have, in at least one case, been increased in weight to 690 lbs. for the purpose of overcoming breakages in the plates, but the breakage of flanges is not so easy to stop. The opinion that the limits of strength of the flanges of cast iron wheels of the present standard contour has been reached is growing among those having the widest experience with these cars. It seems to be necessary to increase the thickness of the flange as it stood before 1894 or to take up the steel-tired wheel. Perhaps 1/8 in. more metal in the thickness of the flange will be enough. It is, of course, desirable on account of the low cost to make the cast-iron wheel strong enough, and efforts will be made in that direction. This question will undoubtedly receive attention at the convention next summer, but instead of being confined to engine trucks the relative safety of the two types of wheel needs to be considered also from the standpoint of cars. Several broken flanges coming to our notice had blue fractures showing the influence of the brakes on mountain grades. This is troublesome in the East as well as in the West. It is evident that the near approach to 75 tons of car and load, brings up new factors in the matter of wheels. It occurs to us that perhaps the general use of rigid trucks has a bearing upon the flange breakage and the suggestion of a return to the swing motion truck for such heavy cars seems to be a reasonable one. It would undoubtedly serve to reduce the shocks to which rigid trucks must necessarily subject the wheel flanges.

Localized Deflections in Built-Up Structures.

(American Engineer, February, 1901.)

The real strength of an engineering structure is its ability to withstand continuous service without undue deflection or fracture, and is not necessarily measured by the greatest single load which it will safely carry. Sometimes the real strength may be increased by a decrease in what may be called the apparent strength. For example, a piston rod, subject to slight bending, may be actually strengthened by weakening it to permit it to adapt itself to the bending. Deflection cannot safely be disregarded, and this is specially true of composite or built-up structures. In some kinds of designing, as in machine tools, deflection must be absolutely prevented, but in general it may be said that good engineering consists in the use of sufficient material to permit of safe deflections and in the distribution of the material in such a way as to prevent the localization of the movements. In built-up structures this localization is most likely to occur, and is most difficult to manage. Locomotive frames and metal trucks for heavy freight cars are good examples of this. In the former mere size of the section will not always suffice, because the improvement of the cylinder attachments to the frames and a general stiffening up of the front ends may localize the service flexure at some point in the rear and cause breakage in a frame which is ample to meet static loads and shocks. In metal car trucks there is a strong temptation toward excessive rigidity in the connections between the side frames and the transoms. These structures must necesarily deflect to some extent, and if the joint is made stiff the deformation is likely to localize in this case in the transom, near the joint, and result ultimately in fracture. Those of our readers who have seen the pile of broken trucks which inspired these comments already appreciate the point we make, and to others this suggestion is offered: that the localizing of deflection must be guarded against in designs of this kind. All this may also be said of boilers, in which the increase of pressures has brought about new conditions which were not important or did not exist at all in the days of lower pressures. The concentration of stresses in boilers is most noticeable in the deformation caused by the attachment of the angle braces for the back heads and for tube sheets. These braces are sometimes short, the feet attachments to the plates small in area, and the angle of pull such as to draw down the outside sheets locally. In back-head bracing this may cause the crown stays of a radial firebox to leak and it may open the seam near which the front braces are secured. These, while not serious, are important in that they indicate a direction for thought in designing. Flexibility must be provided where it is needed, and it is usually necessary to distribute the flexure in order to prevent it from occurring within too small a space.

The Handicapped Master Mechanic.

(Railway Review, February 23, 1901.)

If a master mechanic is so handicapped by the shortness in both quality and quantity of his clerical force that he cannot leave his office and get out around his shops and division the amount of supervision he can exercise is not only necessarily limited but his men only have their attention called to things after a delay or accident has occurred—and time is taken up in inventing plausible excuses which could be more valuably directed to preventing future occurrences. There is a limit to the amount of work one man can properly perform and where the time of a master mechanic is almost entirely taken up by the office work thrown upon him, the division and its shops cannot escape being slighted. The absence of a master mechanic from actual direct touch with the affairs of the different lines of work is felt and results inevitably appear, for it is human nature for the majority of men—be they foremen or mechanics, to need supervision in order to be kept strung up to the proper performance of their duties. This lack of everyday personal touch with the master mechanic is also felt by the foremen, for they are then often compelled to assume certain duties that should be taken care of by the master mechanic, and the time thus consumed is taken away from the supervision of the work which is their legitimate province. Through the absence of the master mechanic chasms also arise between those in charge of different branches of work and, through the disposition of estranged, negligent or overburdened foremen to shirk responsibility for the details which cross the dividing lines of their respective departments, these details are neglected. While it is an unwritten law of shop practice that the foreman must have mechanics he can depend upon, still it is equally a fact that if any set of men observe that a foreman has so much to attend to that he cannot supervise them properly, some of his men will take advantage of his distraction to perform careless work and their attitude will lower the morale of all the men. Nor will discharge for negligent workmanship take the place of proper supervision, for the time which elapses before the results of careless workmanship become apparent, in the majority of instances, renders the tracing of responsibility very difficult.

A Prime Cause for Flat Wheels.

(Locomotive Engineering, February, 1901.)

One of the principal yet tardily recognized causes for slid-flat wheels, is insufficient or incompetent engine brakes. Frequently the driver brakes leak off, because of dried-out piston packing leathers or poor pipe connections, before the train comes to a standstill. Happily the old, faulty type of driving brake cylinder with stuffing box and nut on the piston rod is rapidly becoming obsolete. The push type is a sensible successor; and the remote location away from the heat of the firebox promises a freedom from dried leathers, and consequently better holding brakes.

While many engine truck brakes are being applied, still they are not going on as rapidly as conditions warrant. Too many engines are now stretching the coupling between the tender and first car. This shirking of the engine from doing its share of the work in stopping, thereby requiring the cars to overwork themselves, generally results in slid-flat wheels under the cars. The ruined wheels are removed, and search for the cause is instituted. Strenuous effort is made to saddle the blame on to something. The triple valve is examined and cleaned. The leverage is measured up and possibly the braking power is reduced (if nothing else can be discovered that looks like a cause). All this with no thought or examination of the engine; or, if the engine attracts attention at all, it is only to the extent of having its air gage and governor tested. Never a thought is given to the absent truck brake and incompetent driver brake.

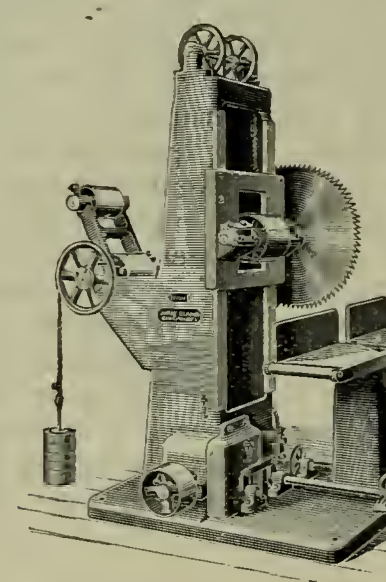
Periods of wheel sliding will probably be ever present with us in a greater or lesser degree—sometimes serious and other times scarcely annoying. But the inspector who seeks the real cause of slid-flat wheels, and not merely a hook to hang the blame on, will obtain a full confession, in many cases, from an observance of the stretched coupling between the locomotive tender and the first car. A pressure gage, connected to the driver brake cylinder so a reading may be had at each application of the brake, will also have a story to tell. The inspector's report, when made, could be fittingly headed, "Flat Wheels Due to Insufficient and Incompetent Engine Brakes."

Fay & Egan Cut-Off Saw and Gainer.

To those engaged in cutting-off and gaining large timber for car work, bridge building, architectural work and ship yard work, the machine shown herewith is bound to prove of interest. It is the new and improved cut-off saw and gainer offered by J. A. Fay & Egan Co., 145 and 166 West Front St., Cincinnati, O.

This machine will carry a saw 40 inches in diameter; cut off material 13 inches square, or 26 by 1 inches thick, and when a proper gaining head is used, will cut a gain 6 inches wide and 1½ inches deep, and expand from 3 to 6 inches wide. The column is heavy, cored and bolted throughout, and has a large base, preventing any vibration.

The feed raising arbor consists of frictions operating on two large screws resting on ball bearings, the nuts being fitted to take up all wear. The arbor is easily adjusted and controlled by a treadle convenient to the operator; and the travel is regulated by adjustable stops. The table is mounted on a stand, adjustable to and from the arbor, and can be swung to an angle of 30 degrees. It has friction rolls on each side, and a suitable screw



clamp is provided for holding the material.

The machine can be belted either from the top or from below, the swinging idler being reversible to bring the weight into action for either position.

The manufacturers will be pleased to furnish full particulars and lowest prices on application, and will also send their large new illustrated hanger free upon application.

Supply Trade Notes.

The Bullock Electric Manufacturing Co. has opened an office at 657 Ellicott square, Buffalo, N. Y., under the management of Francis B. Smith, an electrical engineer of wide practical experience.

Chicago rabbeted grain doors are specified on the 1000 Illinois Central box cars recently let to the American Car & Foundry Co.

Mr. William C. Baker, the widely-known inventor and manufacturer of car heating apparatus, died suddenly Feb. 6. The business will be continued under the management associated with Mr. Baker during the last 10 years, at 143 Liberty street, New York.

Mr. Sidney A. Stephens, for many years traveling representative of the Rhode Island Locomotive Works, has been appointed agent of the Brooks Locomotive Works for the Dominion of Canada, with office at 22 Saint John street, Montreal.

The Standard Steel Works have opened an office in St. Louis, at 712 Security building, with Mr. S. H. Riddell in charge. Mr. C. A. Thompson, hitherto representative of the company in St. Louis and the southwest, has resigned.

Messrs. F. A. Lester & Co. will continue the business heretofore conducted by F. A. Lester and R. C. Hayden in the line of steel forgings and castings, locomotive and car wheel tires, at 945 Old Colony building, Chicago.

Mr. Otto W. Meysenburg, president of the Rodger Ballast Car Co. and former president of the Siemens & Halske Electrical Co. and the Wells & French Car Co., died on February 11 at Alma, Cal., of typhoid fever, aged 52 years.

The name of the Richmond Locomotive & Machine Works was on February 9 changed to Richmond Locomotive Works.

At the annual meeting of the Niles-Bement-Pond Co., held on February 5, the old board of directors was re-elected. Mr. Thomas T. Gaff was elected vice-president, to succeed Mr. F. B. Niles, resigned. The company has declared a semi-annual dividend of 3 per cent on its common stock, payable in two quarterly installments, on March 10 and June 10. The regular quarterly dividend of 1½ per cent on the preferred stock is payable on February 20.

The Rogers Locomotive Works, upon application made by counsel for Jacob S. Rogers, has been placed in the hands of two receivers—Messrs. William Barbour and John C. Pennington. The appointments are said to be satisfactory to all concerned.

Mr. Rolla Wells, president of the American Steel Foundry Company, has been nominated for mayor of St. Louis on the democratic ticket.

The Baldwin Locomotive Works shipped its first consignment of three locomotives and tenders to Spain on January 31 from Philadelphia. The ship also contained 10 locomotives and tenders for French railroads and 7,425 flat steel billets consigned to Newport, England.

Mr. Albert Waycott has resigned as vice-president and general manager of the More-Jones Brass & Metal Company of St. Louis and will devote his entire attention to the Waycott-Andrews Supply Company, which was recently organized to succeed Albert Waycott & Co., as we have previously announced. The Waycott-Andrews Supply Company control the sale of the product of the More-Jones Brass & Metal Company.

The Southern Car & Foundry Company has moved its general offices from Gadsden, Ala., to Birmingham, where hereafter the general officers, including President J. M. Elliott, Auditor C. E. Conner, General Manager C. W. Prosser and Treasurer W. G. Brockeway will make their headquarters.

More-Jones brasses and McCord journal boxes will be used on the 2,000 freight cars recently ordered of the American Car & Foundry Company by the Missouri, Kansas & Texas, and 200 of these cars will be equipped with Monarch brakebeams.

The Lake Shore & Michigan Southern Railway has ordered 1,500 freight cars of 30,000 pounds capacity from the American Car & Foundry Company. The contract specifies that pressed steel body and truck bolsters should be used in their construction. The bolsters will be furnished by the Pressed Steel Car Company of Pittsburg.

The Pressed Steel Car Company of Pittsburg has received an order for pressed steel body and truck bolsters for 1,000 freight cars now being built by the Pullman Company for the Rutland Railroad. Seven hundred and fifty of these cars are 60,000 pounds capacity and 250 are 80,000 pounds capacity.

An order for pressed steel body and truck bolsters for 500, 80,000 pounds capacity, cars for the Pittsburg Coal Company has been received by the Pressed Steel Car Company of Pittsburg, Pa. The cars are being built by the Illinois Car & Equipment Company.

The Richmond Locomotive Works have received an order from the Baltimore & Ohio R. R. for ten switching locomotives, the general dimensions of which are as follows: Cylinders, 19 x 24 inches; driving wheels, 50 inches in diameter; total wheel base, 11 feet; weight in working order, 126,000 lbs.; boiler, 62 inches in diameter; firebox, 78 x 41 inches; No. 11 gage tubes, 2¼ inches x 13 feet, 10 inches.

The Standard Pneumatic Tool Co., of Chicago, manufacturers of the 'Little Giant' Air Tools and Appliances, have moved their New York offices from 619 Washington Life Building to more commodious quarters at 611, 612, 613 of the same building, this being necessitated by the very great increase in their business in eastern and foreign territory during the past few months. All shipments for customers in the district just mentioned will be made from New York instead of from Chicago, thus expediting delivery of machines.

The Detroit Graphite Manufacturing Company recently made a large shipment of its goods to Mexico. The company's export business is growing.

The Sterlingworth Company has received an order from the Northern Pacific for 17,000 Sterlingworth brakebeams to be used on the 4,250 cars just ordered of the American Car & Foundry Company.

President Elliott of the Southern Car & Foundry Company says regarding the proposed new steel car plant for that company at Birmingham: "We are to build a plant at Ensley to make steel cars regardless of what disposition is made of the Memphis works. The Memphis car works have been idle for a long time and it was our intention to tear the plant down and remove it here and to use such portions of it as were suitable in the construction of the new plant."—Birmingham Age-Herald.

Mr. W. O. Jacquette, formerly comptroller of the Pressed Steel Car Company, with office in New York, has been appointed District Manager of that company, with headquarters in Chicago.

The agency for the Bettendorf I beam truck and body bolsters has been taken over from the Cloud Steel Truck Co., by the Bettendorf Axle Co., of Davenport, Iowa. The Bettendorf Axle Co. has opened an office in Chicago, at 1590 Old Colony building, from which in future it will conduct the sale of its bolsters. The Bettendorf bolsters have been in service about four years, 60,000 having been placed on 38 railways.

The rumor that the Pressed Steel Car Company had negotiated a loan of $5,000,000 has been confirmed. The papers securing the loan were signed in New York February 14. In speaking of the matter recently one of the chief officials of the Car Company said: "The reason why a statement, showing the financial condition of the company, was not given to the stockholders at the annual meeting last month was because the audit of the Company's books was not completed at that time. It is now ready and each stockholder of record will be furnished with a copy. So far as the mortgage is concerned it is well to bear in mind that when the Company was incorporated it had a working cash capital of but $1,500,000, and was doing a business of but $1,000,000 a month. Since then the capacity for the manufacture of pressed steel cars and pressed steel specialties has been doubled, and during the past year another plant has been installed for the construction of an entirely new line of work—the manufacture of wooden cars with steel underframing. The work of this plant has been very satisfactory and the Company is now in a position to bid on the erection of all kinds of freight cars. Since the Company was incorporated the profits have aggregated $4,312,284.84; of this sum $1,750,000 in dividends on the preferred stock has been paid and $875,000 in common dividends. The cost of the McKees Rocks plant was $1,581,580.43. Improvements to original plants and the acquisition of additional property has cost $555,701.77. Thus the original working capital has been encroached upon, but the plants and capacity have been doubled, and the monthly production increased from $1,000,000 to over $2,000,000. We are now obliged to carry larger stocks of material, and in order to operate the plants at their full capacity it is necessary to carry between $4,000,000 and $5,000,000 worth of material on hand at all times. This has compelled the Company to borrow money at low rates, and it has been deemed advisable and prudent to fund this floating indebtedness. In view of this a mortgage for $5,000,000, covering a period of 10 years and bearing interest at the rate of 5 per cent per annum, to secure notes maturing at the rate of $500,000 each year, has been executed, with the right to the Company to anticipate payment of all or part, as provided for in the mortgage. These notes have already been disposed of on terms advantageous to the Company. In this way the Company secures extra working capital, and its interest charges are limited to not exceed $250,000 the first year and $25,000 less every year thereafter. Last year the Company paid $215,820.70 interest on borrowed money. We believe that more than the difference between this amount and $250,000 can be saved in extra discounts on material purchased."

The Graphite Industry.

The story of graphite begins away back beyond the Dark Ages. If it could be fully told it would be fascinating and marvelous beyond anything that the fossil remains of ancient organic life have as yet fed our imagination with.

The geologists have made us familiar with the wonderfully preserved specimens of plants, animals and shells of the coal measures, on which human eyes probably never looked until they were laid bare by the miner's pick and shovel, but the earliest history of graphite and its associations must remain a blank.

Graphite is a form of carbon, the substance which constitutes so large a portion of organized nature, more especially of the vegetable world. Graphite is said to be the most highly crystalized form of carbon next to the peerless diamond.

Undoubtedly graphite is closely allied to coal, although older in origin, and the subject of more intense and long-continued metamorphic influence.

So far as yet known Ceylon holds the largest and richest desposits of graphite, and the world is indebted to Ceylon for its largest supply. The next best source of supply are the now equally famous Ticonderoga mines of the Joseph Dixon Crucible Company.

We will pass over the earlier history of graphite, wherein it did not constitute an industry, but was recommended and used for various diseases, and in a crude way as marking pencils, etc., and come to where it was made of more practical and larger use.

In a paper read before the Ceylon branch of the Royal Asiatic Society we are told "that the export of Ceylon graphite must have commenced between 1820 and 1830, as Mr. Joseph Dixon, the founder of the great American Crucible Company, obtained a shipment of Ceylon plumbago in 1829."

Turning to our own records, we find that Joseph Dixon, the founder of the Joseph Dixon Crucible Company, in the year 1827, made crucibles by using the plumbago found in the state of New Hampshire. The quality was so far superior to the Dutch blacklead pots, that the melting-pot business was completely revolutionized, and the Dixon graphite (frequently called plumbago or blacklead) crucibles became the standard. Mr. Dixon afterward saw specimens of graphite that had been brought from Ceylon as curiosities by captains in the East-India trade; and, finding them so much better than the New Hampshire plumbago, he procured a shipment, which was the first importation of Ceylon graphite into the United States.

The graphite industry, therefore, really begins with the founder of the Dixon Company. He it was whose fertile brain conceived the possibilities of graphite, and he it was whose skilled hand first gave to the world graphite crucibles and the celebrated "Carburet of Iron" stove polish, which has brightened the stoves of three generations.—Graphite.

Established 1878.

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

A Monthly Railway Journal

Devoted to the interests of railway motive power, car equipment, shops, machinery and supplies.

Communications on any topic suitable to our columns are solicited.

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Walter D. Crosman, Editor.

Allen R. Cosgrove, Manager.

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ENGINEERING students of Purdue University are making their annual inspection trip as we go to press. The itinerary covers the days from March 25 to March 29. The plants visited are all in Chicago and vicinity. Arriving in Chicago the party divides up into groups, interested respectively in mechanical engineering, electrical engineering, civil engineering ad technical chemistry. Each group has a fine program laid out for it. The mechanical engineering group will visit, among other interesting points, the Chicago & Northwestern shops, the Illinois Central shops, the Pullman Car Works, the Illinois Steel Works, at South Chicago, etc. All groups unite on March 26 at a banquet given at the Chicago Athletic Association rooms by the alumni. About 80 students form the party. An outing of this nature is one of great importance to students of an institution which is so remote from large industrial centers. The whole affair is organized for business and past experience proves the trip to be an important function in the course of Purdue's engineering students. The party is headed by Prof. W. F. M. Goss, dean of the school of engineering.

OUT in Wyoming the Burlington railroad is building a line down into the Big Horn Basin country, and the contractors succeeded in interesting a lot of Crow and Sioux Indians from the reservation near by, and engaged a number of them on the grade. At first they were lined up each with scraper and a team of horses and at the word, with a yell, they started to race, that being the sport dearest to the Indian heart. But after the "Boss" got them in line again, and explained that they were there to "move dirt" and not to race horses things went more smoothly, and most of the bucks have developed into good workmen. And so it happens, that within a few miles of the battlefield where Custer and his brave men of the Seventh Cavalry made their last stand in 1876, these warriors, and sons of warriors, many of whom, no doubt, took part in the massacre, are peacefully taking up the white man's burden and "make 'em heap sweat."

THE Pressed Steel Car Co. is to be congratulated on the success of its efforts to increase the output of its cars. The business of this company grew so rapidly and even phenomenally that it was obliged to increase its plant almost continuously; while at the same time rushed to fill orders. Under such circumstances it is not surprising that it could not at once realize the full nominal capacity of its works. It requires time, patience and skill to get so large a body of workmen to pull together and get out of the machinery the full amount of work it is designed to do. During the week ending March 16th the company built and shipped 467 hopper cars and 169 box cars—an average of 106 cars a day. It is believed that they can now sustain about that average. It is an enormous output but orders ahead are so large that even this capacity does not appear to be sufficient.

A Sample of "Waste Grab."

Chicago, March 4, 1901.

To the Editor of the Railway Master Mechanic:

I enclose herewith a photograph of a particularly bad case of what is known as "waste grab." This waste had embedded itself in the soft lining but when the bearing was renewed it was found to be quite loose and

A SAMPLE OF "WASTE GRAB."

was pulled away from the bearing without difficulty.

I know that you will be interested in looking this over because of the fact that there seems to be a difference of opinion among railroad men as to waste grabs. Some men claim that there is no such a thing and this is about as good an object lesson as I have seen in some little time.

R. D. Smith.

The Business Life of a Technical Graduate.

MR. E. M. Herr, general manager of the Westinghouse Air Brake Company, recently delivered an address before the students of Purdue University. His subject was "Some Problems in the Business Life of a Technical Graduate." Speaking from a wide experience and with a strong feeling of sympathy of his student audiences, Mr. Herr was able to anticipate some of the pleasures as well as the disappointments which lie in the path of men about to graduate.

Referring to the prosperous aspect of business enterprises at the present time, he warned his audience not to relax effort if they found the problem of obtaining employment an easy one, for no true progress is made without effort, and he who is compelled by circumstances to struggle hardest is most entitled to congratulation, if progress and adancement is his object.

MR. C. G. WALDO.
General Manager, Cincinnati, Hamilton & Dayton R. R

Mr. Waldo commenced his railway career as a telegraph operator on the Rome, Watertown & Ogdensburgh Ry. in 1873, and rose through the ranks on that road, the Michigan Central and the Cincinnati, Hamilton & Dayton to his present important post.

In emphasizing the advantage to the technical graduate of a thorough shop apprenticeship, Mr. Herr discussed the necessity for reducing shop cost in manufacture, and showed how necessary it was for the engineer to know for himself the details of doing work. Always remember, he said, that actually doing the planing, turning, drilling or whatever operations are to be performed on a piece of work is by no means all of the labor which the job includes. The handling to and from the tool or machine may, and in many cases does, cost Always avoid reducing cost more than the mechanical operations themselves at the expense of either efficiency, accuracy or durability. There is often a great temptation to reduce the cost of maintenance or construction in railroad work, or the cost of a product in manufacturing, by sacrificing efficiency or durability. This may enable one to make a favorable record for awhile, but so surely will it eventually bring disaster and increased cost for maintenance or operation in railroad work, or a loss of patronage and reputation in manufacturing, that one can safely condemn such practice without hesitation and in a most uncompromising way.

Speaking of the need of early accustoming oneself to carrying responsibility, Mr. Herr reminded his audience that to shirk or fail always weakens the shirker and lessens confidence, whereas every responsibility successfully borne becomes a stepping stone to greater success. In this connection he related an incident in his own experience. Having been appointed to an executive position, the details of which were new to him, he called upon the general superintendent to whom he was to report for final instructions before proceeding to his post. In response to his questions as to whether there were any instructions to be given, he received the reply: "No instructions! The machine is running down there; don't stop it until you are sure you can start it again!"

Emphasizing the need of care and patience, the speaker cautioned the students by saying that it was easy to work when everything runs smoothly—when, to use a homely phrase, things are coming your way. But a time is likely to come when your most carefully laid plans are likely to be overturned and you fail, perhaps through no fault of your own, but apparently because some other person has been a little careless or inattentive, or has lacked judgment, with the result that your work has not materialized and you yourself are subjected to criticism. It is then very difficult to have the patience to carefully and more thoroughly than before go over the old ground and with greater pains and care reconstruct a more secure foundation, avoiding the weakness which caused the former failure, whether in men or materials, and thus finally bring success from apparent failure.

After thus inspiring his audience with the dignity of the demands which would be made upon them, Mr. Herr described in detail the organization of a large manufacturing establishment, showing the purpose of each department and the dependence of one on the other. He traced the movements which are made between the receipt of an order and the shipment of the machine ordered. In conclusion, he said: "Be kind and considerate to your fellows, courteous and obedient to those in authority, and strive always to do a little more than is expected of you, and I can safely promise that there will, in your case, be no such word as fail."

Personal Mention.

Mr. W. J. Shadle has been appointed general foreman of the shops and round house of the Chicago & Northwestern Ry., at Council Bluffs, Ia.

Mr. W. J. Miller, foreman of machine shops of the St. Louis Southwestern at Pine Bluff, Ark., has been appointed general foreman at Texarkana, Ark., to succeed Mr. D. M. Doty, resigned. Mr. W. B. Hilgardner succeeds Mr. Miller at Pine Bluff.

Mr. H. W. Ridgway, formerly division master mechanic of the Mexican Central, has been appointed superintendent of machinery of the El Paso & Northeastern, with office at Alamogordo, N. M.

Mr. Jno. H. Davis, having resigned as general car inspector of the Central of Georgia Ry., Mr. J. L. Whitsitt has been appointed general locomotive and car inspector, covering the duties heretofore performed by road foreman of engines and general car inspector, with headquarters at Columbus, Ga.

Mr. Charles J. Langston, assistant master mechanic and general foreman at the Pine Bluff, Ark., shops of the St. Louis Southwestern, has been appointed master mechanic at the shops in Tyler, Tex., vice John M. Scrogin, resigned. Mr. Langston will be succeeded at Pine Bluff by William Lander, heretofore foreman of the company's shops in Jonesboro, Ark.

On the Atchison, Topeka & Santa Fe important changes in the mechanical department have been made as follows: R. P. C. Sanderson has been appointed superintendent of machinery, temporarily, succeeding John Player, Mr. Player being absent because of ill health. As a result of this James Collinson, master mechanic of the Gulf, Colorado & Santa Fe, at Cleburne, Texas, succeeds Mr. Sanderson as assistant superintendent machinery of the A., T. & S. F., at Topeka, Kan. T. Paxton, division master mechanic of the A., T. & S. F., at Topeka, succeeds Mr. Collinson at Cleburne. Mr. Paxton in turn is succeeded at Topeka by G. T. Neubert, heretofore division master mechanic at Newton, Kan. Mr. I. C. Newmark has been appointed foreman of the machine shops at Topeka, vice J. B. Price, resigned.

Mr. J. Kennedy has been appointed master mechanic of the Maricopa & Phoenix & Salt River Valley, vice J. F. Geimer. Mr. Kennedy's headquarters will be at Phoenix, Arizona.

Mr. Clarence B. Gifford, master mechanic of the Louisville & Nashville, at Birmingham, Ala., has resigned.

Mr. Archie M. Baird, for many years foreman of the boiler department of the shops of the Atchison, Topeka & Santa Fe, at Topeka, Kas., has resigned. Mr. Baird is widely known through his invention of pneumatic tools used in boiler work.

Mr. James Slavin, master mechanic of the Spokane Falls & Northern, has resigned, and has been succeeded by Mr. C. H. Prescott, who formerly held the same position.

Mr. G. W. W. Taylor, formerly with the Copper Range R. R., has been appointed general foreman of the car and locomotive shops of the Chicago & Alton Ry., at Brighton Park, Chicago.

Mr. Henry Bitters has been appointed master car builder of the Duluth, South Shore & Atlantic Ry., with office at Marquette, Mich., vice Mr. D. C. Mulvihill, resigned to accept service with another company.

Mr. A. H. Thomas, assistant engineer of motive power of the Pennsylvania lines at Dennison, O., has resigned, and will be succeeded by Mr. A. R. Kipp, heretofore assistant motive power inspector.

Mr. H. J. Worthen has been appointed foreman of locomotive repairs of the Southern Ry., at Pinner's Point, Va., to succeed Mr. S. R. Richards, transferred to Greensboro, N. C.

Mr. J. McGie, master mechanic of the Montana Central Ry. at Great Falls, Mont., has resigned to accept a similar position on the Central Railroad of New Jersey.

Mr. F. H. Raine has been appointed assistant master mechanic of the Wabash, at Chicago, in charge of the machinery and car department, vice Mr. W. A. Bell, transferred. The appointment dates from February 15.

Mr. H. D. Norris, acting purchasing agent, has been appointed purchasing agent of the Pere Marquette, with headquarters at Saginaw, Mich.

Mr. H. D. Taylor, formerly mechanical engineer and later master mechanic of the Lehigh Valley at Wilkesbarre, Pa., now connected with the Calumet & Hecla Mining Company, has been appointed superintendent of motive power of the Lehigh Valley, with headquarters at South Bethlehem, Pa., to succeed Mr. S. Higgins, resigned.

Mr. John Lloyd has been appointed master mechanic of the Texas Southern, with headquarters at Marshall, Tex.

Mr. D. J. Justice, heretofore with the Atlantic Coast Line, has been appointed master mechanic of the Seaboard Air Line at Americus, Ga., vice Mr. F. H. McGee, promoted, and Mr. J. H. Evans, who has been acting as master mechanic at Americus, returns to his former position as master mechanic at Montgomery, Ala.

Mr. W. H. Prendergast has been appointed master mechanic of the Central of Georgia at Columbus, Ga., in place of Mr. J. L. Whitsitt, who has been appointed general locomotive and car inspector, with office at Columbus, to succeed Mr. John H. Davis, resigned.

Mr. John Hill has resigned as master mechanic of the Chicago Terminal Transfer Railroad, and is succeeded by Mr. Angus Brown, formerly of the Wisconsin Central.

Mr. E. Belknap has been appointed general purchasing agent of the Seaboard Air Line, with headquarters at Portsmouth, Va., vice Mr. O. D. Ball.

Mr. C. H. Bickell has been appointed assistant purchasing agent of the Erie Railroad, with headquarters at New York.

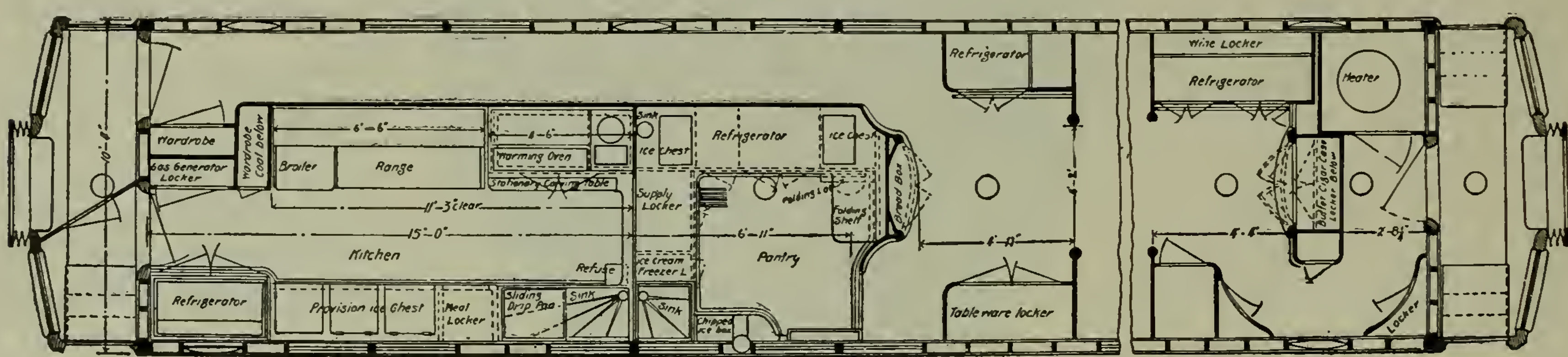
Mr. D. P. Child, for over seven years car foreman of the Minneapolis & St. Louis, at Minneapolis, resigned February 28 to accept the position of general car foreman of the Colorado & Southern, with headquarters at Denver, Colo.

Mr. Samuel Watson has been appointed master mechanic of the middle division of the New York Central & Hudson River, with headquarters at West Albany. He will have supervision of all engine houses and engines on the division, and will assume such other duties as may be from time to time delegated to him by the division superintendent of motive power. The appointment dates from March 16.

Mr. Wm. Schmalzrind has been appointed foreman car department of the Texas & Pacific at Fort Worth, Tex., vice T. F. White, deceased.

Mr. J. H. McConnell has resigned as superintendent of motive power and machinery of the Union Pacific Ry. Mr. McConnell entered railway service in 1861, as machinist apprentice on the Great Western Rd., now the Wabash Rd., at Springfield, Ill., after which he was, consecutively, one and one-half years machinist Chicago, Burlington & Quincy, at Galesburg, Ill.; two and one-half years machinist Chicago & Alton Rd., at Jacksonville, Ill.; 1868 to 1872, general foreman Omaha shops Union Pacific Ry.; 1872 to 1885, division master mechanic of the same road at North Platte, Neb.; and 1885 to 1886, master mechanic of the Nebraska division of the same road. From 1886 to 1888 he was engaged in mercantile business at Omaha, and later, for about two years, he was engaged in special work for Union Pacific system. In February, 1891, he was appointed superintendent of motive power and machinery of the Union Pacific system, retaining that position continuously since.

Mr. S. Higgins, superintendent of motive power of the Lehigh Valley, has resigned, to become superintendent of motive power and machinery of the Union Pacific. Mr. Higgins was born Feb. 19, 1860, at San Francisco, Cal. He entered railway service in 1881 with the New York, Lake Erie & Western Rd., since which he has been consecutively 1881 to Oct. 1, 1885, machinist apprentice, machinist and assistant foreman and also general foreman in the Susquehanna shop; Oct. 1, 1885, to Oct. 1, 1887, assistant engineer motive power department; Oct. 1, 1887, to April 18, 1892, division master mechanic; April 18, 1892, to Feb. 1, 1894, assistant superintendent motive power, all on the New York, Lake Erie & Western Rd. On Feb. 1, 1894, he left the Lake Erie to become superintendent of motive power of the Lehigh Valley, which position he has held continuously since.

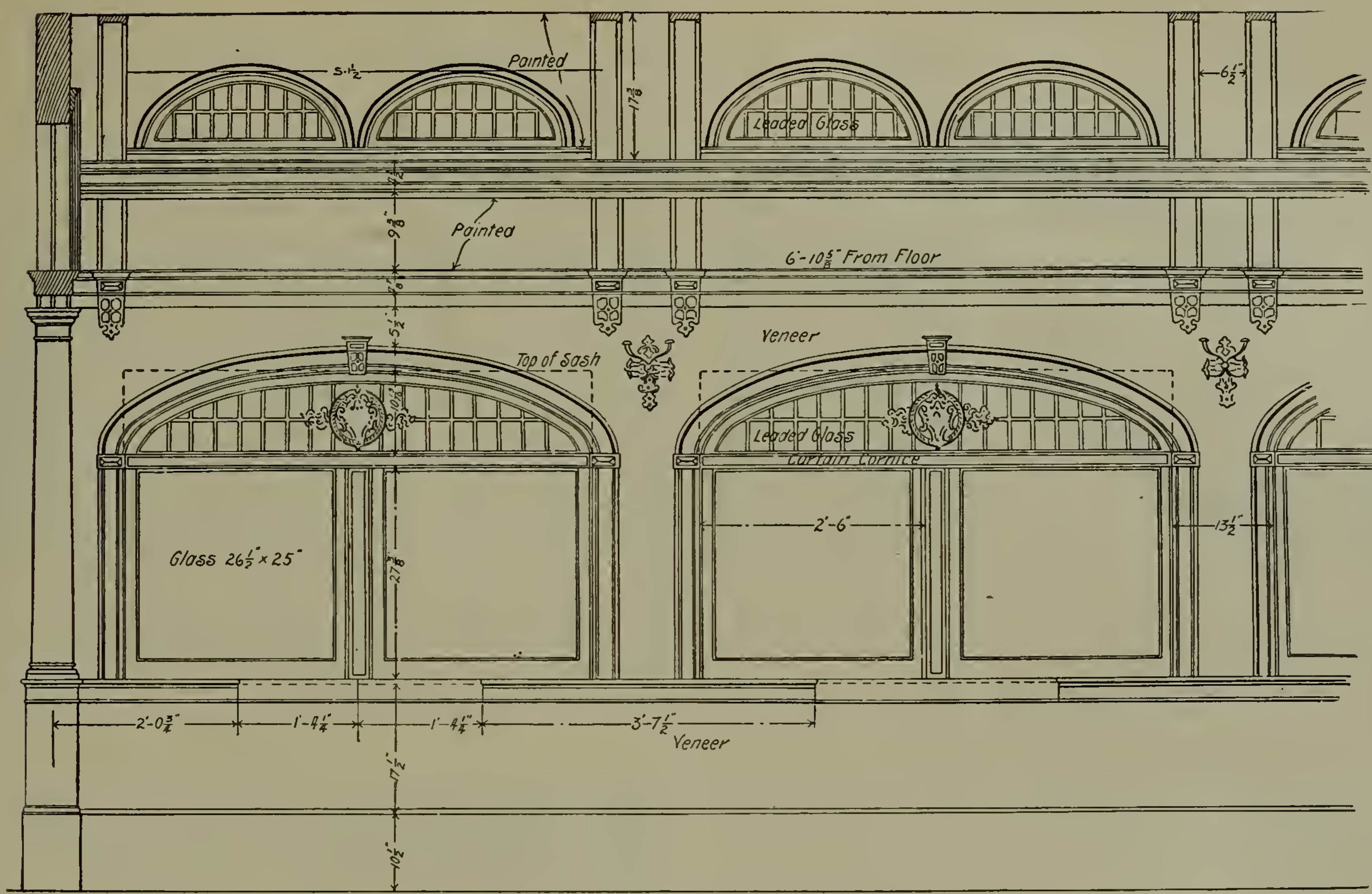


FLOOR PLAN.

A Modern Dining Car.--C. B. & Q. Railway.

The Chicago, Burlington & Quincy is just receiving from the Pullman Car Works five new dining cars that possess decidedly novel features as to interior decoration. The general plan of the car is much like other modern diners with exceptions that we will note later. The chief distinction which these cars bear is the novel scheme of decoration. The idea had in mind when the working out of this scheme of decoration was first approached, was to produce an effect of quiet elegance, in contradistinction to the garish effects usually met with. It is only too common that lavish decoration, ornate carving, etc., are found in car interiors in combinations that are distinctly offensive to people of good taste. This sort of thing is not only offensive, but it is expensive as well. With these Burlington cars a controlling idea was to design an interior with something of the same purposes in mind that a gentleman of taste would have in designing the decorations of the dining room in his home.

In these cars there is a perfectly plain wainscoting carried up the sides to the first deck. This wainscoting is of Flemish oak—very dark, almost black. It is finished dead, almost rough, there being absolutely no polished or varnished wood surfaces anywhere. The cove and ceiling are also absolutely plain, painted in a solid, rather intense yellow, no stencil work or ornaments of any nature being used. The carpets are a rich crimson and the window shades the same. There are thus three colors—crimson, black and yellow. There is but little or no brass work—the coat hooks excepted—and these are unobtrusive and are in brass yellow. When furnished up of course there is brought into the color scheme the snowy white of the table linen and such flowers as may be on the tables. The tables, by the way, and

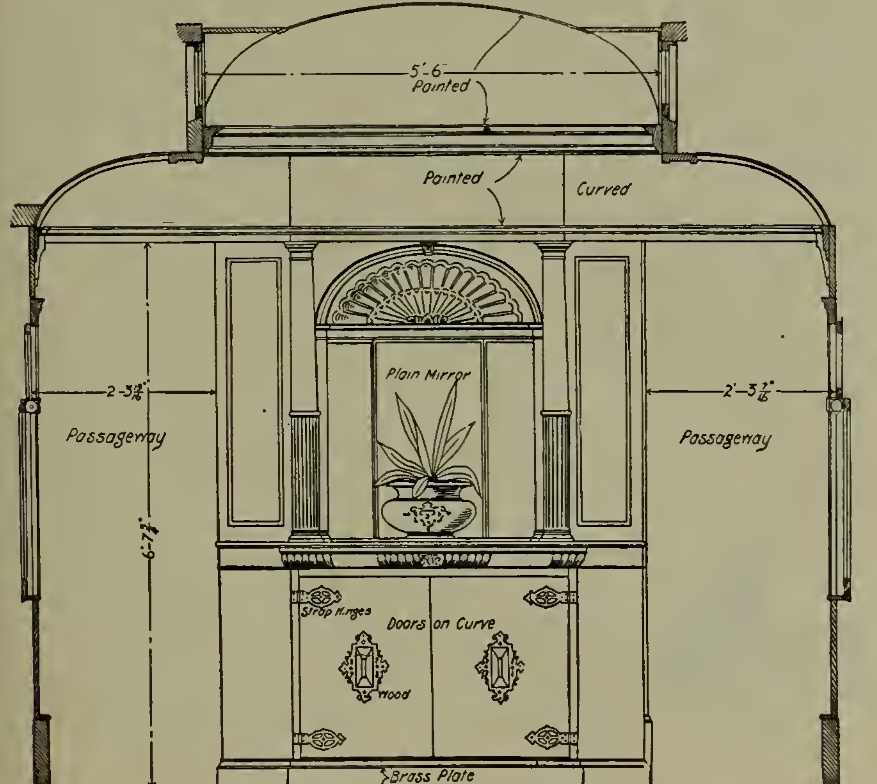


SIDE FINISH—DINING ROOM.

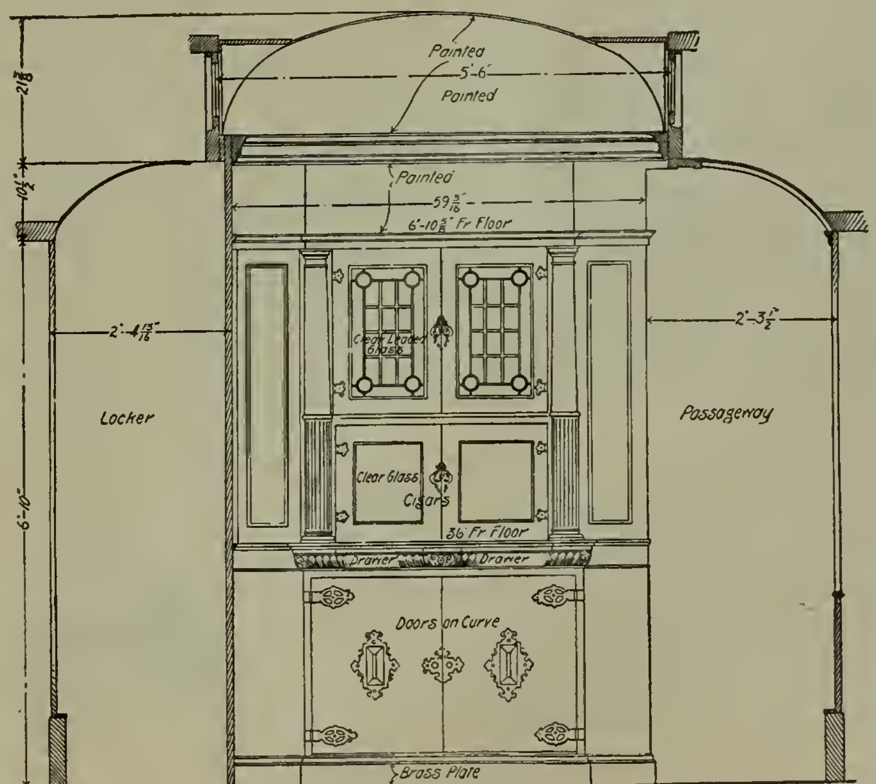
the chairs, are also in the dark Flemish oak and very plain in design. The long perspective lines of the dining room proper are happily broken by Flemish oak bands running up at intervals from the high wainscoting and across the ceiling, producing something of the beam effect often used in home dining rooms.

The table arrangement is excellent. The old style way of setting the table against the bulkheads and the chairs next the windows made gazing ahead at passing scenes difficult; in these cars the tables are opposite the windows and vision is thus unobstructed. Another improvement is in doing away with the little niches or shelves on the bulkheads, used for casters or flowers The bulkheads are plain and bear nothing but the coat hooks.

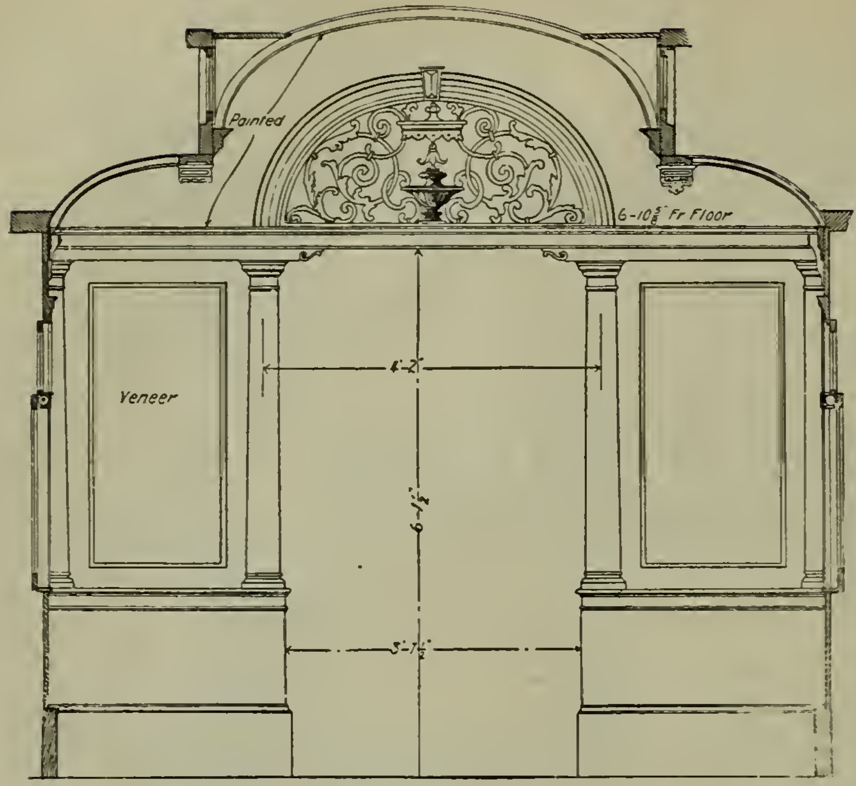
A source of frequent annoyance in old style diners is the freedom with which travelers gaze into the room from the platform and even from the next car. The room is shut off at both ends in these cars, the kitchen closing one end and a buffet closing the other, as will be seen from our floor plan. The tables are arranged with five four-seated on one side and five two-seated on the other. The cars are 70 feet long aand 10 feet 4 inches wide; the dining room proper is 32 feet 2 inches long. The use of



ELEVATION OF NICHE.



SIDEBOARD ELEVATION.



Bulkhead Partition.

two windows instead of a single broad one permits the use of a cinder screen to be effective, which should prove a great comfort for summer travelers.

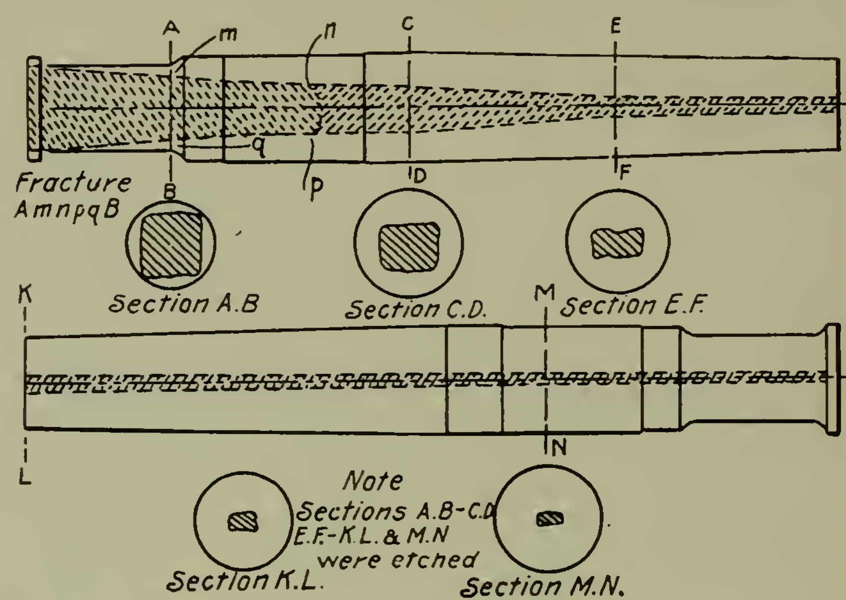
The design of these cars is not to be credited to any one individual—it is the outcome of the joint study of several officials of the Burlington road and of the Pullman Car Co.

A Peculiar Axle Failure.

Mr. M. H. Wickhorst, engineer of tests of the Chicago, Burlington & Quincy, in the course of his paper on steel axle specifications at the last Western Railway Club meeting, displayed a remarkable broken axle, that failed because of segregation of material. Mr. Wickhorst said in this connection:

"As I look at it, the most important thing to look after in inspecting steel axles is to insure that no crop ends of ingots have been used, and that no seriously segregated material gets into the axle. For this reason I do not think it proper to let the axles pass upon the heat analysis, but analysis should be made of borings taken from the end of the finished axle, so there may be some chance of getting hold of badly segregated axles, if there be any. The chances and temptations of not discarding sufficiently from the top of the ingot are so great in this case that I lay all the more stress on it. The steel for axles is melted in open-hearth furnaces, cast into large ingots, and these are rolled down into square billets just large enough to satisfactorily make an axle of the desired size, and, as stated, the chance for insufficient discard is very great.

"To show how serious the segregation may be, I give sketch showing an axle which failed in service, and which was made from the piped end of an ingot, and I also exhibit the axle, which all will admit, was certainly a 'horrible example.' It will be noted that the failure consisted of the axle breaking at the junction of the journal and the wheel fit, and the journal in coming off took along with it a tapered, oblong portion extending into the axle about 12 inches. The journal and this tapered piece consisted of the piped material from the upper end of the ingot, and etchings of sections from different portions of the axle showed this piped material to run all the way through the axle, being, however, at the end opposite the break, only a small portion in the center. The way this ran through the axle can be seen by the sketch presented, and also from the samples submitted. As stated above, it seems to me that the



Axle Fracture.

most important thing in the inspection of axles is to guard against just such axles as this one under discussion.

"The analysis of broken axle gave the following results from borings taken from a section of the body of the axle just away from the end of the tapered portion which broke off, the borings having been taken from the center, and also close to the outside.

	Outside.	Center.
Carbon	.09	.10
Phosphorus	.068	.226
Sulphur	.047	.120
Manganese	.40	.53 "

Theory in Boiler Repairs.

Communicated.

To the Editor of the Railway Master Mechanic:

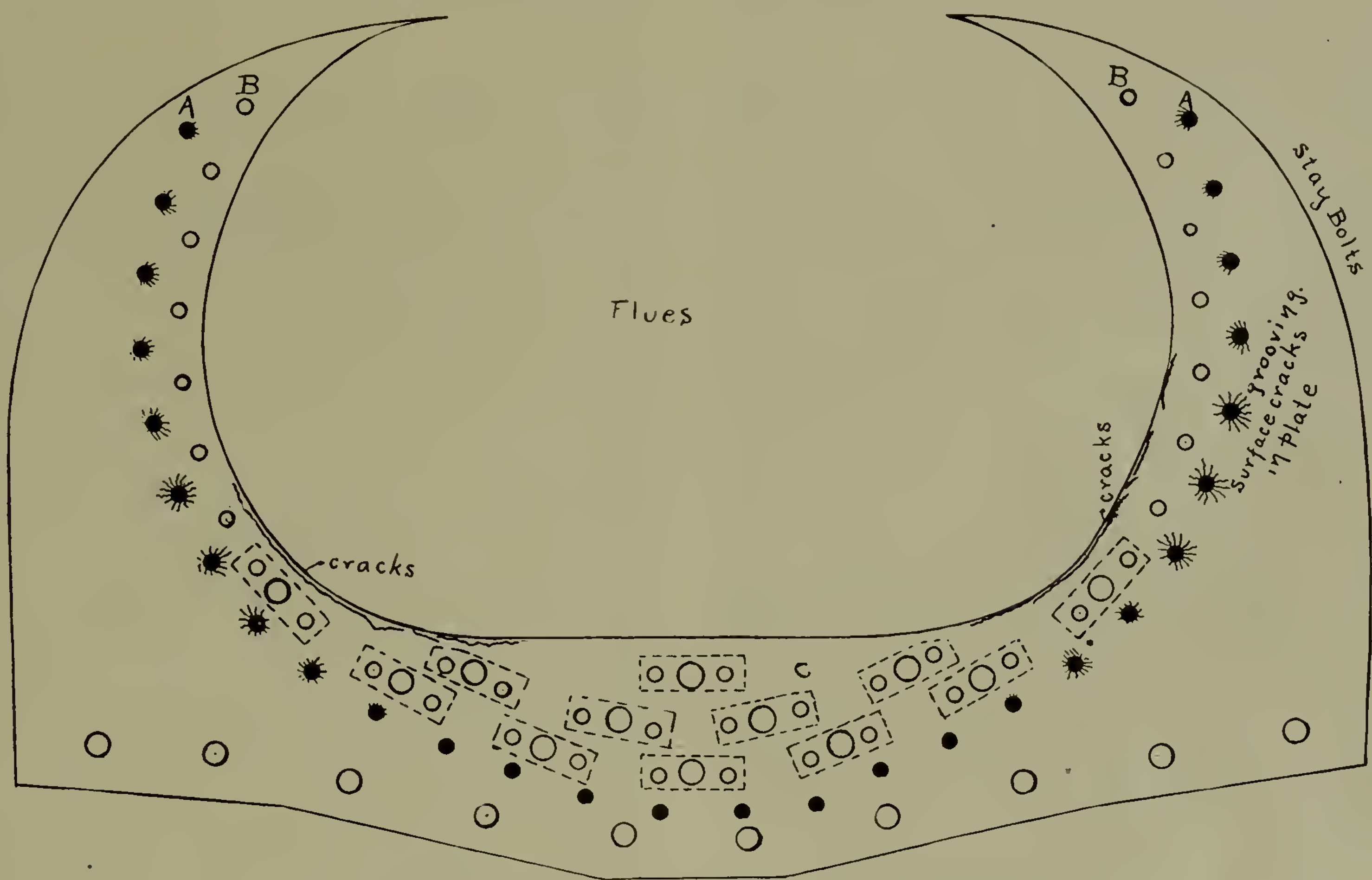
THE accompanying sketch shows the appearance of the back boiler head of an engine as it came into the shops for repairs. The row of staybolts B, however, was not in the old plate.

The cracks in the plate along the flange, and grooves along the staybolts, A, do not seem to be cracks that have affected the metal entirely through the plate, but are only surface fissures. The cracks were on the inside.

There have been several theories about the boiler shop as to the cause of the grooving about the staybolts, going ahead on one side of the boiler and back on the other. Mineral salts in the water may have aided this action, gradually eating away the plate.

This also is probably not the true theory, for if it was, why should the plate be affected only along the flange and along the row of staybolts nearest the flange? The authority answers this question by explaining that at these points the currents are stronger; but we still fail to see why the currents are stronger at the staybolts designated than four inches from them, and why the plate would not be grooved all over in this region if this were the cause.

The third, and probably true, theory for the appear-



Grooved and Surface-Cracked Boiler Head.

A. First, that the plate had been punched too large, and not sufficient metal reamed out after punching, so that the metal about the holes was tortured, thus causing these grooves to start. This is not at all likely to be the true theory, for this would not explain the cracks along the flange, and, besides, this kind of work is not the practice in boiler shops today. Even if the metal had been tortured, this grooving must have been done by some other agent than steam and water acting on a tortured sheet, for steam and water acting on a sheet where it is known to be punched does not produce this worn, grooved appearance.

The second theory is that the cracks may have been caused by galvanic action. This action, if such was the cause, may have been produced by currents of water

ance of the plate is that it is due to the unequal expansion and contraction of the flues and boiler shell. As the fire is put in the firebox, the firebox and flues heat up before the boiler shell, and the flues expanding, puts a severe strain on the flue sheets and staybolts until the water and boiler shell is heated to the same temperature, when the shell expands equally as much and relieves the sheets and staybolts.

The boiler shell being properly lagged, it is supposed to be exposed to the same temperature as the flues in running condition. When the fireman wishes to clean his fire or reduce the pressure, he opens the fire door, and a current of cold air reduces the temperature of the firebox and flues at once, while the boiler shell, being in contact with the steam and water at former pressure, reduces its temperature only as the pressure reduces. So here again a strain is put upon the flue sheets and staybolts in the opposite direction, and will only be relieved when the pressure comes down. When the fire door is closed the flues again heat up sooner than the boiler shell, and the strain is reversed on the flue sheets and staybolts until the pressure comes up sufficient to compel the boiler shell to expand accordingly.

As the staybolts B were not in the old plate, there was a space of six inches between the row of staybolts A and the flue sheet. As the unequal expansion and contraction took place the plate buckled over the staybolts A as a fulcrum, thus injuring the metal most naturally about the staybolts and cracking the plate along the flange. This buckling process not only injured the plate, but loosened the staybolts and flues and caused trouble in keeping them from leaking. The flange in the plate was too sharp, so the crack was invited. A new plate has been made with two improvements, which will probably do away with these troubles. An extra row of staybolts B will sufficiently stiffen the plate, and a longer roll has been put in the flange, giving it more freedom to bind without cracking.

Observer.

*Some Features of Japanese Railroading.**

By Willard C. Tyler.

I SAW a curious performance on a branch road to Nikko. At a station which is about four or five miles below Nikko they detached the locomotive, ran it about sixty feet to the spout of a water tank, filled up its tank, then ran it back and coupled on to the train. That involved, of course, the cutting of the brake hose and the English screw coupling. Every day they do that to all the trains which go up there. I said, "Why don't you move the spout of that water station down to where your locomotive generally stops?" "Oh," he said, "we haven't got to all those modern devices yet." So every day they are uncoupling the locomotive, running it up ahead, filling it with water and putting it back at an expense of twelve or fifteen minutes of time. But this will all change in time when they get around to it.

Further up that road there is a place at Morioka where to fill a locomotive with water it is cut off from the train and run a quarter of a mile up the road to a switch and back down through the yard and across a turntable to the roundhouse, then filled with water, and the same process reversed to get back to the train again. This was in 1898. As they get further along and into our American rush, which they have not yet done, and which they will not enjoy when they do get there, they won't do those things.

The Sanyo Railroad at Kobe is one of the most progressive railroads in Japan. It has copied as closely as possible the American idea. They have got a very nice road there in every respect. It was the first railroad in Japan to put in sleeping cars. Last year it built three sleeping cars on the American Pullman plan. The locomotive superintendent, Mr. Iwasaki, is a very bright gentleman, one of the brightest among the railroad men of Japan. He had been in America and seen our sleeping cars. These cars were three as handsome sleeping cars as you ever looked at, beautifully finished in Japanese woods, with dining room and kitchen at one end, toilet and porter's room at the other, and all the accessories to make travel comfortable. These sleeping cars are sixty feet long, having six sections of two berths each with room for twenty-four people to sleep in. They run on six-wheeled bogie trucks, and have a little room at one end for the porter or Japanese boi. Anybody doing a lackey's work in Japan is a boi. I must say to his credit that he is far more polite than any porter I ever saw in this country. Mr. Iwasaki had a little improvement in the upper berth that we have not in our cars. There were two little narrow sliding windows close together in the upper berth with hair screens outside to keep every bit of dust from coming in, and a little bit of a blind to keep the sun out, so you could look out and see the country and have plenty of fresh air. The car was finished beautifully in Japanese woods in the natural color. They do not believe much in paints, but carve and polish their natural woods so as to produce very beautiful effects. At the end was a polite cook, who cooked things very well in the foreign fashion. That sleeper was the first one run through that section. It interested the townspeople along the line, and when a Japanese coolie from the country wants to look at a thing he looks at it. He would flatten his nose right tight against the glass and look at you just as long as he wanted to. So when we stopped at a station at night, our car being lighted by electricity and heated by steam, there would be a row of noses flattened against the glass all the way down the whole length of the station. The most amusing thing about the sleeping cars is the manner in which Japanese ladies travel in them. The Japanese lady has a habit of doing her hair up in a very artistic manner and in quite

*Extracts from an address delivered before the New York Railroad Club.

a permanent way, fixing it so that the air can blow through it; when that is done in proper order and fastened she does not want to have it disturbed until it is the proper time to have it done over again, as she goes bareheaded at all seasons. Therefore she does not want to sleep in such a way as to disturb her hair, so she sleeps on a device called a makura. On that she rests her neck; therefore she can turn back and forth as much as she likes during the night without disturbing her hair. But the makura and sleeping cars do not agree with each other at all. It is all right when you are in a tea-house or a hotel, but if you put this makura on top of a sleeping car mattress, and the engineer takes up the slack of the train a little bit sharply, over goes the makura and twenty cents worth of hairdressing is gone. Consequently when the gentlemen of that region traveled with their wives on these sleeping cars they paid two yen for a berth for their ladies, who sat up in them all night.

In Japan everybody smokes; many of the ladies smoke. Consequently in the sleeper people were smoking all night. They do not require smoking cars in Japan, because all the cars are smoking cars.

The Japanese roads are splendidly built. The gauge is three feet six. The standard size of rail is 61½ pounds to the yard, and they are well laid. As civil engineers the Japanese are very skillful. They have to tunnel a lot; they have to fill a lot; they have to look out for flood rivers. The cars used are mostly the English style of compartment carriage with four rigid wheels, and now they are getting into a sort of American car, which runs on two four-wheel bogie trucks. These cars are 58 or 60 feet long, divided into first, second and third class. The first class has a white stripe on the outside, the second a green stripe, and the third a blue stripe, so they are easily distinguished. The railway travel in Japan is largely third class, about eighty per cent: about fifteen per cent second class, and five per cent first class. The first-class people pay three sen a mile as a rule; that is a cent and a half. The second-class people pay two sen, which is one cent, and the third-class people pay one sen, which is only half a cent, United States money. The third-class cars have a row of seats across. They are not specially comfortable. There are a few second-class cars which are upholstered in leather, with longitudinal seats and provided with little toilet rooms and appliances for washing your face, just such as are used on the ships. The water is in a tank above, and you press a button to let it down. Their first and second class cars are comfortable. The first class are upholstered in leather. There are no car steps, because the car floor is about even with the edge of the station platforms; the doors are in the side, one at each end, and they are opened only on the side where there is a station. Very few of the roads are double-tracked. They do not have conductors on the trains. The trains are made up generally very long, and the guards' van, in which the brakemen and guards ride, is at the end—quite English.

The locomotives weigh, as a rule, from 30 to 40 tons each. Many 8-wheel passenger engines with tenders are used, but the favorite locomotive, or the type used most in the country at large is either four or six wheeled coupled engine with side tanks and no tender, as they still believe in the theory that if they carry a lot of water in tanks on top of the driving axles they are getting all the benefit of a heavy engine without the expense, and that by having only a small coal supply they are getting rid of hauling around a useless tender, just to carry coal and water in. So you will find a sort of half tender at the rear built on the same frame as the engine, with a pair of trailing wheels under it and a single pair of trucks ahead of the driving wheels. The coal capacity of those engines is very limited, and they change them often. In the run from Tokio to Kobe they use nine engines in 376 miles, making an average of only forty miles run to each engine. Lately some American moguls and consolidation engines have been purchased here by the Kiushiu Railroad.

The freight cars in Japan are from seven to ten tons capacity, and weigh from four to six tons each. While there are a good many box cars, they still adhere a good deal to the English open wagon practice, with a tarpaulin covering the freight. You often see at stations a loading gauge, under which if a load covered with a tarpaulin will pass, it is perfectly safe for the tunnels on the road, as all Japanese railroads have tunnels. There has been a slight movement towards a much heavier type of freight cars. One railroad man made a most extraordinary criticism on the use of larger cars. I was telling him something about the enormous cars that we have been going into over here. He said, "We built two very much larger and heavier cars a while ago and they were failures." I said: "That is very strange; we have not found them so. Why are they failures?" He said, "The coolies could not push them around." In most of the places in Japan they do not use switching engines. Labor is very cheap, ten to twenty cents only a day, and it has not paid to buy a locomotive to do the switching in any but half a dozen of the largest cities in the empire. Therefore, they kept a gang of forty or fifty coolies to push the cars around in the sidings instead of using yard engines.

When your train stops in Japan they sell what they call bento—that is, a lunch. It is in a little two-story box, the lower story of which is filled with rice while the upper story has some fish or vegetables, and perhaps you might get a bit of chicken in there. There are two prices for those lunches. Before I get to this lunch I want to say that at every station you can buy a pot of tea and a cup to drink it out of; you get the pot and the cup and the tea for three sen, equal to 1½ cents, United States gold, for the whole outfit. The boy I refer to came along calling "Bento," and there were two kinds of "Bento." One is twelve sen, which would be six cents United States, and the other is twenty-five sen, which would be twelve and a half cents. I was new to the country, and got those two prices all mixed up. I ran after the coolie boy; everybody was rushing after him. I chased him down four or five cars and got a box of bento, and asked him the price. I understood him to say it was twenty-five sen, and I gave him twenty-five sen, rushing back to get to my compartment. I got in there, and I soon heard the sound of flying clogs running after me. There was the boy with thirteen sen in his hand, putting it in the car window. He had neglected his business and turned down a lot of people who wanted to buy lunch from him, in order to return that money to me which I had overpaid him. I think almost any American boy like that would have thought the Lord sent him the thirteen cents and he ought to keep it.

Lately the government road has bought two English and two American sleepers, and the era of sleeping cars has set in, also of steam heating and electric lights. The electric lights are run by an oil engine and dynamo in a special car. Formerly the heating had been by English hot water cans. When you travel all night in the country in winter about every four or five stations the door opens and in come a lot of fellows who remove the cold English water cans, and there is no more rest for the wicked, for they are followed by another troop with more cans, alleged to be hot, which they drop down with a great deal of noise. When you get up to move about you fall over them. They are a first-class nuisance and never seem to give out an appreciable heat.

The average speed of trains in Japan is eighteen or twenty miles an hour. It would be expensive to run faster, as steam coal costs in Tokio nearly $7.00 gold a ton. Besides, there is no particular demand for faster time from the public.

In Japan there are about 1,100 locomotives, of which 650 are of English make, 400 American, and about 50 German, with some scattering. The number of American engines out there has increased very rapidly of late. Some German engineers got in on Kiushiu Island years ago and introduced a lot of German engines there which are really the worst looking locomotives I ever gazed on. There are 3,800 and some odd passenger cars and 14,125 freight cars; but that is not enough, as the commerce of the country is rapidly increasing, and complaints are made all the time that freight cannot be taken care of as rapidly as desired. There will be in time, I suppose, locomotives built in Japan, as all the cars now are. There is a company started to build cars and locomotives both at Osaka. So far they have built only three locomotives and imported all the parts and assembled the locomotives there

There is one thing that must be considered in connection with railroading in Japan; that is the effect of earthquakes. The trains run only 18 or 20 miles an hour. I do not know whether it would be considered safe to run 50 or 60 miles an hour in a country in which the seismic instruments are never quiet. There were nine shakes in the four or five months I was there the last time. They had a very bad earthquake there in 1891, which totally wrecked a long stretch of the governmen road, leaving the rails in serpentine form. The roadbed sank in forty-five places, sometimes over 13 feet. Sixty-three bridges were destroyed, one with nine spans of 200 feet over the Kiso River, one with five spans of 200 feet over another river, and another place where there were eight spans of 200 feet. The piers were cast-iron caissons filled solid with Portland cement. These piers were cut off as with a gigantic knife and the entire bridge dropped into the river just as the last car of a train left it. The wing walls of many culverts were destroyed and such havoc was wrought that the road did practically no business over that territory for six months, and it cost nearly half a million to put things in order again.

*A System of Steel Framing for Freight Cars.**

By G. W. Scott.

INCREASED carrying capacity of cars implies increased strength in that which is to do the carrying; and, therefore, if we are to consider a car of carrying capacity larger than heretofore, and with relatively small dead weight, it is clear that we must consider those materials which, from a commercial, no less than from a car builder's, point of view, are best fitted to the desired end. Time was when the framing of freight cars consisted of wood joined in various ways and held together by bolts. For many years, indeed, a due regard for commercial considerations made this form of construction the best attainable, because of the comparative ease with which wood and iron could be procured, and also because of the facility with which these materials could be worked into the resulting car framing.

But along with the industrial growth of the country at large has gone the development of the manufacture of steel and of the machinery by which that material may be rolled into sections convenient for general use.

*From paper presented at March meeting of the Western Railway Club.

And so wide are the lines on which this development has taken place, and so ably is the process of manufacturing conducted, that steel may now be procured in sections well-night ideal for constructional purposes, and at a cost sufficiently low to constitute a strong commercial advantage in its favor. The conditions, then, are different today compared with the past years—different with respect to material supplies, industrial facilities, and economic conditions generally—but all distinctly favorable to the introduction of steel as the ruling material element in car construction; and its selection for that purpose is as assured as was its selection for use in ship and bridge building, in each of which wood and iron formerly held sway. Even now there are thousands of steel cars in active service, and the car building atmosphere seems laden with the thoughts of designs of others yet to come.

The fact of a car being made of steel is not sufficient, however, to warrant indiscriminate conclusions regarding its desirability, its carrying capacity, or its longevity. Something more than merely being made of steel is to be considered if a satisfactory and economically constructed car is what is wanted. It would at least appear advisable that the design of the car shall be made in accordance with the broadest requirements in the case, and with some regard to commercial consideration concerning the material used, and also with some thought of the working stress to which the material is to be subjected.

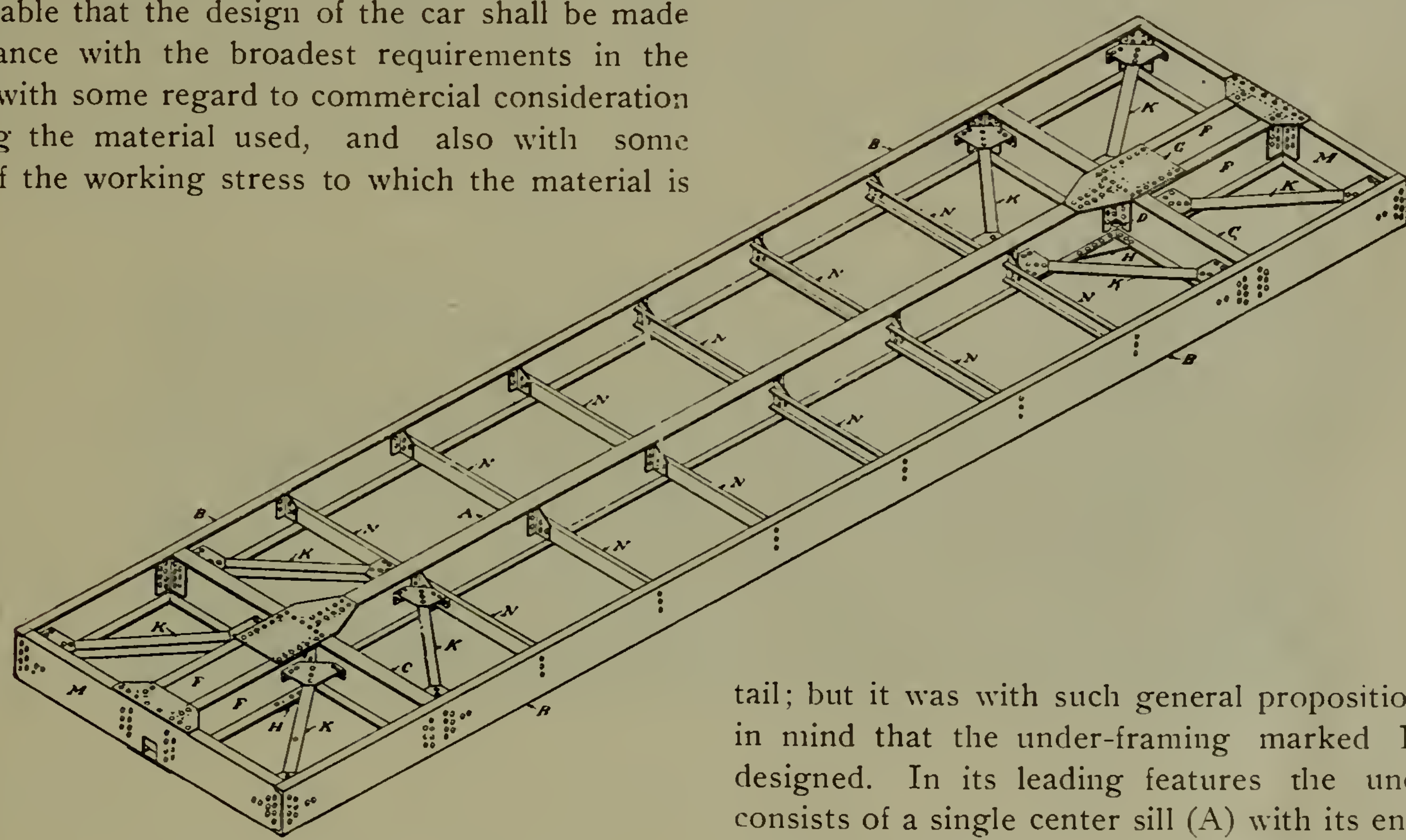


Fig. 1—Steel Car Framing

There may be some question as to what constitute the fundamental requirements in car design, but the following notes are submitted as being worthy of consideration in this respect:

(1) A car designed primarily with regard to the nature of car service in general.

(2) The use of materials which may be obtained as nearly as possible in their finished forms, and throughout the country at large, and preferably independently of any one manufacturer.

(3) The application of such materials in the simplest and most direct manner. This to promote economical construction and to admit of repairs and replacements being made with the least difficulty and expense.

(4) A system of under-framing competent to carry the whole of the dead and applied loads without assistance from any associated upper structure, and no less competent to hold up, structurally unimpaired, under the general conditions of car service.

(5) A system of under-framing in which the greatest possible proportion of the vertically applied loads shall be transmitted in the most direct manner to the center plate without producing a bending moment in the body bolster.

(6) A system of under-framing consisting of members having equal upper and lower flanges, between which the horizontal forces from and through the drawbars may be transmitted.

(7) A system of under-framing having a central rigid connection for the purpose of transmitting direct from drawbar to drawbar the shocks due to impact, in addition to the ordinary stresses consequent on the movement of the car or train.

There are, of course, many other requirements in detail; but it was with such general propositions as these in mind that the under-framing marked Fig. 1 was designed. In its leading features the under-framing consists of a single center sill (A) with its ends abutting against the bolsters (C), the connection with the latter being over the central portion of the center plate. The bolsters (C) are continuous throughout their length and have their ends framed with the side sills (B), the latter extending the full length of the framing. Draft beams (F) bear directly against the bolsters (C) at the one end, and against the end sills (M) at the other; and the end sills (M) are connected, as shown, to the side sills (B).

The system of under-framing so far described is uniform in depth, and thus renders easy the application of the upper and lower covering plates (G and H) at the connection of the bolster (C) with the center sill (A) and draft beams (F). Other covering plates are employed at the connection of the draft beams (F) with the end sills (M). The diagonal braces (K) are intended to add to the stiffness of the framing, and to transmit corner shocks to the rigid connection at the center of the bolster and to the center sill beyond.

In the design shown, the intention is to use a wooden floor; hence the floor beams (N) to carry suitable floor joists to which the floor may be fastened. These floor beams are also serviceable as lateral stiffeners.

There is reason to believe that the system of under-framing described (Fig. 1) complies with the general terms of requirement No. 1, in the foregoing; and with regard to requirement No. 2, it may be stated that the center sill and bolsters are standard "I" beams, and that the side sills, draft beams and end sills are standard "channels." The materials, then, are such as may be readily procured, and their sectional form renders unnecessary any special work being done upon them save

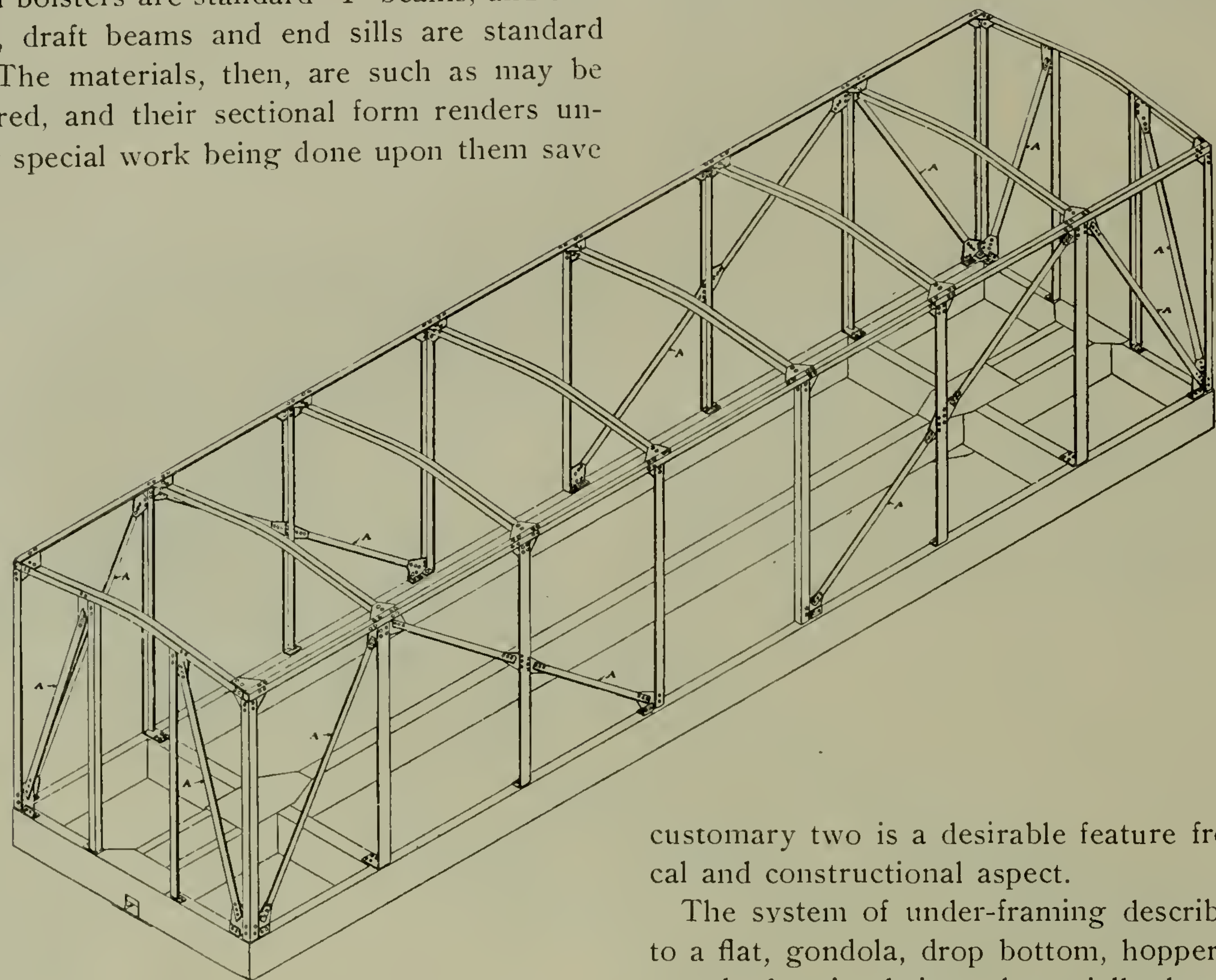


FIG. 2.—STEEL CAR FRAMING

that associated with their application. It may further be noticed that the several connections are reasonably simple in character, thus complying with requirement No. 3.

Concerning requirement No. 4, it may be stated that one of the advantages of this system of under-framing is in the fact that by the use of standard commercial shapes it is possible to calculate within close limits just what sectional elements are required for a car of any reasonable length and capacity, and with any desired fiber strain or limiting factor of safety, relative to any assumed form of loading.

Requirement No. 5 is complied with in the most positive manner; for if it is granted that the center sill carries say, one-half of the total load supported on the area between the bolsters, it is plain that this large proportion of the entire car load is transmitted practically direct to the center plate, and, therefore, without producing any bending moment in the body bolsters.

The symmetrical character of the commercial "I" beam and channel sections, and their equally symmetrical disposition as indicated in Fig. 1, are in accord with requirement No. 6; and with regard to requirement No. 7, it may be said that while a single center sill may be unusual, reflection will show that it is a correct solution of the problem with regard to the direct transmission of stresses from drawbar to drawbar. It has also been shown that a single center sill has an advantage in transmitting direct to the center plate its share of the vertically applied load, and it will be further recognized that the use of one center sill instead of the customary two is a desirable feature from an economical and constructional aspect.

The system of under-framing described is applicable to a flat, gondola, drop bottom, hopper bottom or box car; the framing being substantially the same in all cases, only the floor and upper structure differing. It will also be clear that the floor and upper framing may be constructed of wood or steel as required. The system of under-framing can also be used in combination with the system of upper framing for a box car as shown in Fig. 2. In this case it is assumed that the under-framing is sufficiently strong to carry its dead and applied loads without any assistance from the upper framing, and, therefore, the strength of the upper framing need not be considered beyond its ability to withstand wind, inertia and other shocks incidental to the ordinary operation of cars in service. This arrangement is an advantageous one, for each portion of the under and upper framing can then be considered more definitely with regard to its purpose, thus admitting of a reasonably correct design and an economical use of material.

The use of "angle" or "T" section carlins as shown in the arrangement of the upper framing (Fig. 2), results in a decided gain in head room, and to an extent equal to the difference between the depth of the steel section employed and that of the wooden carlin which otherwise might be used. It may also be noticed that this system of upper framing admits of the application of either wood or steel as the material for the car siding, lining or roofing.

If car framing, and car construction generally, gave rise to no questions after purchase and delivery of the car. there would be no need to dwell any longer upon this subject; but the primary object of a car's existence is that it be placed in active service and kept there as long as it can be used, the commercial value of the car being altogether dependent upon its period of useful activity. An active life, however, implies exposure to the inevitable process of material "wear and tear"; it also means the possibility of coming in contact with sundry distorting and destructive forces from which even the best of steel cars may not be exempt. The problem of car construction is, therefore, incomplete unless proper consideration be given the question of renewals, replacements and repairs. Some thought should also be given the matter of tools and appliances needed, for it will, of course, be recognized that the repairing of steel cars of any form will require the use of tools and appliances quite different from those which are sufficient for repairing cars built of wood.

The range of tools and facilities required will depend altogether upon the type of steel car selected, being complex or simple in direct proportion to the complexity or simplicity of the car to be repaired. That tools and appliances will, eventually, be found necessary may be granted. For steel cars are not without their limits of endurance, and sooner or later they will stand in need of attention and repairs. Hence the necessity for a timely consideration of that which is desirable from the broadest point of view with regard to the construction of steel cars.

With these thoughts in mind it may be noted that in the system of under-framing herein considered it has been shown that there are few principal members, and that these are arranged in what is believed to be the best manner consistent with their purpose. It has also been shown that these members are of the regular and standard commercial sections, and therefore such as may be readily procured throughout a large portion of the area traversed by railroads. Furthermore, the design of the under-framing is entirely free from complexity, and the connections of the principal as well as those of the subordinate members are in keeping with the simple character of the construction, all of which constitute, as a whole, conditions the significance and importance of which can best be appreciated by those concerned with the cost and operation of car repairing.

Consolidation Freight Locomotive, Colorado Springs and Cripple Creek District Ry.

The Schenectady Locomotive Works recently turned out a consolidation freight locomotive for the Colorado Springs & Cripple Creek District Ry. This engine is shown in our engraving. The engine weighs 168,000 lbs., of which 157,000 lbs. are on the drivers. It has 22x 26-in. cylinders; 51-in. drivers; a straight boiler, 74 3-8 ins. in diameter and designed to carry 180 lbs. working pressure; a heating surface of 2738.55 sq. ft., of which 2542.95 sq. ft. is tube and 195.6 sq. ft. fire box surface; a grate area of 34.22 sq. ft. The tender has a water capacity of 5000 gals. and coal capacity of 9 tons.

The special fittings and equipment of the engine include: U. S. metallic piston rod and valve stem packing; Richardson balanced slide valves; cast steel driver centers; Carbon fire box steel; Nathan Monitor injectors; Westinghouse-American combined brakes on drivers, tender and for train; Westinghouse 9½-in. pump; Le Chatelier water brake on cylinders; three 3-in. Coales safety valves, one muffled and two open pop; McIntosh blow-off cock; K. & M. magnesia sectional lagging on boiler and on cylinders; Leach sand-feeding apparatus; Tower coupler at front of engine and rear of tender; Sterlingworth, Marden patent, tender brake beams; Pyle National electric headlight equipment.

The Wisconsin Central Repair Shops.

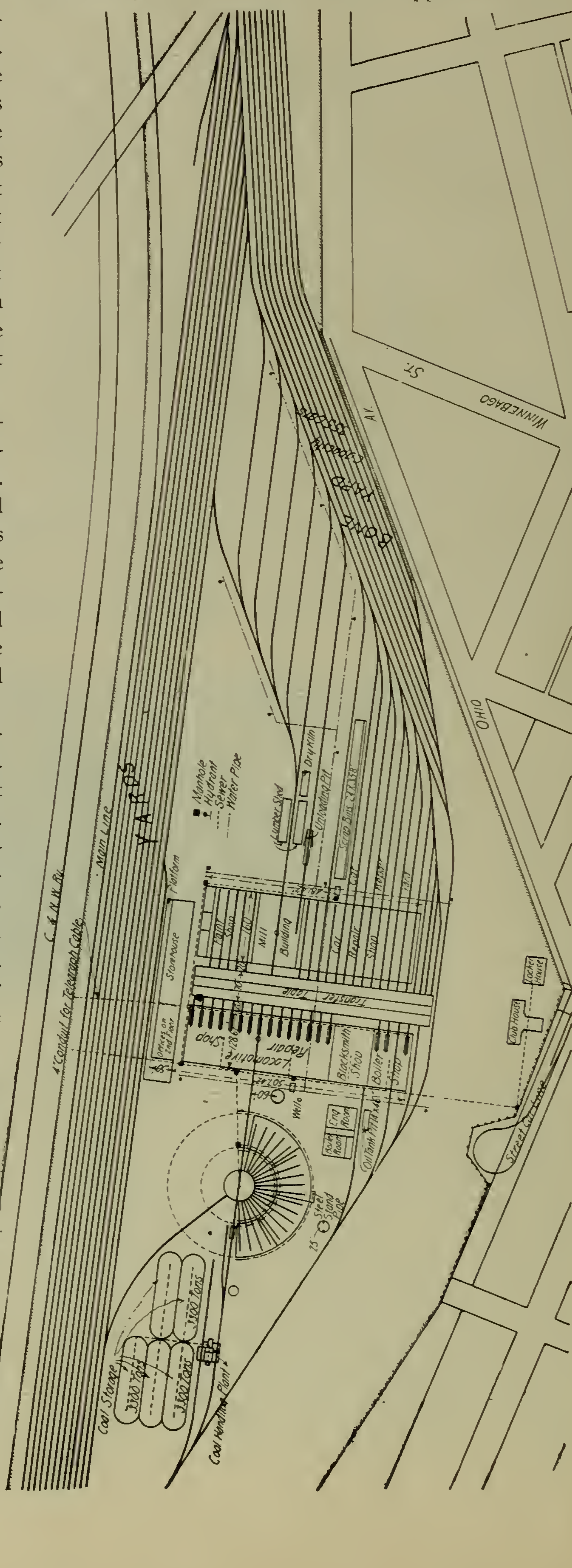
THE Wisconsin Central Ry. recently erected new repair shops at Fond du Lac, Wis., the essential features of which are shown in our engravings. Our descriptive matter we take from the Railroad Gazette.

These shops are intended to provide facilities for making the heavy repairs of all the locomotives and cars of the road, where formerly this work was divided and done in two shops, at Waukesha and at Stevens Point. This road has about 900 miles of track and an equipment of about 150 locomotives and nearly 10,000 cars. The new shop buildings are all of light brick with steel roof trusses and posts, and present a fine appearance. In addition to side windows, there are numerous skylights and windows in the roof, so that in the daytime the shops are very light.

The arrangement of the shops is shown by the general plan. It will be seen that this provides for transverse shop tracks, which are served by a transfer table. The car shops are on one side of the transfer table and next the car repair yard. The locomotive repair shops are opposite, and the store house is at the head of the transfer table and convenient to both car and locomotive shops. The roundhouse, coaling station and clinker pits are beyond the locomotive shops. As all the shops are electrically driven, the buildings are arranged with no special reference to the power house.

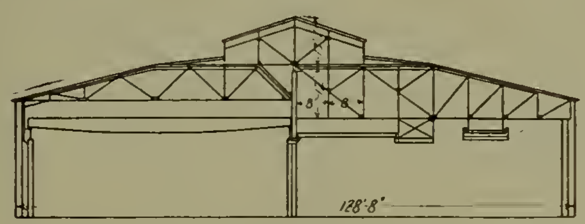
A plan of the locomotive shop showing the approximate arrangement of the tools is given, as well as a cross-section, from which can be seen the arrangement of roof trusses and crane supports. This building is a little over 500 ft. long x 128 ft. wide, and the plan permits of enlargements. Thus, if ever required, the machine or erecting shop can be increased from 15 pits to 23 pits by putting up an extension for blacksmith and boiler shops, and using the present blacksmith and boiler shops for erecting and machine works. The car shops opposite can, of course, be extended in the same direction.

At present there are 15 pits in the erecting shop and three in the boiler shop, all pits being on the side next the transfer table. A shop track extends the entire length of this building and a similar track connects the machine shop and roundhouse. Other means for handling material are cranes and hoists. The pits in the erecting shop are served by two 30-ton overhead traveling cranes driven by ropes, these cranes having been brought from the Waukesha shops. One track for this crane is carried on posts along the wall and one track on a row of posts at the center of the buildings. The design of the roof trusses above these cranes is so modified as to give about 4 ft. greater headroom, which is sufficient for the uses to which these cranes are put—chiefly raising engines for removing the wheels and lifting large parts into place. The transfer table is depended on for bringing materials close to the point where they are to be used. On the opposite side of the



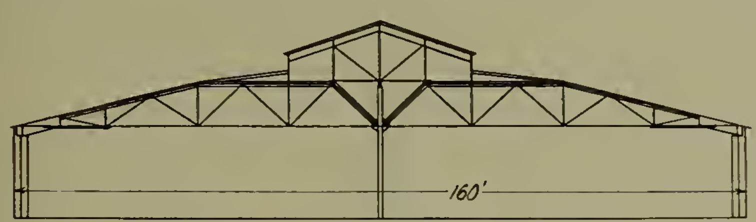
Wisconsin Central Repair Shops at Fond du Lac, Wis.

center posts are two 5-ton overhead traveling cranes, which, it will be seen, are located to serve the heaviest tools. One track for these cranes is carried by the center posts and one track is supported by the roof trusses. Beyond, and serving the light tools and benches, are four 2-ton lifts which can be moved along an overhead track suspended from the roof trusses. In addition to these cranes running on longitudinal tracks. all the large machines are served by air hoists for lifting the work in and out of the machine



Section of Locomotive Repair Shop.

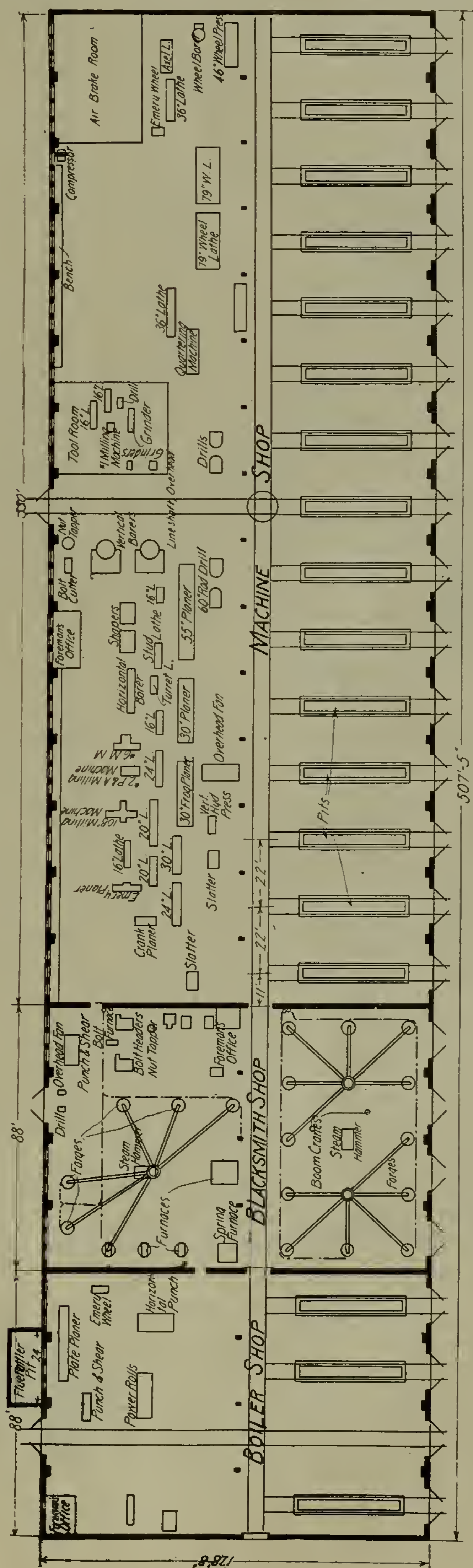
In the machine shop there is one main line shaft which extends through the roof trusses for the full length of the machine shop, being divided into three lengths. Each section of the main shaft is driven by a 40 h. p. motor mounted on a platform built in the roof truss, and a 10 h. p. motor drives a short shaft above the tool room, this tool room motor also being mounted above. Counter-shafts are carried below the roof trusses by hangers. In addition to this electrical equipment there are two 30 h. p. motors in the locomotive shop, mounted on the roof trusses, which drive the fan of the Sturtevant hot air heater used in that building. Also there are two 20 h. p. motors, mounted above, which are belted to air compressors on the floor. A compressor is located at either end of the building, both delivering air into a common system of piping and reservoirs. The air reservoirs are located above and carried by the roof trusses. The motors driving air compressors are regulated automatically. When the air pressure falls below the point for which the regulator is set, a contact is closed which



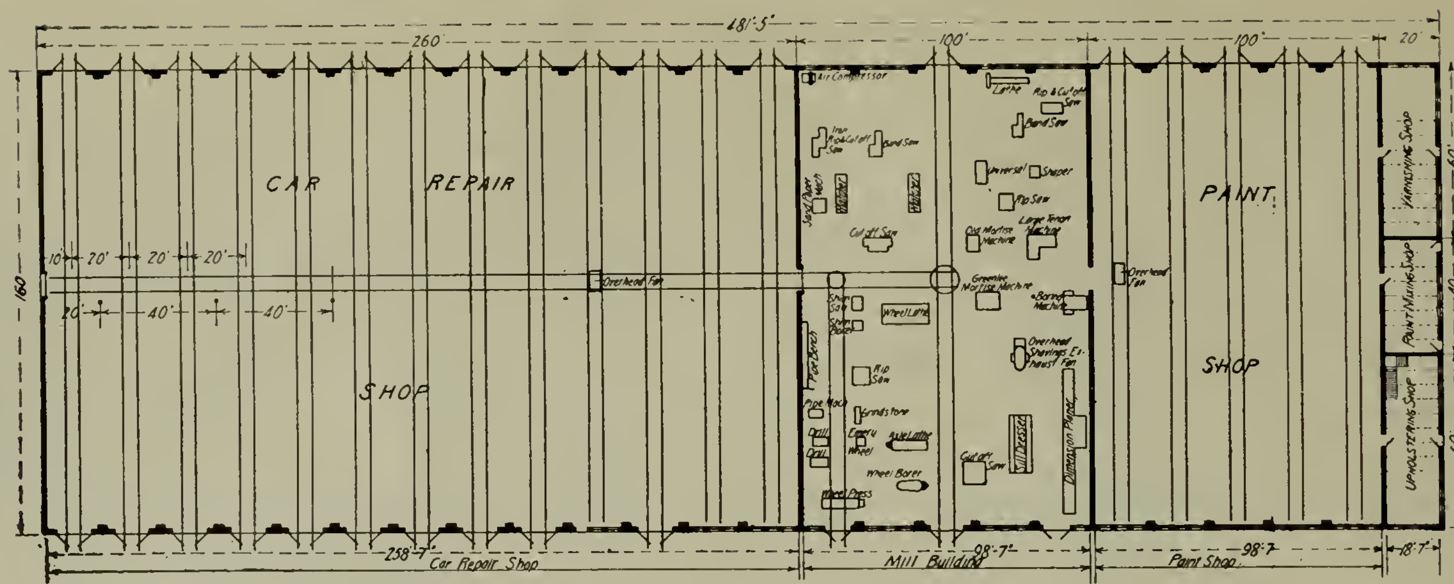
Section of Car Repair Shop.

admits current to the motors. When the pressure is raised above the desired point, contact is broken through a mechanism worked by a small air cylinder and a regulating spring. This regulating device has a range of working of about 2 lbs. It will be understood that while the electric motors are carried by the roof trusses, all the switches and controlling apparatus are on the nearest wall and the usual distance from the floor. In grouping the machinery, the idea has been to concentrate the heavy machine work under the larger cranes, to bring the wheel and axle work together and to place the lighter machines near the benches. About the only thing which interferes with placing machines at any point in the shop is the fact that the location must be such that the roof trusses will not interfere with the necessary pulleys and belts. None of the machine tools in this shop have individual motors.

About the only points of interest not shown by the plan of the blacksmith shop are the electric drives and the manner of carrying off the smoke from the fires.



Wisconsin Central Repair Shops at Fond du Lac, Wis.



WISCONSIN CENTRAL REPAIR SHOPS AT FON DU LAC, WIS.

This shop has one 15 h. p. motor, mounted above on the roof trusses, which drives a line shaft, from which in turn the tools in this shop are driven. Another 15 h. p. motor drives the fan which supplies the blast for the forges, both fan and motor being mounted in the roof trusses. The air is carried down through two mains alongside the wall and thence through underground branch pipes to the several forges. Above each fire is a large pipe ending in a hood, which rises straight up from the forge; these smokepipes are then turned and run into chimneys. There are three chimneys for the whole shop and natural draft is depended on for carrying off the smoke.

The boiler shop has three pits, and one cross track which connects this shop with the adjacent yard tracks, independent of the transfer table. The tools in this shop are driven from one line of shafting, which, in turn, is driven by one 20 h. p. motor. The tools in the car shop will be driven by one 15 h. p. motor, and the fan of the hot air heating apparatus by one 40 h. p. motor, all mounted above as in the other shops. The transfer table is 70 ft. long and has a capacity for 200 tons of load. It is driven by one 50 h. p. motor and can be moved at a speed of about 5 miles an hour.

There are 19 pits in the roundhouse with a considerable enlargement possible. The turntable is 70 ft. in diam., with center gearing only, and this table will be driven by a motor. At present the coal handling plant shown on the general plan has not been installed, but it is proposed to substitute a modern plant with mechanical conveyors for the temporary coal wharf now being used. The machinery of the storehouse is three stories and the upper floors are used for offices. The foundations of this building are so proportioned that additional floors can be added if in the future more office space is required.

In the power house, which furnishes current for power and lighting purposes for the whole plant, there is one 16 x 42-in. and one 24 x 42-in. Allis condensing engine. The smaller engine is belted to a 100-k. w. generator, while the larger engine drives, by two belts, two 100-k. w. generators. The generators and motors throughout the plant were furnished by the Milwaukee Electric Co. The boiler plant consists of three 72-in. x 18-ft. cylindrical boilers, and there is room for a fourth unit. These were furnished by the Milwaukee Boiler Co. In addition to the pumps for boiler feeding, there is a large fire pump. The water for the plant is stored in a large steel standpipe, shown on the plan. The American Blower Co.'s system of forced draft is used, and the stack is but 20 ft. above the roof.

By referring to the plan it will be seen that there is a "locker" house near the shop gate, and in this house the workmen change their clothes before they receive checks. Lockers are here provided for storing clothes and such things as workmen usually carry with them into the shops and put in out of the way places. Also this building is fitted with large lavatories for the men. In this way when the men get their checks and go into the shop building they are ready to begin work, and in the same way they are obliged to change their clothing after the checks are deliverd up. The most important feature, however, is that fire risks are lessened by keeping lockers and surplus clothing out of the shop buildings.

*Best Method of Preparing Journal Box Packing.**

By J. W. Bunn, (Galena Oil Co.)

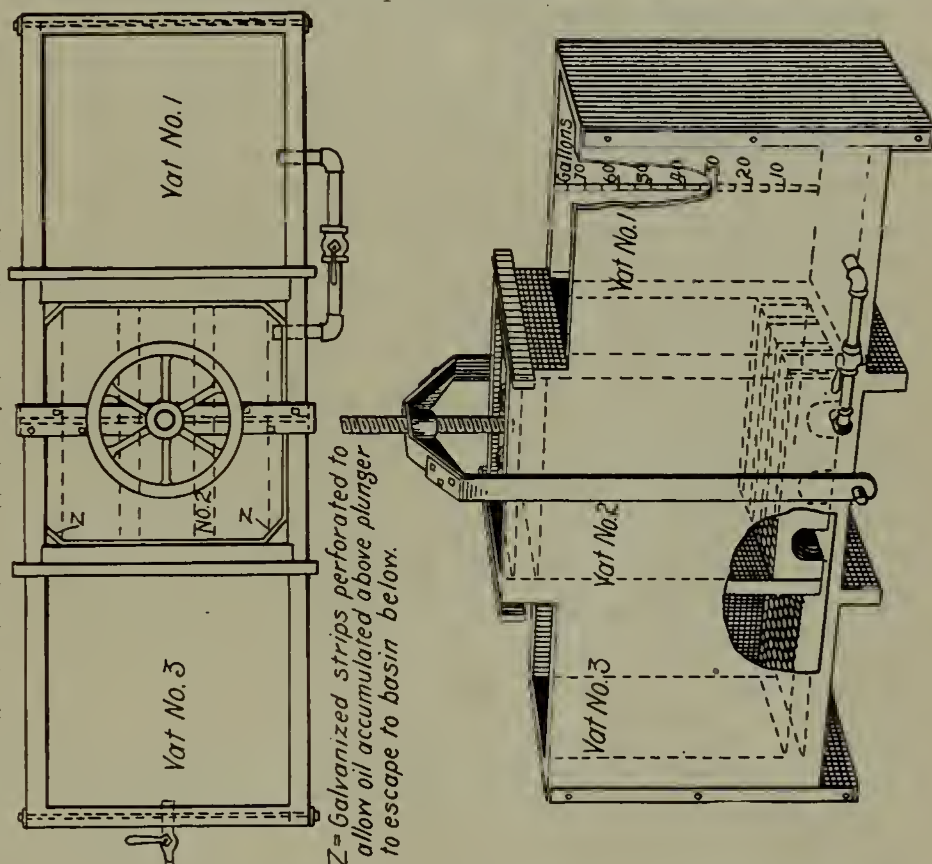
DURING a period of more than twenty years in railroad service directly connected with the oil business, I have noticed with regret the crude and unsatisfactory manner that packing has been and still is being prepared in a majority of places.

At almost every shop or station, where cars are inspected, they have tubs, half barrels or cans for soaking the waste, and in many places they have cans with wire screen false bottoms for draining the packing after the same has been saturated.

But the need of a quick, sure and economical way of preparing this material has led me, with the assistance of some friends, to perfect a machine for doing this work, which has proven very satisfactory to all who have used it. It consists of a wooden or iron box, having three partitions or vats (as shown in blue prints). It can be made as cheap of iron as of wood, thereby making it fire-proof.

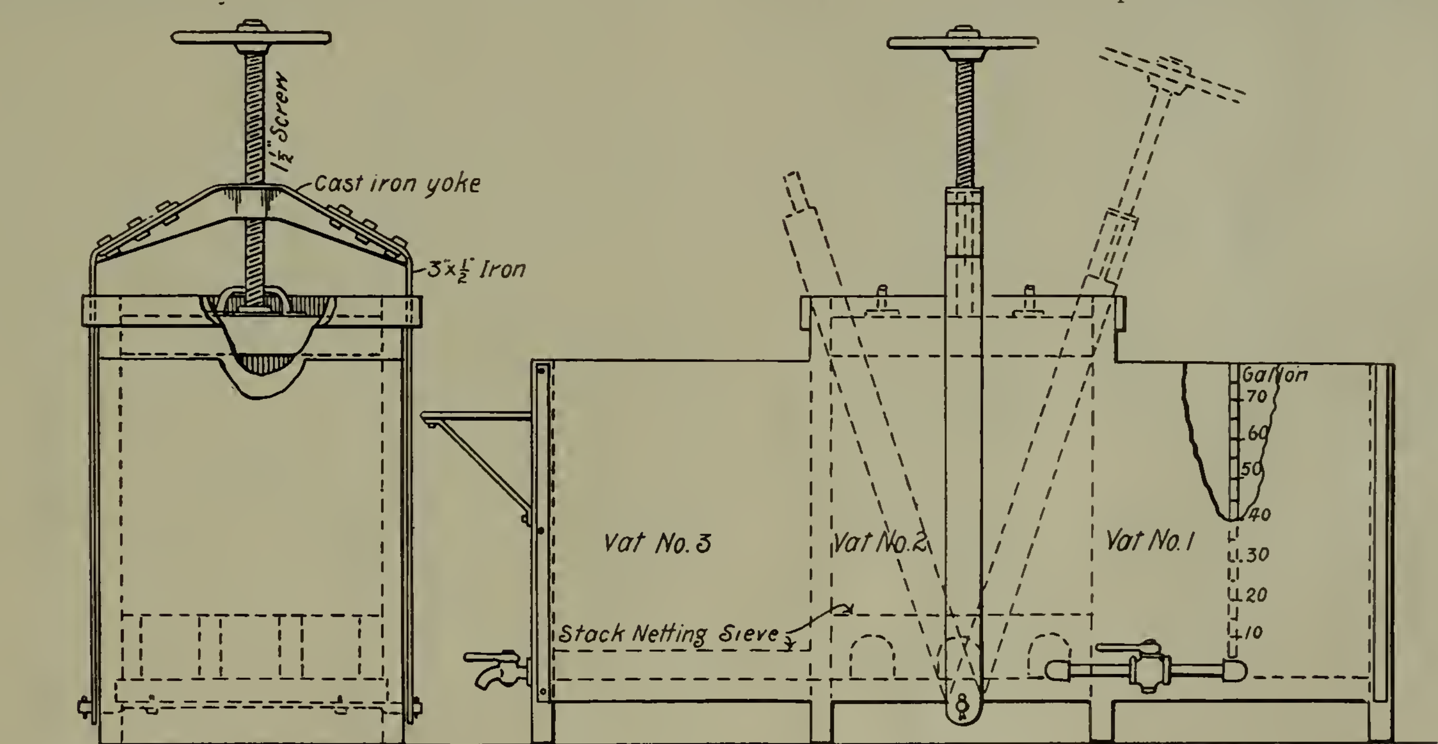
This machine has developed and proved some conditions which, although not new, had not been fully demonstrated, one of which is that forty-eight hours' soaking is none too long to properly saturate or ripen the packing, even when it is completely submerged in a bath of oil.

The process of preparing the packing is as follows: Place sixty pounds of wool or cotton waste in vat No. 1, pouring over same sixty gallons of car or coach oil. This will entirely cover the waste, making an oil bath. Let it remain for forty-eight hours at a temperature of 70 degrees. This time will be sufficient to thoroughly saturate and ripen the packing. Now remove the packing to vat No. 2, which, you will notice, has a stacknetting screen six inches from the bottom of the vat. Place the pressure block on the waste and screw it down. Should any oil raise and cover the pressure block it will drain at once



Vats for Treating Packing.

to the bottom, through the perforated corners. As the pressure is applied the excess oil will be driven through the connecting pipes from vat No. 2 back into vat No. 1. Careful experience has shown that four



Vats for Treating Packing.

*Paper presented at the February meeting of the Rocky Mountain Railway Club.

pints of oil to one pound of waste is sufficient and all that it will hold without dripping. So continue the pressure until thirty of the sixty gallons first put in the waste has been forced into vat No. 1. Now close the stop-cocks (as shown), and you now have thirty gallons ready for soaking more waste. It is easy to determine when you have pressed the amount you desire to remove from the packing, by having a fixed scale of gallons per inch, placed inside of vat No. 1, located where the operator can see it, or having a measuring rod and measure frequently. Now release the pressure and remove the block, placing the screw clevis to the side next to vat No. 1 to be out of the way, and remove the packing to storage vat No. 3 for issuing same as needed. You will notice that at the bottom of this vat there is also a stacknetting screen, and as the oil will continue to drain, becoming dry on top, the oil accumulating at bottom should be drawn off through the end faucet. This oil must be poured over the top of waste each morning and evening, thus keeping the packing perfectly saturated all the time. This process of extracting the surplus oil, although taking some time to describe, can be very quickly done, and the machine is ready for recharging with new waste. If the machine is placed in an oil house or room, where a pump is used, the oil can be transferred through an overhead pipe direct from the car oil-tank to vat No. 1, thus avoiding any handling of oil in buckets or measures.

Some of the advantages of this process are: Should your car oil be heavy and thick, as is often the case in winter, and slow to penetrate the waste, the pressure forces it through every particle of the packing, thus preparing it for immediate use under adverse circumstances.

Should you desire to leave four, five or six pints of oil to the pound of waste you can do it exactly, and know that your waste holds just the amount of oil you want in it all the time. These are important features; for to introduce packing into an oil box, without having the waste fully saturated, is but to invite hot boxes and train delays, etc.

I believe the question of perfectly saturating the waste has not received the attention that it deserves, and which is now demanded by the increased size and weight of the present motive power and rolling stock, and this work will have to be done along the lines I have indicated to meet with the success necessary in modern railroading.

In order that advantage may be taken of what this device will accomplish, I will gladly furnish free a blue print of this machine to any railroad company that will build one or more of them, for they will save them oil and waste, and us Galena oil men trouble with hot journals and hotter officials.

The Car Foremen's Association of Chicago.

March Meeting.

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Chicago, Wednesday evening, March 13th. President Sharp called the meeting to order at 8 p. m.

Among those present were the following:

	Donovan, A. G.	Mehan, J. E.
	Earle, Ralph.	Marsh, Hugh.
	Evans, W. H.	Mileham, C. M.
	Grieb, J. C.	McOmber, A. H.
Ackerman, J.	Guthenberg, B.	McAlpine, A. R.
Anderson, Geo.	Goehrs, H.	Olsen, L.
Borrowdale, J. M.	Goehrs, W. H.	Powell, C. R.
Brown, J. W.	Gruhlke, Edw.	Parke, P.
Blohm, Theo.	Hansen, A. P.	Perry, A. R.
Bates, Geo. M.	Helwig, H.	Stewart, H. A.
Chambers, Frank.	Hurlehey, J.	Sharp, W. E.
Carter, W. A.	Hall, W. B.	Schultz, F. C.
Callahan, J. A.	Kirby, T. B.	Stimson, O. M.
Carey, C. H.	Kline, Aaron.	Showers, G. W.
Cardwell, J. R.	Kuhlman, H. V.	Schoeneberg, C.
Carman, J. P.	Kalas, A. F.	Thomson, Geo.
Cornwall, J. R.	Ketchum, I. J.	Terry, O. N.
Cook, W. C.	Krump, M.	Wessell, W. W.
Chadwick, A. B.	Kroff, F. C.	Wentsel, Geo.
Cather, C. C.	Lauer, John.	Williams, Thos.
Deen, Chas.	La Rue, H.	Wirtz, L. C.

President Sharp: As the minutes of the previous meeting have been printed in the Railway Master Mechanic, we will dispense with the reading of the same.

Secretary Kline: The following have made application for membership:

J. W. Brown, Assistant Foreman, C. M. & St. P. Ry., West Milwaukee, Wis.; Wm. Bickford, Air Brake Man, Swift Ref. Line, Chicago; H. G. Griffin, Car Inspector, L. S. & M. S. Ry., Chicago; A. Heller, Car Inspector, C. L. S. & E. Ry., Chicago; John Haley, Car Inspector, C. T. T. R. R., Chicago; F. M. Keiser, Car Inspector, N. Y. C. & St. L. R. R., Chicago; A. F. Kalas, Salesman, The Railroad Supply Co., Chicago; C. C. Marshall, Car Inspector, C. L. S. & E. Ry., Clark Station, Ind.; H. D. Mohr, Clerk, D. L. & W. Ry., Scranton, Pa.; Jas. Puddicombe, Foreman, C. L. S. & E. Ry., Joliet, Ill.; I. Thompson, Foreman, Streets Western Stable Car Line, Chicago; A. L. Yost, Foreman, C. R. I. & P. Ry., Rock Island, Ill.

President Sharp: On account of the very excellent report prepared by the committee appointed to revise the M. C. B. rules, and as it is of considerable length we thought best to change the program and take it up at once, and I will ask Mr. Stimson, chairman of the committee, to read his report, section by section, and we will pass upon it as it is read.

The committee on proposed changes in the M. C. B. rules, consisting of O. M. Stimson, chairman; C. C. Cather, C. M. Mileham, F. C. Kroff, and T. R. Morris, then reported through its chairman as follows. All sections were approved as read except as otherwise noted:

Promptly upon notification by the President that such a committee had been appointed, the chairman of the committee caused a circular to be sent to each member of this Association, over 400 in all, notifying them of the appointment of the committee and requesting them to communicate any changes they had to propose direct to the chairman of the committee not later than March 1, 1901.

The committee regrets to state that comparatively little interest was manifested in this important request, as was evidenced by the number of replies received. It was therefore thought necessary to call the members' attention to the fact, which was done by the Secretary when sending out notices for the March meeting. This resulted in bringing the total number of replies up to 24, which is hardly 6 per cent of the total membership.

The committee is pleased to state, however, that among the replies received were those of representatives of most of the large railroads and private car lines entering Chicago.

Of the total number of replies received, four stated that they had no changes to propose, while the remaining proposed an aggregate of 150 changes. Many of these latter, however, were practically the same, differing only in the phraseology, while many others referred to the sections affected or made obsolete by the universal adoption of the M. C. B. coupler.

After having given due consideration to the suggestions of all members who made replies to the committee's request, and after devoting as much time and thought on the part of the committee as the limited time at its disposal would permit, your committee suggests that this Association recommend to the Master Car Builders' Association, that changes as enumerated below be incorporated in the rules for 1901.

Rule 1. After the word "packing" insert "brake adjustment," making the rule read as follows: "Each railway shall give to foreign cars while on its line the same care as to oiling, packing, brake adjustment and inspection that it gives to its own cars."

Rule 3, Section 1, 2d paragraph. Omit reference to Sections 34 and 35.

Rule 3, Sec. 13. Flat sliding: If the spot caused by sliding is 2½ inches or over in length and spot on the mate wheel 2¼ inches or over at same point of wheel, caused at same time. (Care should be taken to distinguish this defect from worn through chill.)

Rule 3, Sec. 16. Insert "limit of ¼ in. for worn collars," making section read as follows: "Axles broken or having seamy journals, fillets at the back shoulder worn out, or with collars broken or worn to less than ¼ in. under fair usage."

Rule 3, Section 17. Change section to read as follows: "Axles less than the following prescribed limits:

Capacity of car.	Journal inches. Com.	Journal inches. Refg.	Wheel Seat inches. Com.	Wheel Seat inches. Refg.	Center inches. Com.	Center inches. Refg.
100,000	5	...	6¾	...	5⅞	...
80,000	4½	5	6¼	6¾	5 5/16	5⅞
70,000	4	4½		6¼	4⅞	5 5/16
60,000	3¾	4	5	5⅝	4⅜	4⅞
50,000	3½	3¾	4¾	5	4⅛	4⅜
40,000	3¼	3½	4⅝	4¾	3⅞	4⅛
30,000	3	3¼	4¼	4⅝	3½	3⅞
20,000	2¾	3	4¼	4¼	3½	3½

In the consideration of this particular part of the report it should be noticed that there is a greater difference between the limit of 60,000 and 70,000 lb. axles than there is between the 50,000 and 60,000 axles. You will note by reference to your rules that the limit dimensions of the center of 50,000 lb. axles for an ordinary car is 4⅛ in.; for a 60,000 lb car 4⅜ in., an increase of ¼ in., whereas the increase from 60,000 to 70,000 lb. capacity is ½ in., being from 4⅜ to 4⅞ in. Therefore if this report is adopted it would appear that axles for 60,000 lb. refrigerator cars would be condemnable by the limit measurements, which is ¼ in. larger than the axle when new. Therefore we trust that there will be a very general discussion of this particular paragraph in our report.

Mr. Grieb (C., M. & St. P.): I would like to get a little information from the parties recommending these sweeping changes, as to the necessity for making them, as to whether they have found that the journals, wheel seat and centers of axles for refrigerator cars require such a marked difference in limitation of size as compared with the ordinary cars. It seems to me that holding the 60,000 lb. axle down to ¼-in. wear on the journal and the limitation as to diameter of center would cull out an abnormally large number.

Mr. Kroff: The party that suggested this has the following to say: "Axles less than the following prescribed limit." I think this section should be corrected to read: 'Axles less than the following prescribed limits, except refrigerator cars, which must have axles of greater dimensions than their marked capacity.' For instance, a 40,000-lb. refrigerator car should have a 50,000 capacity axle, a 50,000 capacity refrigerator car a 60,000-lb. axle, and so on; also correct the last line of section to read 'all cars must have their capacity stencilled on them.' My reason for this recommendation is that refrigerator cars are built heavy in themselves, and, together with the ice which is in them, there is an extra weight on the axles not on the ordinary cars, therefore the axle limit should be greater than their marked capacity."

I will say this, that it is very necessary to have the capacity stencilled on all ordinary cars for safety. Now, as I understand it, the point is this: That with the same construction of car—a refrigerator and the ordinary box car—there is a difference in light weight of from ten to twelve thousand pounds more on a refrigerator car then on a box car, and, therefore, I believe this is a very good change and should be made for safety.

Mr. Grieb: I would like to ask Mr. Kroff, inasmuch as he has touched upon one side of the question, whether refrigerator cars are subjected to the same conditions as to loading, particularly as to overloading, as an ordinary car.

Mr. Kroff (P., F. W. & C.): I think that the weigh master judges by the marked capacity and of the weight in the car, and therefore I think it could be determined by him, if the capacity mark is on there, whether it is overloaded or not.

Mr. Bates (C., B. & Q.): In my experience I find that refrigerator cars are very seldom overloaded, but notwithstanding this fact, the most axle breakages over our way occur on refrigerator cars and our company had is classed as a refrigerator in this report; in this we can load a maximum of 35,000 lbs.: add 5,000 lbs. ice, and average light weight of the car being 37,000 lbs., we have a total weight of car of 77,000.

One of the members has suggested that we do not always control the loading of these cars. I want to say that we do. Our transportation department controls the loading of them. No one is allowed to load our cars without our permission and they are not permitted to load cars with pig iron, bar iron, or commodities of that class and overload the car, and I think in view of these facts that the committee's report as presented here is wrong. I do not think there should be any distinction between a refrigerator car and a common car. I also want to call attention to the fact that the recommendation as to a 60,000-lb. capacity axle calls for 4⅞ in. center. That alone would condemn every 60,000-lb. axle in use today because it is ⅛-in. larger than they were made new.

Mr. Kroff: I would say this from my own experience, that some time ago I had an Armour tank line car that came from Galena, I think, which was loaded to 66,000 lbs. and it was a 50,000-lb. capacity car. In connection with refrigerator cars I will say that they are often loaded with boxed meat and I have opened them frequently myself in order to replace head king bolts, and I found that lots of times I could put another load in them just like the original. Therefore, I believe that the change should be made for safety, if for nothing else.

Mr. Wirtz (A. C. L.): Mr. Kroff has just stated a case that may all be true, but the car may not have been loaded to its full capacity. There may have been only 20,000 lbs. in the car, the minimum instead of the maximum, yet, as he said, they could have nearly doubled the load in the car, and still it would have been safe.

Mr. Marsh (C., N. Y. & B.): I do not believe that this little instance in regard to a tank line car being overloaded has anything to do with a refrigerator car. I do not believe that the ratio of broken axles under refrigerator cars is any larger than under ordinary cars, and if it is not, then it must be a fact that the axles under refrigerator cars to-day are of sufficient strength.

Mr. Mileham (S. W. S.): For my part I cannot see where there should be any distinction between the axles in ordinary cars and in refrigerators, both carrying the same load.

Mr. Cather (I. C.): If I remember right, the argument prevailing with the committee in submitting this change, was mainly this: That the Master Car Builders' Association had provided a minimum axle for a certain capacity car, and when an axle is below that minimum, or rather loaded beyond the capacity of that particular axle, it is dangerous. Now, it is true, of course, that the weight of the car, as well as the load, is on the axle, and it looked to the committee that if a 4¼x8-in. journal was safe to carry 60,000 lbs. load, that a 4¼-inx8-in. journal was not safe to carry 70,000 lbs. load, and it was generally conceded that a refrigerator weighed about 300 refrigerator cars built two years ago with 60,000-lb. axles which were marked down to 50,000 lbs. for that reason. We thought it good, safe practice to have heavier axles than the marked capacity. We have some cars of 40,000-lb. capacity, with 60,000-lb. axles under them. I think it a good recommendation, although it will no doubt work a hardship on some private refrigerator companies if adopted.

Mr. Sharp (A. C. L.): I agree with the committee that we should take every precaution towards the safety limit of the axle, and I regret to take any exception to this valuable report, but the recommendation made to place 10,000 lbs. extra to the credit of a refrigerator car over and above the ordinary car seems a little bit exaggerated, or it seems we are going from the safety line right in the other direction to too great an extent.

Here is a sketch of a 50,000-lb. axle (referring to sketch). We use 4x7 journal 5-in. wheel seat, and 4⅜-in. center—which are about the M. C. B. limits, for 50,000-lb. capacity cars. Mr. Kroff, in explaining this, says that the gentlemen making the recommendation states that the cars are built heavier in the beginning. That is true to a certain extent, but not to so great an extent as Mr. Kroff mentioned. The Armour Car Line's cars average from 31,000 to 37,500 pounds light weight, and the average weight of the ordinary freight car is about 32,000 lbs. Now, we will take the loading of a refrigerator car as compared with the ordinary car of 60,000 lbs. capacity. To begin with, ordinary cars are allowed to be overloaded 10 per cent., therefore a 60,000 capacity car can be loaded with safety to 66,000 lbs. The average light weight, as shown in this chart for

LOADING AND WEIGHTS OF CARS.

Beef Cars.	
Maximum loading A. R. L. cars	22,000
Add. for ice in tanks	5,000
Average weight of cars	37,000
Total	64,000
Provision Cars.	
Maximum loading	35,000
Add. for ice	5,000
Average weight of car	37,000
Total	77,000
Ordinary freight cars, capacity	60,000
Maximum loading	66,000
Weight of cars	30,000
Total	96,000

an ordinary car, is 30,000 lbs., which is low. Figuring on this basis, it would make a total weight of 96,000 lbs. when loaded. Now compare this with a refrigerator car or what we call a beef car. In the beef car we can only get a maximum of 22,000 lbs. of beef; we will ice that car with 5,000 lbs. of ice, and the average light weight being 37,000 lbs., we have a total weight of 64,000 lbs. against a total weight of 96,000 lbs. for an ordinary car. Take what we call a provision car, which about 10,000 lbs. more, on an average, than the ordinary box cars of the same general dimensions and capacity, and that thus 10,000 lbs. additional weight was on the same class of axle. Now, suppose a 60,000-lb. axle applied to a refrigerator; that refrigerator should be stencilled 50,000 lbs. on account of the 10,000 lbs. additional weight of the body on the journals, and it does not seem to me that this would be unreasonable.

Mr. Marsh: I would like to ask if the committee has any table formulated showing the ratio of broken axles under refrigerator cars as compared with ordinary cars.

Mr. Stimson: The committee has no information of that character, but I may state that I keep an accurate record of axles that break under the cars of the company I represent and from the best information I can get our average of broken axles is less than that which occurs under other ordinary cars. That information was given to me, not officially, but as one foreman would give to his brother foreman similar information, and if that is true I see no reason why there should be any occasion for increasing the sizes, but being the chairman of the committee and abiding by its decision, although I may be opposed to it, I, of course, must accept the committee's report as it is presented. I think that what has been said on the subject fully covers the ground, but some of the practical men who come in daily contact with these conditions and handle refrigerator cars, coal cars, etc., may be able to advance some other reason why it should be necessary to increase the sizes of the axles.

Mr. La Rue (C., R. I. & P.): It seems to me that for us to make a stand on this axle question is a very grave matter. What has brought this suggestion of a change? It seems to me that it is the trouble that the railroads have been having in the handling of these refrigerator cars. What the exact trouble is—whether it is some weakness of the axle or overloading, I am unable to say with such short notice. I think that this matter of axles ought to be considered fully and data gathered to show most positively what the trouble is.

Mr. Evans (B. & O.): I do not understand that this proposed change would work any hardship to owners of refrigerator cars for the reason that a 60,000-lb. capacity car to-day should not have less than 4-in. journals. One criticism that can be held against refrigerator car companies is that they have held on to the small axle while the railroad companies are forging forward to a heavier axle. As to the change in the wheel seat and the centers, that would possibly work a hardship because they are a little bit heavier.

There is one thing in regard to the journal that has not been mentioned this evening. I think refrigerator cars should have a large percentage of safety as far as journals are concerned, because they are always hauled in fast freight trains and naturally are more liable to run hot than ordinary box cars. That has been my experience at least. In regard to overloading refrigerator cars I will say that we have had experience with refrigerator cars being overloaded with butter and butterine, and have had trouble with cars loaded with that product running hot, which in my opinion is conclusive evidence that it is possible to get the full capacity of the car in it.

Mr. Goehrs (C., M. & St. P.): I do not think I have ever had a case of an axle breaking under a refrigerator car. Most axles break under light capacity cars; and as far as overloading refrigerator cars is concerned I do not think there is one in a hundred that is overloaded. There may be such a thing happen that a car can be overloaded with butter or boxed meat, but I have not seen it. As to increasing the capacity of the axles in refrigerator cars because one or two have been overloaded, I do not hardly think it is fair. There are twenty cars that are not loaded to 30,000 lbs. where there is one that is loaded to 50,000. We have about 1,200 refrigerator cars of our own and from what I have heard here to-night it seems that most of you represent refrigerator line cars. There are refrigerator cars owned by almost every railway company in the country and they all seem to have the same opinion that I have, that for refrigerator cars it is not necessary to have heavier axles than for any other car. We take our 60,000-lb. cars which are stencilled so, and they overload them to 67,500, but we do not allow 70,000 lbs. to be loaded in them by anybody. Of course refrigerator cars run faster in a good many trains, but I think when they are loaded with products out in the country, unless it is on a long trip, they will not be overloaded.

Mr. Cardwell (A. C. O. Co.): Any car can be overloaded if we want to load it with iron or anything of that kind, and I cannot see, from the evidence that has been presented here to-night, that we are warranted in recommending a change of this nature. There are other causes for axles breaking aside from cars being overloaded. I do not think I have had one break yet that there was not some cause for it—flaw or crystallization—and I do not think we ought to pass a recommendation of this nature without knowing the ratio of axles in refrigerator cars because one or two have been cars. In making up this ratio they should consider the number of cars hauled. I will make a motion that this recommendation be stricken from the list.

Mr. La Rue: I would like to make an amendment that we recommend to the Master Car Builders' Association that they take notice of this section relating to the different sizes of axles and leave the matter with them to take such action as they see fit.

The orginal motion was put and carried by a rising vote.

Your committee suggests that the limit of reduction in the size of the wheel fit of axle for 80,000 and 100,000 capacity cars is not sufficient, but makes no recommendation as to whether the size of axle should be increased, or the limit size decreased.

Rule 3, Sec. 21. Change to read: "Journal bearings which require renewal by reason of change of wheels or axle, for which the delivering company is responsible, regardless of the previous condition of the bearings."

Rule 3, Sec. 22. Add after the word "brakes" the words "not elsewhere provided for," making section read: "Defective, missing or worn-out parts of brakes not elsewhere provided for, which have failed under fair usage, except missing material on cars offered in interchange."

Rule 3, Sec. 23. Reduce the time limit from twelve months to nine months, making section read as follows: "Cylinder or triple valve of air brake cars not cleaned and oiled within nine months, and the date of last cleaning and oiling marked on the brake cylinder with white paint."

Rule 3, Sec. 25. Add at the end of section, "broken triple valves, cylinders and reservoirs."

Rule 3, Sec. 28. Add at the end of section: "When more than two sills under a refrigerator car are found broken at one end, that could not be detected until the floor and insulation had been removed, responsibility shall be decided by each party calling in one disinterested car foreman, they to choose a third and a decision of the three to be final as to whether the repairs are chargeable to owners or delivering line."

Rule 3, Sec. 29. Substitute the word "couplers" for "drawbars."

Rule 3, Sec. 34. Omit entirely.

Rule 3, Sec. 35. Omit entirely.

Rule 3, Sec. 37. Change to read: "Uncoupling attachments of M. C. B. couplers offered in interchange, must be operative to comply with the requirements of the Safety Appliance Act—if inoperative, repairs shall be made instead of issuing M. C. B. defect card."

Rule 3, Sec. 38. Omit reference to Sections 34 and 35.

Rule 3, Sec. 39. Omit the words "or draw bar," and substitute the word "coupler" for "draw bar" in the second line.

Rule 3, Sec. 40. Substitute the word "coupler" for "draw bar" in the first line. Add "All damage resulting from cars knocked off center aside from broken center pins, center plates and center plate bolts."

Mr. Grieb: I would like to be advised whether it is the intention to charge for the renewal of center pins, plates and bolts under all conditions?

Mr. Cather: My understanding was that if additional damage other than the king bolt, center plates and center plate bolts was caused at the time of the damage—for instance if the bolster or sills are broken in addition thereto, no charge should be made at all.

Mr. Stimson: I understood that when the car left the center it was on account of defective king bolt—partially broken or of insufficient strength, and that was to be considered as owner's defect, but the consequential damage was to be considered as rough usage.

Mr. Grieb: It seems to me that the construction of that particular section, as stated by Mr. Stimson, is inconsistent with the general tenor of the rules. It represents a case of unfair usage and still you allow charge for certain items. I think it is entirely wrong. If you damage a car beyond a certain limit, defined as unfair usage, you are responsible for all damage done.

Mr. Mileham: The question was that if a car was knocked off the center and was put back again immediately, no further damage would result. The additional damage is caused by hauling the car around the yard while it is off center.

Mr. Bates: I have seen quite a number of cars knocked off the center and they invariably only need a king bolt, but where the parties knocking them off neglect to make the repairs they should stand the other damage. Quite often you will find the trucks under the center of the car when repairs are not made at the time of original damage, but generally speaking they are not knocked under the center of the car and I would be in favor of voting for this with that understanding. It is just the same as when, if an axle breaks under a car, you can charge for the axle but not for any additional damage.

The recommendation was here put to a vote and lost by a rising vote.

Rule 3, Sec. 41. Substitute the word "coupler" for "drawbar" on first line, and cut out the words "or drawbars" on the second line.

Rule 3, Sec. 42. Cut out the words "or drawbar" on second line and substitute the word "coupler" for drawbars" on third line.

Rule 3, Sec. 44. Cut out the words "or drawbar" about the middle of second line—substitute the word "coupler" for "drawbar" next to last word on second line—substitute the word "coupler" for "drawbar" on third line.

Your committee recommends that, in consideration of sections 39 and 47, missing couplers, pockets and spindles should be construed as forming combination of unfair usage, the same as if they were not missing, but damaged.

Mr. Grieb: In my opinion this recommendation is unnecessary, it being self evident that if the coupler and its attachments is recovered they cannot be regarded as missing; and if it is missing, their condition, of course, cannot be ascertained, and current practice requires that the owner be given the benefit of the doubt, and consequently no charge would be made.

Rule 4, Sec. 2. Omit figures 4 and 6 from exceptions to this section.

Rule 4, Sec. 3. Add new section after section 3, reading: "In making repairs for which owners are responsible, 30-in. or 36-in. wheels may be replaced with 35-in. wheels, if practicable.

Mr. Mehan (C., M. & St.): I do not think it is consistent with good practice to replace 36-in. wheels with 33-in. wheels—that is, one pair in a truck containing two pairs of 36-in. wheels. Both pair of wheels in one truck should be removed if they are to be replaced with 33-in. wheels.

Mr. Prickett: It does not seem to me that that section would be practical, because some railroads are maintaining 30-in. wheels, and we should not replace them with 33-in. wheels without first getting authority from the owners to do so.

Mr. Goehrs (C., M. & St. P.): While we are recommending these changes I would suggest that we recommend to the M. C. B. Association that 36-in. wheels be condemned entirely under freight cars, as there is only one road that I know of that uses them.

Mr. Cather (I. C.): There is only one road that uses them, to my knowledge, and that is the Illinois Central. I do not consider that it is of any material value, so far as the care of cars is concerned, as to how many roads use them. It is not a matter as to whether that particular appliance is of particular benefit or detriment. A car goes out with certain standards and it is due to that car owner, if the car is accepted in interchange, that that standard be maintained. There are various cars with various classes of draft rigging, of no particular standard; at the same time one would not be permitted to substitute any different kind of a draft rigging for one standard to car, even if M. C. B. standard. Now, as a matter of fact, so far as 36-in. wheels go, there is no extra expense involved upon any road beyond the difference in value of 33-in. and 36-in. wheels. You put in a pair of 33-in. wheels and when the car gets home the 36-in. wheels are substituted and proper credit given for the 33-in. wheels.

Mr. Grieb: I must take exception to some of the remarks made by Mr. Cather, that railroads are not subjected to expense in maintaining oddities that are placed on cars. It inflicts hardships on railroads handling those car in repairing them with a special lot of material that can only be procured from the owners. There is the extra shifting and storage of such cars in yards for months. Again, we have got to accept those wheels at Chicago, consider one pair possibly as a carload, and cart them all over the line in order to make repairs. There is the double labor charge—you put the wheels in and the other party takes them out, for both of which you pay. We certainly will allow that people have the privilege to use such oddities as they desire, but they should be willing to stand the expense of maintaining them.

Mr. Cather: I agree with Mr. Grieb's statement and erred in my previous remarks in stating that the only expense would be in the difference in the material value of the two sizes of wheels. There would be an expense, of course, in the labor involved in changing the wheels, but there is no more proportionate difference of expense than on any other class of wrong repairs—there would be a material and labor charge in case of any wrong repairs. I do not believe it is fair to make the owner stand the expense of wrong repairs in case of 36-in. wheels and all other classes of wrong repairs be excepted. In other words, if an exception is to be made for wrong repairs in one case, it would have to be made in all cases. There are roads that use an axle with 7½-in. journal. We cannot, according to the rules as they exist to-day, put in an axle with 7-in. or an 8-in. journal and expect the owners to accept it. When the car gets home the owners would put in an axle standard to the car and give us proper credit for the axle removed. If this is true in the case of axles, the same is true of the wheels.

The recommendation was adopted by a rising vote.

Add new section: Couplers of the vertical plane type other than M. C. B. standard, may be replaced with M. C. B. standard, and the expense of alteration thus necessitated charged to the car owners.

Rule 4, Sec. 4. Omit.

Rule 4, Sec. 5. In the second paragraph on second line insert the words "draw or truck springs" after the words "wheels or axles," making paragraph read, "When M. C. B. couplers, knuckles, metal brake beams, wheels or axles, draw or truck springs are replaced under conditions which make them chargeable to the owners, it must be plainly stated on the repair card and stub whether the material is new or second hand."

Rule 4, Sec. 6. Omit.

Rule 4, Sec. 7. Substitute the word "couplers" for "drawbars" in second line. Substitute word "couplers" for "drawbar" in last line.

Rule 4, Sec. 13. Change the last four words to read: "Size of the journal."

Rule 4, Sec. 14. Add after first paragraph the following: "Repair card and stub shall be made out by the party doing or overseeing the work at the time repairs are made, and should also specify whether the repairs were made at both ends of the car in all cases where the information is not self-evident. If not specified the repairs shall be considered as all at one end."

Rule 5, Sec. 7. Cut out the word "draw bar" in second line, substitute the word "draw" for the word "drawbar" on the sixth line. Cut out the words "drawbars or" that lap from the next to the last to the last line.

Rule 5, Sec. 9. Recommended that prices of wheels and axles be reduced to correspond with what they were in the rules of 1899.

Mr. Grieb: It seems to me that this recommendation is one that is beyond the province of the members of the Car Foremen's Association. Not many of us are wheel makers or familiar with the market price of wheels, and I would move that the matter be referred to the Committee on Prices, with a kind note inviting their attention to the prices.

Motion carried.

Insert after paragraph closing as follows: "No charge shall be made for any difference in value between the parts used and those removed, that are not damaged," the following: "When second hand wheels and axles are applied to foreign cars, they must be in good, serviceable condition. Such wheels or axles to be treated as wrong repairs in case they are removed within 30 days from time of application account being worn out."

Rule 5, Sec. 13. Following the part which refers to the weight of scrap to be credited for bearings, add the words "whether bill is rendered on defect card or not."

Rule 5, Sec. 13. Cut out the words "link-and-pin" in the fourth line of second paragraph, and the words "drawbars and," in the fifth line of second paragraph.

Rule 5, Sec. 17. Insert on second line after the words "brake beams" the words "draw or truck springs," making section read: "When M. C. B. coupler parts, metal brake beams, draw or truck springs are replaced, good second hand material may be used, but they must be charged at 75 per cent. of price when new. The credit for similar parts released from service in good condition must be 75 per cent. of price when new."

Rule 5, Sec. 22. Add provision for labor charges as shown below:

	Ord. Cars. Hrs.	Ref. Cars. Hrs.
American continuous draft rod, blacksmith labor on rod per end repairing...	1	1
Coupler with pocket fastened by rivets, blacksmith labor	1	1
Truck transoms, two, wood, in same truck renewed	12	12

Mr. Mehan: The rules already provide that two hours may be charged for blacksmiths' labor in repairing American continuous draft rods. It says, "renewing or repairing." The intention was to charge two hours if a new rod was applied, but if the old rod was welded and put back, an additional two hours could be charged for blacksmith labor.

The general opinion seemed to be that the rules were not specific on this point and the recommendations were adopted.

Rule 5, Sec. 22. In the table, the provision for "running board, one, complete applied," the word "one" is superfluous and should be eliminated.

To prevent confusion of the words "replaced" and "renewed" in the table of labor charges, it is recommended that they be corrected to conform to their grammatical meaning.

Rule 5, Sec. 23. In the first paragraph, change the word "applying" to "renewing"; also after words "locking pins" should be inserted the words "lift chains," making paragraph read: "No charge to be made for labor of replacing or renewing M. C. B. knuckles, knuckle pins, locking pins, lift chains, clevises, brake shoes or brake shoe keys."

Rule 5, Sec. 25. Make prices for 60,000 and 50,000 or under trucks, as shown below:

50,000, and under, wood bolster and wood spring plank, or wood bolster, wood transoms and wood spring plank	$160.00
50,000, and under, metal transoms with wood bolster	240.00
50,000, and under, all metal	250.00
60,000 wood bolster and wood spring plank, or wood bolster, wood transoms and wood spring plank	175.00
60,000 metal trucks and wood bolsters	260.00
60,000 all metal	275.00

As the members of this association were not familiar with the market price of trucks, or a majority of them, at least, it was moved and carried that this matter be referred to the M. C. B. Committee on Prices, without reference to what prices should be allowed, merely calling attention to the fact that a change in price should be made.

Your committee recommend suggesting to the M. C. B. Association that a special committee be appointed to make investigation and design a wheel for cars of 80,000 and 100,000 lbs. capacity, strengthening the flange as much as track conditions will admit; also to formulate rules, design gages, etc., governing the inspection and operation of said wheels.

Your committee wishes to extend its thanks to those members who made replies to their request, particularly to those whose replies indicate the very thorough and exhaustive manner the subject received attention at their hands.

At the same time we cannot refrain from at least calling this association's attention to the lack of interest in this important subject on the part of at least a portion of the 94 per cent who failed to make replies to the committee's request, which does not harmonize with the good resolution made by most members in the early part of the present year.

Mr. Goehrs (C., M. & St. P.): While there have been a great many different changes proposed here tonight, there is one that I would like to suggest, and it is very simple. Change Sec. 27 of Rule 3 to read: "If the car has air-signal pipes or air-brake pipes, but no air-brakes, it shall be equipped with hose and couplings." My reason for this is that if trainmen find a car equipped for "straight air" without hose in their train, they will, if they wish to use the air, remove hose from another car in order to avoid switching, and the railroad company over whose line such a car passes is the loser, as the hose is most likely never removed when the car passes to another line.

President Sharp: We will be glad to have that recommendation accompanying the committee's report, as a recommendation coming from Mr. Goehrs.

Upon motion the report of the committee was accepted as a whole, as corrected, and the committee discharged.

The meeting then adjourned.

It is the intention to hereafter print in the Railway Master Mechanic the program of this association for the following month—that is, the April issue will contain the program for the May meeting, the May issue the program for the June meeting, etc., notice of the meeting to be sent by postal card. This to give the members a long period to study the questions to be discussed and thus be better prepared to talk.

Below is the program for the May meeting, which will be held May 8th, 1901.

No. 1. A received from B a foreign car with one draft timber broken, old, and one American continuous cross key bent on opposite end of car (no indications of rough usage). The car was taken over A's line to a point about 36 miles distant, where it was offered to C, but was refused on account of one draft timber broken, old, and two American continuous cross keys bent. A was obliged to make repairs. Can A make bill against the owner provided he secures joint evidence from B and C showing that the defects existed as stated above?

No. 2. A receives from B one of C's cars carrying B's defect card for four wrong draw lugs, which are again broken. A not having proper material, has to apply four more wrong draw lugs. Should A issue another card?

No. 3. A car is returned to the owners after having sustained damage to end sill, deadwood and draft timbers requiring their renewal. The coupler, with pocket rivetted to same, is missing. All of the items are properly covered by defect card. The question is, what labor charge is proper—particularly can any charge be made for the expense incurred in assembling the parts of the coupler and putting it together.

No. 4. In cleaning and oiling triple valves and the application of triple valve gaskets and check valve case gaskets at the same time, what is the proper charge to make? Should a charge of 10 cents for applying a triple valve gasket and 10 cents for a check valve case gasket be made in addition to the charge of 25 cents for cleaning and oiling? What is the common practice?

No. 5. Should not the practice of omitting to make bill or to apply repair card in case of making wrong repairs of owner's defects, be discouraged?

New Passenger Train--Texas Midland Ry.

The Texas Midland Railroad exhibited a handsome new passenger train, March 15, at the St. Louis Union Station. The train was built by the American Car & Foundry Co., at their St. Charles works, and consists of a combination baggage, postal and express car, one day coach, one chair car and one cafe car. The train is wide vestibuled with steel platforms. The outside color scheme is dark bottle green up to the window line, above which the cars are painted a dark chocolate, making a very pleasing effect.

The interior decorations are carried out in pale sea-green, the wood work, of oak, being stained green, and oil finished. The upholstering is dark green. The cars have empire decks and the head lining is decorated in green and gold, and the carpets and curtains are in hues to match. The entire inside decorative scheme is a very happy one and is restful and pleasing to the eye.

All of the windows are equipped with the Edwards' automatic window sash fixtures and with the Curtain Supply Co.'s shades; and the vestibules are equippd with automatic trap doors.

The entire train is illuminated by means of the Adams & Westlake system of acetylene gas lighting, with very elaborate and handsome fixtures, the lights being so arranged that it is possible to read the finest print in any portion of the cars with the greatest of comfort, and at the same time the lights are soft and pleasant to the eye. An engine and dynamo are located in the baggage car for the purpose of supplying electric light when required, the train being wired for this purpose. The entire train is equipped with the Westinghouse friction draft gear, high speed brakes, automatic air and steam couplers and American automatic slack adjusters.

A very large attendance of prominent railroad men viewed the train, which was the subject of very favorable comment on all sides.

Mr. E. H. R. Green, president and general manager of the Texas Midland Railroad Company, is certainly to be congratulated on his successful efforts in getting up a train that embodies the highest standards of safety, comfort and convenience in railroad practice.

New Texas Midland Train.

Inspection of Draft Attachments.

Boston, Mass., March 8, 1901.

To the Editor of the Railway Master Mechanic:

In your March issue, page 89, I notice Mr. Shannon's letter on "Inspection of Draft Attachments."

I agree with him fully, that all cars should have more attention given to tightening up than they appear to get. We are constantly going over our cars and tightening them up.

I think the great trouble with draft attachments is not on account of construction or neglect, but on account of the carelessness and rough handling that the engineers give the cars at the present time.

It is necessary for me to be around junction yards a good deal, and I have seen cars thrown on side tracks without any brakeman on the cars, and without any attempt to check them. Have seen cars strike each other with so much force that you could perceive the wheels jump from the iron.

Unless this matter is taken up vigorously with the operating departments of railways, especially in the switching yards, the repairs to cars will reach an alarming figure in the next few years, for the handling of cars is getting worse all the time.

Yours truly, A Car Owner.

Tropenas Steel Shop Wrenches.

We present a particularly interesting engraving reproduced from a photograph of a lot of railway shop wrenches, made from Tropenas cast steel. This lot of tools was made by the Sargent Company, of Chicago, from patterns supplied by a western railway, which had well defined ideas of what it wanted, both as to design and as to quality. The group of tools shown covers a wide range of plain wrenches, release valve wrenches, side, box, steam chest, crowfoot and socket wrenches, etc.

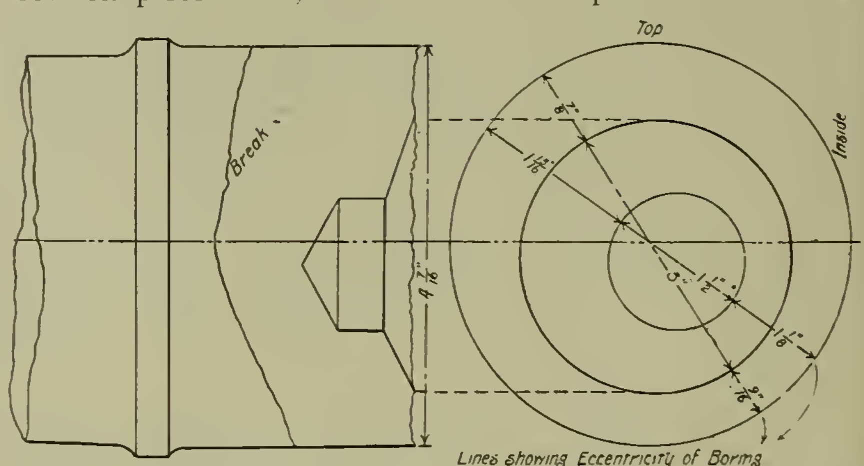
The Tropenas steel is particularly well adapted to uses of this nature. The process by which it is made consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of 3 to 4 lbs. pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese or ferro-silicon, or both, to bring up the silicon, manganese and carbon content to the specified proportions, when the metal is drawn off into a ladle and poured. The process is simple and the product regular. The peculiar advantage of the Tropenas process lies in the fact that the resultant metal is said to be much hotter and consequently more fluid than that produced by any other method, and it is this fact which makes it valuable in the manufacture of small and intricate castings, as it can be poured over the lip of the ladle in as small a stream as desired, and will run through thin sections, producing solid castings free from pin-holes and cracks.

The finished product is solid and true to pattern. These tools that we show are said to be stronger and harder than the usual forgings and their finely preserved truth to the lines of the pattern are of distinct value.

Tropenas Steel Shop Wrenches.

A Broken Piston Rod.

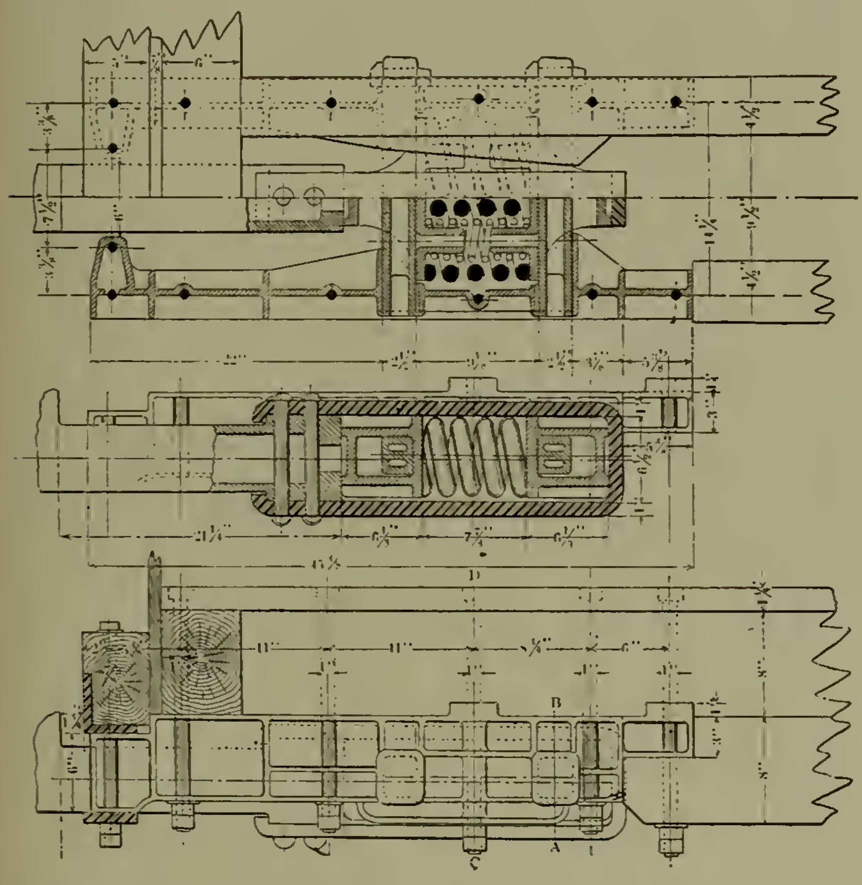
A friend sends us the accompanying sketch of a broken piston rod, broken on a compound locomotive



on his road. The sketch readily suggests the cause of the break. It was doubtless due to the imperfect boring. This is an exceptionally bad job in boring, and our friend assures us that such jobs are not numerous in his shops. It may, however, suggest to others the cause of similar breaks. The broken piece is the cross-head end of the low pressure piston rod.

The Dayton Twin Spring Draft Rigging.

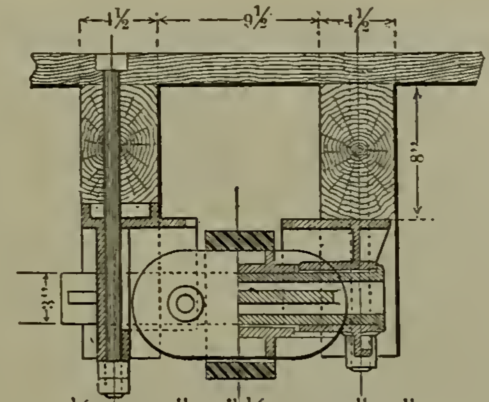
THE Dayton draft rigging, which has met with a very considerable measure of success in the market, is made for use with single spring and with double springs, the latter in either twin or tandem arrangement as desired. Our illustration shows the twin arrangement, as applied with malleable draft sills, to cars on the Atchison, Topeka & Santa Fe Ry. This rigging contains only 20 pieces per car—four draft sills, four stop bars, four followers, four keys and four cotters. The arrangement of these parts is clearly shown in our engraving. The stop bars, which are rectangular and which are cast with an opening through the center, remain in a stationary position and



are rigidly secured to the draft timbers by a 2½-inch key, which extends through, as shown. The only duty these keys have is that of binding the draft sills together and carrying the weight of the tail end of the coupler, the tail trap and springs.

Each follower has a rectangular horizontal opening through which the stop bars are passed. In a perpendicular direction the opening is made with sufficient clearance to allow the followers free movement, while in a horizontal direction it is made greater than the width of the stop bar. Each spring is supported at its ends by a boss cast on each follower. The length of these bosses is such that while the springs are without load the distance between the bosses is 1⅞ in. A travel of 2 in. is required to close the springs and therefore the bosses come in contact before the spring is fully closed.

Under buffing strains the rear stop bar receives the load and the forward follower travels loosely over its stop bar and compresses the springs. The forward stop bar receives all pulling strains. The draft sills are heavily ribbed to withstand strains. These ribs extend inwardly to a point beyond the center of each spring and therefore the strains applied to the stop bars and followers are crushing strains. The ribs on the rear end form a box which gives great strength and at the same time gives a guide to prevent the tail strap having too much side play.



The purpose sought in this design was to eliminate bending and shearing strains, to effectively bind the draft sills together, and to reduce the number of parts required. Our engravings show how the last two requirements have been met. The appended account of recent service tests will indicate how successfully the first requirement has been met.

The tests to which we refer were made in January of this year on the Atchison, Topeka & Santa Fe Ry., two series of tests being made. The first were made with empty cars and the second with loaded cars. The particulars of these tests given in the following paragraphs are taken from the official report signed by Mr. R. P. C. Sanderson, assistant superintendent of machinery of the Atchison, Topeka & Santa Fe:

TESTS WITH EMPTY CARS.

Date, January 22. Place, Chicago Division.

Engine used: Class 17, 21x28 cylinders, 57-inch wheel center, 180 lbs. steam pressure

Make-up of Train: In front, twelve 80,000 capacity hopper coal cars, empty, fitted with Dayton draft gear; 35 hopper coal cars, empty, fitted with Miner draft gear; caboose.

Observations were taken for speed with a stop-watch and a system of signals between engine and caboose was prepared and used during the test.

Test No. 1. Emergency application at 10 miles an hour.

Test No. 2. Emergency application at 15 miles an hour.

Test No. 3. Emergency application at 20 miles an hour.

Test No. 4. Emergency application at 30 miles an hour.

Test No. 5. Emergency application at 20 miles an hour, with the brakes cut out on the six rear cars and caboose.

Test No. 6. Emergency application at 20 miles an hour, with brakes cut out on the 12 rear cars and caboose.

Test No. 7. Emergency application at 20 miles an hour, with brakes cut out on the 18 rear cars and caboose.

Test No. 8. Emergency application at 20 miles an hour, with brakes cut out on the 24 rear cars and caboose.

Test No. 9. Brakes cut out on the front 23 cars, engine and tender. Engine pulling with throttle wide open and lever in full gear. At speed of 10 miles an hour the angle cock on the caboose was thrown wide open, causing violent emergency application on 24 rear cars and caboose. Train brought to a standstill with the engine wide open and stalled.

Test No. 10. Same as Test No. 9, except speed was 20 miles an hour.

Test No. 11. Hand brakes were set hard on the caboose and 10 rear cars. The engine took the slack against them and then started ahead in full forward gear with wide open throttle. This test was repeated four times.

Test No. 12. All air brakes cut in, train moving at 4 miles an hour, engine reversed so as to bunch the train, then the lever was dropped down in full forward gear with the throttle wide open, causing the engine to plunge forward. This test repeated four times.

Test No. 13. The engineman was then requested to make any other attempt he could think of to break the train in two. Tried in a number of ways, but failed.

RESULTS.

It was found impossible to break the train in two with any of the thirteen tests referred to. There was absolutely no damage to any of the draft gears or couplers, but some of the wooden sills showed splits or cracks from the corners of the key ways where these were gained into the wood sills. This damage, however, was quite insignificant, did not require any repairs, and in no wise affected the strength or safe condition of the cars; and if steel center sills were used instead of wood, this trifling damage, of course, would not have occurred.

Tests Nos. 7, 8, 9 and 10 were particularly hard on the cars. The conductor of the train refused to stay in the caboose.

It was noticed that there was a good deal of recoil from the springs, and this was to be expected, as, with the play in the couplers and the compression of the springs, there was a difference in length of 15 ft. 8 ins., as between when the train was stretched and when it was bunched. In tests Nos. 9 and 10 the recoil was sufficient to pull the engine back several feet. In spite of all this, it was noticed with surprise that the recoil was gradual always and elastic and free from all jerks, so that this recoil is not likely to cause any damage to the draft gears. From the action of the train, it is to be doubted whether the full capacity of all the 188 draft springs was ever fully exhausted.

TESTS WITH LOADED CARS.

Date: January 31st. Place: Chicago Division.

Engines used, double head: Engine 977, cylinders, 21x28; driving wheels, 57 in. diam.; steam pressure, 200 lbs. Engine 590, 18x24; ten-wheeler, 63 in. wheels; 180-lbs. steam pressure.

Make-up of Train: All cars 80,000 capacity, hopper coal cars, loaded with coal as follows: 10 cars, Miner draft rigging; 2 cars, Dayton draft rigging; 15 cars, Miner draft rigging; 5 cars, Dayton draft rigging; 1 car, Miner draft rigging; 2 cars, Dayton draft rigging; 5 cars, Miner draft rigging; 1 car, Dayton draft rigging. Caboose. Gross weight of train outside of engines and caboose, 2459 tons, which was above the rating of the engines.

Test No. 1. Emergency application at 10 miles an hour.

Following this the train stalled on a 42-ft. grade east of Nixon, and had to be doubled over the hill. The slack was taken several times in attempting to start the train before doubling.

Test No. 2. Emergency application with all brakes cut in at 20 miles an hour. Following this 8 front cars were taken off so as to avoid stalling on the grades, as the train was overloaded, leaving 2005 tons gross in the train without the engines and caboose.

Test No. 3. Brakes cut out on the 6 rear cars and caboose; emergency application at 15 miles an hour.

Test No. 4. Brakes cut out on the 12 rear cars and caboose; emergency application at 15 miles an hour.

Test No. 5. Hand brakes set hard on the caboose and 10 rear cars. Both engines took the slack against them and then started ahead in full forward gear with throttles wide open. Repeated this five times.

Test No. 6. Angle cock turned on the ninth car from the rear end, and the hose uncoupled between the eighth and ninth, thus setting the air brakes hard on the last 8 cars. Backed up against these and attempted to start train with these brakes set by taking the slack with full power of both engines. Test repeated five times.

Test No. 7. The engineers were then requested to make any other efforts they could think of to break the train in two. They tried in a number of ways, but failed.

RESULTS.

With the exception of some small cracks in the wooden sills where the malleable draft arms were gained into the sills, there was absolutely no damage to any of the draft gears, springs or couplers. The cars, after the tests, were carefully inspected in daytime by regular car inspectors, who searched them thoroughly for any damage. Six of the cars used in this second test were previously used in the first test.

Test No. 6 of the second series was exceptionally severe on the cars.

It is to be noted that the tests with the empty cars of January 23d were nearly a duplication of the Westinghouse tests made at Walls, as nearly as our local conditions would allow of their being duplicated with an engine of about 20 per cent more tractive power than the Pennsylvania engine used at Walls.

The test of January 31st is comparable with the tests made of the Westinghouse friction gear at Wilmerding, because the aggregate power of the two engines used was nearly that of the Pittsburg Ry. Union engine used at Wilmerding, while the weight of the train used in our second tests was in excess of the weight of the train used at Wilmerding. In referring to these Wilmerding tests we are speaking from the published reports in the papers.

The Dayton draft rigging is made solely by the Dayton Malleable Iron Co., of Dayton, O.

Spirit of the Railway Press.

Being the Cream of the Literature of Railway Mechanics Appearing During the Past Month.

The Full Throttle and Valve Setting.

(Locomotive Engineering, March.)

There is a very decided belief among the practical locomotive men such as traveling engineers and experienced locomotive engineers of observing habits, that the practice of running engines with a full open throttle is responsible for much of the flattening of driving wheels in spots, which frequently sends locomotives prematurely out of service for repairs. This subject was thoroughly discussed several years ago and those who took part in the discussion were all remarkably intelligent engineers—the kind of men whose services recommend them for higher positions which they attain without much waiting. The discussion was by no means one-sided, but the majority of the writers associated together wheel flattening and the full open throttle.

The same position was lately taken by Mr. Howard Curry, of the Northern Pacific, in a discussion at the North-West Railway Club on "Wear of Tires." Besides holding the wide-open throttle responsible for flattening of tires, Mr. Curry told that on the level, sandy districts flattening of tires was much more common than on the hilly divisions. He was inclined at first to think that the manner of valve setting had something to do with flattening tires, but he changed his opinion on that by his experience with engines from different shops.

We find that there is a tendency among many practical railroad men to attribute to the methods of valve setting influence beyond reason on the working of the engine. The valve setters who hold to the tradition that considerable lead opening in full gear will make an engine "smart" under all conditions of working are falling monthly into a diminishing minority. If an engine has very long eccentric rods it is all right to give it lead in full gear, but if the rods are abnormally short—a very common condition nowadays—setting the valve blind in full gear will prevent the engine from working against itself when hooked up short. This is no far-fetched theory. It is a fact demonstrated by the most accurate and exhaustive kind of tests. Valves ought to be set to cut off as nearly even as possible at the point where the engine does most of its work. Passenger engines set to cut off evenly at one-third of the stroke will not be much out at other points; freight engines set evenly to cut off at half-stroke will not jar the nerves of listeners who are worried to hear an engine limping with one or two exhausts in partial desuetude.

Wages in the Shop.

(American Engineer, March.)

A horizontal increase in wages is usually included in the demands of grievance committees, particularly those representing shop forces. This is usually one of the first problems a newly appointed superintendent of motive power meets if he comes from another road, and unless he is a close student of men he is likely to meet it often. On two roads having recently come under our notice, grievance committees are part of the past, because there are no grievances of the men in classes. This has been brought about by developing individual effort among the men and by placing the premium of increased wages upon merit. A horizontal increase is generally unwise, because it affects the worthy and unworthy alike, and it is likely to lead to strike after strike simply because the men are dealt with in classes. It is better to raise the wages of a good man in a group as a reward of good work. This will bring others to the foreman with claims of equality with the one who has been advanced. The reply may then be: "Yes, you are perhaps as good in every way as he; but the only way I can judge is by the results. Show that you can do as much and as good work as he and I will raise your wages in the same way." If such a plan is systematically practiced, with care and discrimination, there will probably be nothing for a grievance committee to do. This is the result on the two roads referred to. Shopmen are usually ready to respond to perfectly fair treatment. Much thought and study are needed in the handling of men, and it is safe to say that not all of the difficulties with shop labor are unavoidable.

Specialists in the Mechanical Department.

(Railroad Gazette, March 1.)

The field for specialists in the mechanical department is widening and to the profit of the railroads. Indeed the use of these men seems to be the most satisfactory if not the only practicable way in which general plans can be carried out on a large road, standards maintained and the practice on different divisions brought to anything like uniformity. Through these special men the head of the department can bring his influence directly to bear on details to which he himself or the master mechanic can give very little or no attention. But having these details followed up in an intelligent manner has in several instances resulted in surprising savings. The traveling engineer is one of the best known of these specialists, and probably next comes the air-brake instructor; on smaller roads one man often does the work of both. A number of roads now employ traveling firemen. Recently we were interested to learn from a superintendent of motive power that he has men whose specialty is valves and valve gear, looking after these details in all the shops of the system. Another man makes locomotive boiler washing a specialty, while still another is in charge of all the car oiling. Others will doubtless be added and in addition one or two men are retained on the headquarters staff who can be assigned to particular jobs as they come up. Of course, such an organization might not be best in all cases, but the suggestion is made here that many roads will find it profitable to employ these specialists.

Flange Wear and Heavy Cars.

(Railway Review, March 9.)

The general introduction of large capacity freight cars has resulted in a very noticeable increase in flange wear. This would be still more in evidence did not these newer cars have a much stiffer body and truck bolster construction than was used in the older car. Side bearings being thus kept more generally free from contact than was the case with the easily sagged parts of the older car, the flange wear due to side bearing friction has not increased in proportion to the increase of load. Nevertheless, the wheels in these heavier cars are evidencing an increase in flange and tread wear as compared with the service given by similar wheels in cars of smaller capacity. Notwithstanding the better construction of the later cars this increase of wear is to be expected with an increase of load. This is apparent and there is hardly anything to be done about it unless consideration is undertaken of a truck which shall effect an amelioration by providing a less violent reaction between the rails and wheels than is the case with the very stiff truck generally used under the large capacity cars. Another feature of the matter, however, lies in the question of flange breakage. Broken wheel flanges contain so serious possibilities that any increase in defects of this character may well be regarded with concern. An increase of flange wear under the heavier cars, despite their improved construction, denotes a severity of stress placed upon the flanges in service that should lead one to expect some increase in flange breakage to become apparent. We know of one line on which a recent investigation of this phase of the matter has shown an increase to be evident—and this on a line which has the track up in a shape that does much to lessen shocks arising from the excessive swaying incidental to bad track. In the heavy loads given wheels under locomotives and passenger cars the cast wheel has been replaced with one of steel, but the steel-tired wheel can hardly be considered for freight cars. The first thought would be to strengthen the flange of the wheel itself, but a consideration of the standard relations of guard rails and flanges will show this to be a task hardly possible of satisfactory solution, for little stock can be added where it would be of benefit in strengthening the flange. The course giving promise of most results would seem to lie in the truck itself, for here there is a possibility of accomplishing something, and the matter of flange wear as well as breakage would be handled at the same time. That is to say, it is better to reduce the necessity for increase of flange strength by placing a truck between the load and the rails which shall be flexible and resilient enough to absorb to a great degree the various motions arising when under way. It is a point worth regarding when considering the large capacity car.

Dignifying the Drafting Room.

(American Engineer, March.)

If the drafting room was considered a step in advancement toward important positions, and if it was used to develop men, or rather to enable them to develop themselves, it would be full of men prepared for advancement and equipped for greater responsibilities. It is argued that railroads are not training schools, but this does not appear to be true. If drafting rooms are to have good men they must make them. One who, as a rule, looks outside of his own organization for men ready trained to his hand, is likely to be frequently disappointed and he will always be looking for men. That organization is best and most successful which best provides for its own perpetuation.

What may the drafting room offer that will attract the right kind of men, and keep them? What should the men do to place their work in an advantageous position before their superiors and lead to the proper appreciation of the department? These are questions worthy of thought on every railroad.

There is no better experience in the motive power department than that of the draftsman who is encouraged and allowed to follow up his work. There is no better place than the drafting room in which to gain an appreciation of the commercial questions which are so vitally important, and all things considered this department ought to broaden and develop men. There is no better way to develop ability to take responsibility than by designing in this department. Its tendency, however, is almost altogether away from executive experience, but there is no reason to believe that a successful draftsman is necessarily a poor executive. He cannot be a good one unless given the opportunity, and we answer the first of these questions by suggesting an outlet to the talent of the drafting room. Give the men a little hope that they may go higher if they can show their ability. One good way to encourage them, and it will pay, is to give them a whole day every month in which to visit the shops or places where the results of their work are in use. Informal reports of these days, with suggestions, would be valuable to all concerned, and it would be easy, through them, to study the men with a view of making them still more useful. Do not consider this a vacation, but one of the draftsman's duties.

Because of his training for accuracy, his disinterestedness, as well as his tendency to see things for himself rather than take the reports of others, the draftsman should be a most satisfactory investigator and observer. He will do much better work at the table for being occasionally sent away from it upon errands of investigation.

Not every draftsman will make a good foreman and some will always remain draftsmen. These should have the incentive of good salaries in order to develop their best efforts. A salary of $1,500 per year is not too much for a good car or locomotive draftsman, but the railroads do not realize this as do the locomotive and car builders. They are far below the market price for the best men and these men are not luxuries, but necessities. Prevailing rates of wages are perhaps sufficient for the ordinary draftsman, but they should have hope in one direction or the other, either in the executive work or in higher development in their present line or they will be, as many are to-day, mere machines.

To the draftsman we would say that we have no sympathy with his complaint that there is no outlet for him. He may make one if he will, though it is not provided by the policy of his superiors. A young man who is determined to rise will not be kept back, even by the drafting room. It is his fault if he does not find something on the road that needs to be done and make known his ability to do it.

If the purpose of these paragraphs is understood there is no inconsistency about them. The plea is for intelligent administration of the drafting department such as to make it an attractive opportunity for young men to gain experience and advancement, and in this way improve the average as well as the expert draftsman. On the other hand, the draftsman is urged to do his part. We are heartily in sympathy with the young men who spend their evenings on designs of their own, made to meet conditions which they see about them and know to require improvement. A superior officer must be blind indeed not to see the promise of a brilliant future in a young man who will submit such a design for criticism.

Great results may be obtained by uplifting the drafting room to a place of importance and true, practical dignity.

Supply Trade Notes.

The Richmond Locomotive Works have received an order from the Plant System for three six-wheel connected switching locomotives. The general dimensions of these engines are as follows: Cylinders, 18 ins. x 26 ins.; driving wheels, 50 ins. in diameter; driving wheel base, 11 in.; weight in working order, 108,000 lbs.; 60-in. radial stay boiler; firebox, 41 ins. x 96 ins.; 250 tubes, 2 ins. diameter x 12 ft. long; boiler pressure, 180 lbs.; tank capacity, 4,000 gallons.

Mr. R. E. Janney has been appointed representative of the Sargent Co. and the Railway Appliance Co. in New York and the East and South, with office at No. 1314 Havemeyer building, Cortlandt street, New York City. He will sell the well known specialties of the Sargent Co., namely, open hearth cast steel knuckles and locking parts of couplers for repairs, and also a line of cast steel tools, such as car repair and machinists' hammers, wrenches, coal picks, etc., and for the Railway Appliance Co. the Gilman-Brown emergency knuckle, the O'Brien coupler and the Sargent coupling device.

The Railroad Supply Company has been organized at Red Wing, Minn., with a capital stock of $100,000. Henry Martin is president; Dr. H. F. Eachus, vice-president; Hans Madson, treasurer; Dr. A. M. Johnson and Paul Martin the directors, all of St. Paul. The Red Wing officers are Dr. C. W. Barber, secretary, and L. H. Stiles a director. The company will manufacture an improved dust guard for railroad journal boxes, in St. Paul, Minn.

The Franklin Air Compressor Company, has completed its new plant at Franklin, Pa. The company, which was organized last fall with a capital stock of $800,000, has General Charles Miller for vice-president and S. G. Allen, who has supervised the erection of the works, general manager. The plant covers three acres of ground, consisting of several buildings all connected with narrow gage railroads and platforms. The machine shops, testing and assembling departments, are housed in one building 100x250 ft. in size. The foundry department adjoins the machine shop, and is 120x170 ft.; the engine room 40x48 ft.; boiler room 48x52 ft., containing two 200-h. p. boilers and three pumps of large dimensions. The company will manufacture compressors to furnish power for every known form of pneumatic tools.

The Westinghouse Friction Draft Gear Company, of Pittsburg, has been chartered by the state department of Pennsylvania, with a capital stock of $10,000.

The Handy Car Equipment Company, Old Colony building, Chicago, are having a sample car built by the Illinois Car & Equipment Company, which will be used for exhibition purposes. The car will be equipped with the following specialties: Chicago roof, Westinghouse air brake, Monarch draft rigging, Bettendorf body bolster, Kindl truck, A. French springs, Monarch brakebeams, Springer safety coupler, Brown journal boxes, National journal bearings furnished by the National Railway Specialty Company, Corning brakeshoes, Security door fixtures, Star grain door, Bass Foundry &

Machine Company's wheels, Devoe & Reynolds paint. The Handy car was described fully in our issue of February, 1901.

The Curtain Supply Company, 85-93 Ohio street, Chicago, has issued a new catalogue descriptive of all kinds of curtains and curtain fixtures for passenger car equipment. The Curtain Supply Company, as now constituted, represents the consolidation of the curtain and curtain fixture departments of the Adams & Westlake Company, the E. T. Burrowes Company, Forsyth Bros. Company and the Davis Car Shade Company. The purchase of the machinery, good-will, merchandise and patents of all these concerns enables the Curtain Supply Company to furnish any kind of curtain or curtain fixture entirely free from danger of patent litigation.

The annual statement of the Safety Car Heating & Lighting Company, the owner of the Pintsch system in this country and Canada, shows that the total number of cars equipped with the system in this country and the Dominion of Canada now numbers 16,147. There have been 136 Pintsch gas lighted buoys furnished to the United States and Canadian governments, and six gas lighted beacons and four lighthouse tenders have been equipped with Pintsch compressors and storeholders. There are now 56 Pintsch gas plants in operation in the United States and Canada. The company's heating systems have been adopted as standard by 106 railroads in the United States, and the total number of cars heated by the steam systems of this company now aggregate 8000, included in which are 2000 Pullman cars.

The Aurora Metal Company, Aurora, Ill., manufacturers of journal bearing metal, are meeting with considerable success in the introduction of the "R. R. Special" brand of metal for bearings for cars and locomotives. It has been in successful use on one of the leading western systems for some time, and a number of others are making satisfactory tests of it on a rather extensive scale.

The Cleveland City Forge & Iron Company has recently completed an addition of 200 ft. by 70 ft. to its turnbuckle forge shop, which is being equipped with forging machinery for turning out all kinds of special forgings. Among the machines recently installed are a 3-in. Acme upsetter, a Guillotine shears of special design made by the Cleveland Punch & Shear Company, for shearing 5-in. square billets cold, an eyebolt bender and a specially large bulldozer from Williams, White & Co., of Moline, Ill. This bulldozer is to be used in connection with their 700-ton press in the manufacture of extra large and heavy drawbar yokes, the corners of which are upset, a feature that very materially strengthens this part of the drawbar gear. The company are supplying these yokes to a great many railroads with very gratifying results from absence of breakages.

The following item appeared in the Pittsburg Leader of March 3: "A recent freight wreck on the Baltimore & Ohio demonstrates beyond a shadow of a doubt the superiority of the new steel cars over the wooden equipment which they are rapidly replacing. The train was made up of several steel cars between which were at last half a dozen box cars of the ancient wooden type. The force of the collision threw the wooden cars into the air like so many sticks, while the steel cars remained intact. Trainmen say that when the steel cars come into general use destructive freight wrecks will be a thing of the past. On numerous occasions it has been shown that the metal cars seldom leave the track in case of a collision, and in the majority of cases they suffer little damage. In the matter of durability the trainmen say the steel car is far superior to the old style wooden equipment, and while they are more expensive to manufacture the difference in price is saved in the matter of repair work." The steel cars referred to were designed and built by the Pressed Steel Car Co., of Pittsburg, Pa.

Mr. William C. Baker, whose death we noted in our last issue, was killed at Upper Montclair, New Jersey, on February 6th, by a train of the Erie Railroad, while on his way to New York. Mr. Baker was born in Dexter, Maine, in 1828. He had been in business in New York for the last forty years, and was the inventor of the system of heating cars by hot water circulation. He was also the patentee of over forty other inventions, most of them relating to house and car heating. During his business career he originated the firm of Baker, Smith & Company, was connected with the New York Steam Heating Company, and was the head of the Baker Heater Company. For the last few years he had been doing business under his own name, succeeding the Baker Heater Company. After making the Baker

Mr. William C. Baker.

heater famous throughout the country, he designed apparatus for using steam from the locomotive in connection with it; and his systems of car heating are in universal use in first class cars throughout the world. He was well known in all railroad circles and had a host of friends in every part of the country to whom he was authority on all matters relating to the heating of cars, and if the thousands who travel daily would stop to consider the added comfort which they enjoy due to his inventions, they would resolve never to forget the man or the benefactions he conferred on his fellow-men. We understand the business will be continued under the management associated with Mr. Baker during the last ten years.

The Michigan Lubricator Co., of Detroit, Mich., has engaged the services of Mr. W. T. Simpson as traveling representative of its railway devices. Mr. Simpson has been for 31 years with the Grand Trunk system, and resigned the position of traveling engineer of that system to engage with the Michigan Lubricator Co. Mr. Simpson is the inventor and patentee of the Michigan driver brake retainer.

The Robert Aitchison Perforated Metal Company, of Chicago, recently made shipments to Kentucky, Wisconsin, Utah, Nebraska, and many other states, covering material for railroads, agricultural implements, breweries and other industries. Among recent inquiries are some from Australia, Germany and the West Indies.

The Richmond Locomotive Works are running night and day, having 1700 men employed and orders enough in hand to keep the establishment busy the remainder of the year.

The Star Brass Manufacturing Company, of Boston, has recently sent to England for use in the navy a complete equipment of valves and gages. These will be used on one of the largest battleships now building. The price paid was one-third more than valves and gages could have been bought for in England. The Star Brass Manufacturing Company is also supplying the United States navy with similar appliances.

The following sales are reported by the Bullock Electric Manufacturing Company: Glasgow Evening News, Glasgow, Scotland, three motor generators; London Daily Express, London, Eng., three motor generators; Montreal Water & Power Company, Montreal, Canada, one 400-h. p. three-phase motor; Aberdeen Journal, Aberdeen, Scotland, one 30-h. p. Teaser equipment and one motor generator; Carnegie Steel Company, Pittsburg, Pa., one 25-h. p. type "H" motor; Greuner & Co., Johnstown, Pa., one 30-kilowatt type "I" generator; Brown & Sharp, Providence, R. I., four type "N" motors for direct connection to machine tools; Wier Frog Company, Cincinnati, O., three 10-h. p. type "N" motors; Pullman Company, Pullman, Ill., two 150-kilowatt type "H" generators; Mosler Safe Company, Hamilton, O., one 50-h. p. type "H" motor; Susquehanna Valley Electric Company, Sidney, N. Y., one 65-kilowatt single-phase generator; Central Lard Company, New York City, N. Y., one 65-kilowatt engine type generator; Buffalo Evening News, Buffalo, N. Y., one 70-h. p. type "H" motor.

The Smith car door has been specified on the 1000 stock cars recently ordered by the Chicago, Burlington & Quincy from the American Car & Foundry Company.

It is stated that the New York Central will equip 14 cars with the axle lighting system of the Consolidated Railway Electric Lighting & Equipment Company, to give the system a thorough trial.

The Westinghouse Electric & Manufacturing Company has received a contract from the railway commission of Queensland, Australia, to furnish the complete electrical equipment for new railroad shops at Ipswich.

The Westinghouse Air Brake Company is reported to be planning the erection of a large plant in Manchester, England. It is reported that the contracts for the buildings have already been let to a construction company of St. Louis and that the work will be superintended by J. W. Cowper, superintendent of maintenance of way of the St. Louis division of the Big Four railway. He has resigned this position on that road and will sail for England during the present month, to begin work on the factory.

The Detroit Steel & Spring Company, of Detroit, Mich., during February last, showed the largest tonnage output of any month in the history of the concern.

The American dustguard, manufactured by the American Dustguard Company, of Columbus, O., has been specified on the 1500 40-ton cars being built by the Pullman Company for the Hocking Valley, and on the 1200 30-ton cars and 800 40-ton cars under construction by the American Car & Foundry Company for the Missouri Kansas & Texas Railway.

The Best Mfg. Company, of Pittsburg, brass and iron founders, pipe fitters and machinists, and maker of Best gate valves for high and low pressure, has leased the plant of the W. J. Carlin Company, of Pittsburg, which is adjacent to its present works, and are installing in it a large amount of new machinery. The growth of the business of the Best Mfg. Company made it absolutely necessary for it to increase its capacity for the manufacture of their various products.

The Gould Coupler Company has secured contracts for the supplying of 400 sets of automatic couplers for shipment to various roads now being equipped in Yucatan, Mexico. Three hundred sets are about to be forwarded for use by Cuban roads, while similar quantities have been ordered by Jamaican and Mexican railroad systems.

Railroad shops proposed or under construction are reported during the past month by our exchanges as follows: The Erie R. R. has completed plans for the erection of large car and locomotive repair shops at Salamanca, N. Y. The new shops will be equipped with the most modern machinery and will employ 2000 men. The shops at Kent, O., and at Buffalo, will be abandoned to a great extent, only minor repairs being made at all these points.—Little Rock, Ark., has offered a bonus of $100,000 to secure the rebuilding of the shops of the St. Louis, Iron Mountain & Southern Ry., at Argenta.—The Boston & Maine R. R. will rebuild the shops at Mechanicsville, N. Y., recently destroyed by fire.—The Wheeling & Lake Erie R. R. contemplates the erection of new and extensive shops at Norwalk, O. The plans have been made and work will commence as soon as the weather will permit.—The Matthews (Ind.) Land Co. has closed a contract with the Chicago, Indiana & Eastern Ry. Co. for the erection of the company's shops at that point. When completed the shops will represent an investment of from $50,000 to $75,000.—The Baltimore & Ohio R. R. will erect a round house at Grafton, W. Va., to accommodate 45 locomotives.—The Michigan Central is contemplating shop improvements at Jackson, Mich., to cost about $150,000. It is proposed to instal a central power, heating and lighting plant, and drive the machines in the several shops by electric motors. A new erecting shop will also be built. —The New York, New Haven & Hartford will build shops at New Haven. The plant will include carpenter shop, machine shop, power house and office buildings, at a total cost of about $200,000.—The Chicago & Northwestern will, it is stated, build shops and a roundhouse at Omaha.—The Armour Packing Company are enlarging their car shop at Kansas City.—The roundhouse of the Union Pacific, recently completed in McPherson, Kan., was demolished by a hurricane on March 3.—The Pittsburg, Bessemer & Lake Erie will erect new shops, according to reports, at Greenville, Pa., to cost about $400,000. The buildings will be of brick and steel and will cover about 7 acres of ground.—The Northern Pacific will make improvements to its Como car shops in St. Paul, to cost $175,000, according to reports. Improvements are also contemplated to the company's shops at Brainerd, Livingston and Tacoma.—Plans have been completed for the new shops of the Philadelphia, Wilmington & Baltimore Railroad to be erected at Todd's Cut, Wilmington, Del. They will be one-story high and constructed of brick and iron, and will include car, paint, locomotive, tin and repair shops. The roundhouse will be removed from near Front and Third streets to the new location.

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RAILWAY MASTER MECHANIC

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Walter D. Crosman, Editor.

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THE decisions of the Arbitration Committee, Nos. 1 to 603, inclusive, have been reprinted in one volume. They are now ready for distribution, and will be sold at $1.50 per copy, postage added when sent by mail. These decisions, with index, form a volume of 711 pages; it is bound in cloth similar to the report of proceedings. Those wishing copies of this invaluable publication should address Jos. W. Taylor, Secretary, 667 Rookery Building, Chicago.

MR. L. E. JOHNSON, general manager of the Norfolk & Western Railway, delivered an address before the engineering students of Purdue University, April 8th. In deference to the specific request of the university authorities, Mr. Johnson spoke upon "The Duties of a General Manager." After describing somewhat briefly the organization of a railway, he discussed more in detail the character of the business which reaches the office of a general manager. He incited some amusement by relating incidents arising in connection with claims, and then by exposing the record of a single day's work, convinced his student audience that the office of a general manager was no sinecure. The lecture was instructive, interesting and inspiring.

PRESIDENT THEODORE C. SEARCH, of the National Association of Manufacturers, announces that the sixth annual convention of the association will meet in Detroit June 4, 5 and 6. Mr. George H. Barbour, of Detroit, the Michigan vice-president of the association, is in general charge of the arrangements in Detroit. The opening of the Pan-American Exposition at Buffalo a few weeks prior to the dates fixed for the convention will enable manufacturers to arrange for a trip which will take in both points of interest. It is expected that arrangements will also be made for excursions to points of interest on the lakes after the adjournment of the convention. The number of inquiries received from those who desire to attend the convention and wish to know when it is to be held, indicates an unusual interest in this year's gathering. The work of the association during the past year has been full of interest and importance to the manufacturers of the country and the business of the convention will have direct bearing upon their affairs.

THE dynamometer car built by the University of Illinois and the Illinois Central Railway was, during the past month, under the direction of Mr. E. C. Oliver, instructor in mechanical engineering, assisted by John M. Snodgrass, Robert P. Shunnim and Floyd L. Swanberg, junior mechanical engineering students of the University, sent to Centralia to make power measurements and evaporative tests of the boilers in the Illinois Central Railway shops at that place.

ARMOUR Institute, of Chicago, long a promising college, is given new impetus by a donation of $1,000,000. The mechanical, electrical and chemical engineering departments will, among others, directly benefit through this good fortune, and among other details already considered will be a dynamometer car. The science of railroading will thus be in the way of deriving gain from the work of still another educational institution.

DURING the past month Mr. William Kent of New York City, delivered a series of lectures each day before the seniors in mechanical, civil and electrical engineering of Purdue University. His subjects, of his own choosing, were as follows: "Steam Boiler Economy," "The Iron and Steel Industry," "The Organization of a Manufacturing Establishment," "Some Engineering Problems," "Some Elements of a Successful Engineering Career." On one afternoon he delivered a more formal address before juniors and seniors of the three schools of engineering, upon the subject of "Engineering and Economic Science." Mr. Kent also spoke briefly in chapel on another morning, on which occasion he presented "Engineering as a Liberal Culture." Purdue is certainly to be congratulated upon its admirable success in securing addresses of this nature.

The Twentieth Century Locomotive

AT a recent meeting of the New England Railroad Club, Mr. S. M. Vauclain, of the Baldwin Locomotive Works, gave a lecture on "Locomotives of the Nineteenth and Twentieth Centuries." His views as to the future are in part as follows:

The improvement of the locomotive will embrace the further development of those features invented in the previous century; compounding of all locomotives upon some system now used, or yet to be invented, will be almost universal, the wide fire-box and tubular boiler will be carried to the limit of human ability to manage it. This will give place to the water tube boiler, especially so for high speeds. Who that is here tonight is destined to be the instrument of its introduction? Already bright minds are employed in designing a boiler of this description which can be placed on our arrangement of cylinders, underframing, wheels and machinery—a system that will give three times the heating surface for an equivalent weight. Higher pressures will then be common, and we all may live to see triple and even quadruple expansion locomotives almost noiselessly performing their work. High speeds will be used for all trains carrying human freight, but long and heavy express trains will be handled with facility by the improved high-pressure compound locomotives of that period The loading gage of our trunk lines will not prevent doubling, or even trebling, the power of locomotives for freight traffic. Double bogie engines similar to thos used abroad, but on the American idea, will be employed, thus reducing it to an almost perpetual operating machine, any part of which can be removed in a short time and a duplicate substituted.

Electricity as a motive power will steadily gain friends; large plants will be erected for supplying current; water power where available is now being employed; the lives of great men are being spent in an endeavor to solve this great problem. One of the greatest, if not the greatest of all relies upon the use of gas, made at the mines and sent through pipes to the power plants placed at intervals along the line, and used direct in gas engines of huge units for generating the current necessary to operate the traffic of the road. Perhaps so, but it is the opinion that for our trunk line traffic electricity will not be used until it can be generated economically on the locomotive itself. It is in this direction we look for success, as we now use up but a small per cent of the calorific power of coal in our best steam locomotives. As the electric locomotive occupies relatively the position that steam locomotives did a century ago, those who live in 2001 may merely have recollections of the wonderful events of our present age.

Have any of you as yet considered to what extent the pneumatic tube will be employed to expedite transportation now entirely dependent on locomotives? Has anybody watched the long lines of coal cars on their way from the mines to the coast, and the same cars return empty? If the weight of a car is 25 per cent of the gross load, we have more than 50 per cent loss, or non-paying freight, when we consider that the empty train requires quite as much power to haul it up into the interior as was expended taking it to the coast. Is it not possible? Will it not be accomplished? And just as the miles of cars loaded with oil, seen in former years, have disappeared, and that commodity sent hundreds of miles through a tube in the ground, will coal, grain and ore be sent speeding through tubes to central depots for local distribution.

MR. W. C. BROWN,
General Manager Chicago, Burlington & Quincy R. R.

Mr. Brown's first railway work was on the Chicago, Milwaukee & St. Paul Ry., in 1869, as a lad, cording wood and wooding engines. He soon became a telegraph operator on the same road and through the telegraph office, the train dispatcher's and superintendent's offices on this, the Rock Island and the C., B. & Q. roads, he rose steadily to his present position.

Copying American Machinery

AMERICAN machinery has made its way in Great Britain in spite of the strongest prejudices. I have heard scores of practical men denounce it, much as they do the German today. I know firms, too, who, having vented their antagonism in spiteful terms against American machinery, have afterwards labored with feverish haste to copy and, if possible, to improve upon it, for sale in Great Britain. The number of firms who now manufacture machines which are modeled after those of successful American types is constantly increasing, and a considerable business is now being done with these in Great Britain. These efforts, however, do not result from any love which was borne to American designs in the first place, but because of the pressure of their competition which is making itself felt.

The two main reasons why these machines are imitated are either because they produce more cheaply than those which they displace, or they yield more accurate results. But a cheaper and a better product also often go hand-in-hand as the result of employing the best modern machines. The question arises whether the British imitation of American rivals will save the industrial situation. Imitation is the sincerest form of flattery, and yet this may not prove to be an unmixed good. Possibly it may not be the most excellent way in the end.

British firms appear to believe that, by copying improved machines, they will always be able to retain or recover their menaced position. Those who do this—buying a machine, pulling it to pieces, and imitating it—forget that though it is easy enough to imitate, lost trade is not regained in that way. Imitators generally fail. Britain's supremacy was not won thus. She led the van. America is not gaining ground by following Great Britain, but by getting ahead of her.

Further, if a firm, having found its business damaged by the superior designs of a rival, endeavors to regain that business, it becomes the proverbial stern chase. The problem, then, is not that of making goods as well as one's rivals, they must be better, or cheaper, or both. And, again, the firm which is already in possession of a market holds the best position for its retention.

The firm or nation, therefore, which has a good start of its rivals will have the better chance to hold its own. This is the case now with the leading American makers of machine tools. They have secured a good market in Great Britain and abroad. In a dilatory way British manufacturers are waking up to the gravity of the situation, and are offering rival tools, of a class similar to those which find a ready sale here. But the necessity for producing something better still is generally neglected; and while they imitate existing machines, the American firms advance, constantly devising improved forms. While British firms are panting to recover lost ground, the Americans are still forging ahead, and scoring new triumphs year by year.—An Englishman in Cassier's Magazine for May.

Personal Mention

Mr. L. E. Butler, general foreman locomotive and car department of the Missouri Pacific Ry., at Kansas City, Kan., has resigned to accept a position with the United States Metallic Packing Company, of Philadelphia, Pa.

Mr. Carlos C. Huntington has been appointed general storekeeper of the Lehigh Valley, vice Mr. J. J. Shea, resigned.

On the Chicago, Burlington & Quincy changes in the mechanical department have been made as follows, all dating from April 1: Mr. J. A. Carney, hitherto master mechanic at Beardstown, is appointed master mechanic of the Burlington division, with headquarters at West Burlington, Iowa. Mr. A. J. Cota, hitherto air brake instructor, is appointed master mechanic of the St. Louis division, with headquarters at Beardstown, Ill., vice Mr. J. A. Carney, transferred. Mr. Jacob Kastlin, hitherto general foreman at the West Burlington shops, is appointed assistant master mechanic of the Galesburg division, taking effect April 1, 1901. Mr. Kastlin's headquarters will be at Galesburg, and he will have entire jurisdiction over the shop and roundhouse forces at Galesburg and such other duties as he may be assigned to from time to time.

Mr. C. L. Bundy has been appointed traveling general car foreman of the Delaware, Lackawanna & Western.

Mr. John Lloyd has been appointed master mechanic of the Texas Southern, with headquarters at Marshall, Texas.

Mr. F. E. Davisson, master mechanic of the Santa Fe, Prescott & Phoenix, has been appointed superintendent of motive power and machinery of the Los Angeles Terminal (San Pedro, Los Angeles & Salt Lake), with headquarters at Los Angeles, Cal., vice Mr. W. N. Best, resigned.

In our last issue a typographical error made us say that Mr. F. H. Raine had been appointed assistant master mechanic of the Wabash, at Chicago. The announcement should have read that "Mr. F. H. Paine," etc.

Mr. F. W. Cox has resigned as general machinery inspector of the Baltimore & Ohio at Baltimore, to accept the position of superintendent of the Milwaukee Electric Company at Milwaukee, Wis.

Mr. T. E. Adams, heretofore master mechanic of the Eastern Railway of Minnesota at West Superior, Wis., has been appointed general master mechanic of the St. Louis & Southwestern, with headquarters at Pine Bluff, Ark., vice Mr. R. H. Johnson, resigned.

Mr. John B. Gallivan has been appointed road foreman of engines for the Santa Fe, with jurisdiction over the Southern California and San Joaquin divisions and with headquarters at Los Angeles, Cal.

Mr. J. F. Enright, general foreman of the Plant System at Waycross, Ga., has been appointed master mechanic of the third division of the same system, with headquarters at Waycross.

Mr. William Lander has been appointed assistant master mechanic of the Arkansas and Missouri divisions of the St. Louis Southwestern at Pine Bluff, Ark., vice Mr. C. J. Langston, who has been appointed master mechanic of the lines in Texas, with headquarters at Tyler, Tex.

The headquarters of G. W. Smith, master mechanic of the Santa Fe Pacific, have been removed from Albuquerque, N. M., to San Bernardino, Cal. R. J. Turnbull has been appointed division master mechanic of the Santa Fe Pacific, with headquarters at Albuquerque.

Mr. C. M. Taylor has resigned as master mechanic of the Atchison, Topeka & Santa Fe at La Junta, Col.

Mr. P. L. Raymond has been appointed superintendent of motive power of the Quebec Southern, with headquarters at Saint Hyacinthe, Quebec.

Mr. George A. Gallagher has been appointed master mechanic of the Eastern of Minnesota, vice T. E. Adams, resigned to accept service with another company.

Mr. A. E. Taber, heretofore road foreman of engines on the Great Northern, has been appointed master mechanic of that road at Great Falls, Mont., to succeed Mr. J. McGie, resigned. The latter has, as announced in our last issue, accepted the position of master mechanic of the Central of New Jersey at Elizabethport, N. J.

Mr. J. H. Manning, who has been connected with the mechanical department of the Union Pacific since 1875 and who has been master mechanic at Cheyenne, Wyo., since 1898, has resigned that position to take effect on May 1.

Mr. E. E. Hudson, formerly master mechanic on the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed assistant engineer in the division of smoke abatement of the city of Cleveland, O.

Mr. J. B. Braden has resigned as superintendent of motive power and cars of the Wheeling & Lake Erie, and Mr. C. S. Morse has been appointed to succeed him, with headquarters at Cleveland, O.

Mr. J. M. Robb has resigned as division master mechanic of the Chicago Great Western at Saint Paul, Minn., to accept a similar position with the Virginia & Southwestern at Bristol, Tenn.

Mr. Fred W. Wright, formerly foreman of car shops of the Great Northern at Great Falls, Mont., has been promoted to be general car foreman at the same point.

Mr. James Ashworth, general foreman of the Louisville & Nashville at Corbin, Ky., has been appointed master mechanic of the South & North Alabama and Birmingham Mineral divisions, with headquarters at Birmingham, Ala. Mr. J. C. Carroll, foreman at Bowling Green, Ky., is appointed general foreman at Corbin, in place of Mr. Ashworth, and is succeeded as foreman at Bowling Green by Mr. Louis Wellisch, heretofore foreman at Montgomery, Ala., the latter being succeeded by Mr. D. D. Briggs. Mr. Henry Hardie, assistant foreman at Louisville, is appointed foreman at Nashville, Tenn., in place of Mr. Briggs.

Mr. Angus Brown has been appointed master mechanic of the Chicago Terminal Transfer Co., vice J. Hill, resigned.

Mr. Robert M. Hemphill, who was master car builder of the Toledo, Peoria & Western from 1860 to 1885, died on March 23 at the age of 75 years.

Mr. David Clark, formerly for many years master mechanic of the Hazleton division of the Lehigh Valley, died at Hazleton, Pa., on March 25, at the age of 80 years.

Mr. W. H. Prendergast has been appointed master mechanic of the Central of Georgia Ry., at Columbus, Ga.

Mr. G. W. Wildin, formerly mechanical engineer of the Plant System at Savannah, Ga., has been appointed to a similar position with the Central of New Jersey, with headquarters at Jersey City, N. J.

A Handsome Ash Pit.--New York Central Railroad

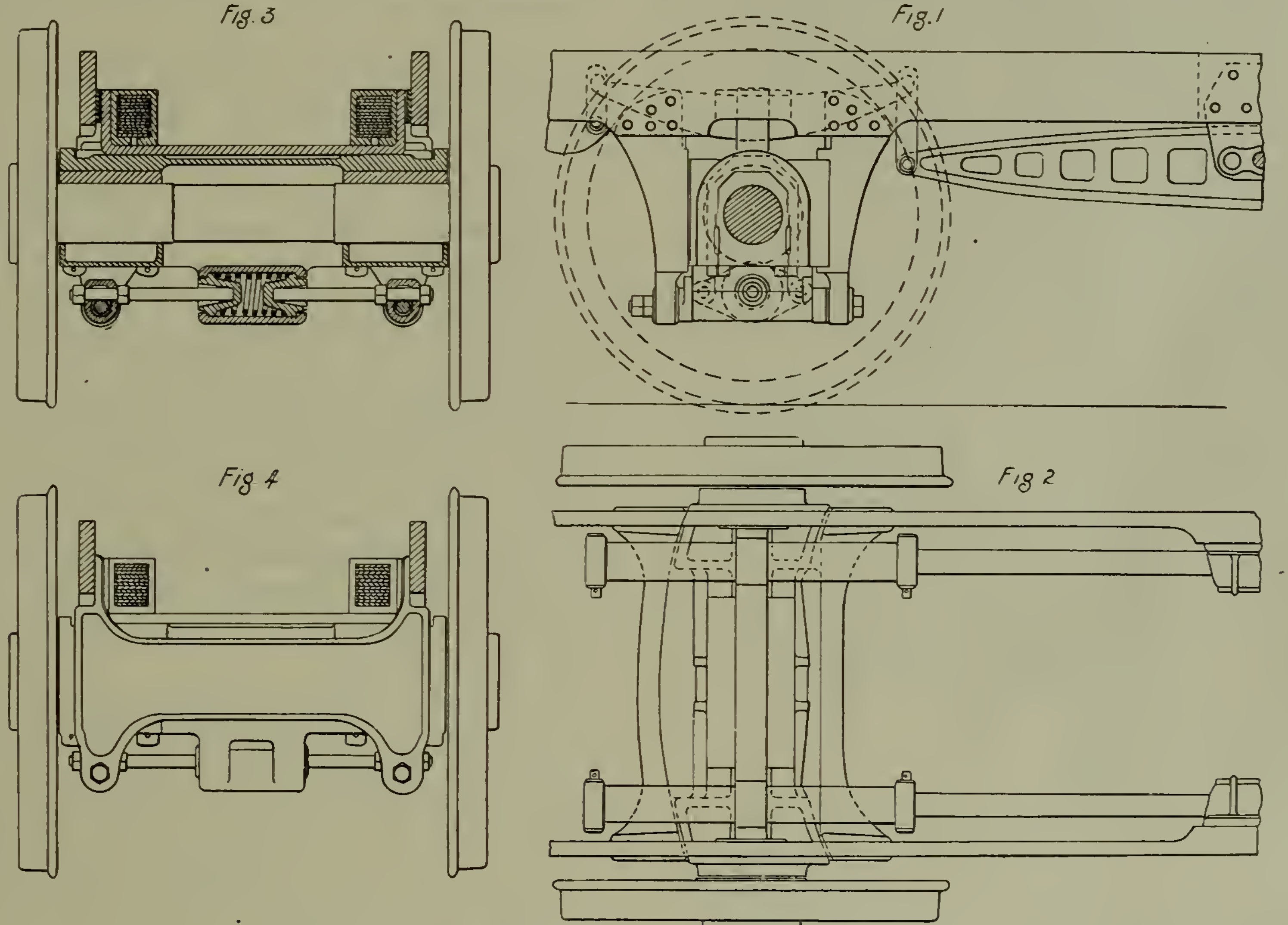
The depressed ash track is not at all new, but some of the forms which it has taken are open to criticism. Here is a treatment which affords durability, convenience, and, withal, handsome appearance. This pit is located on the New York Central, at Syracuse, N. Y. In its construction concrete was employed, which affords smooth, clean and durable surfaces. Cast iron pedestals support the rails as shown.

The Player Patent Improved Radial Truck

THERE has been considerable inquiry as to the theory and construction of the radial truck used under a number of recent Brooks locomotives, and we accordingly present sketches of the arrangement. The following descriptive matter was prepared for us by the locomotive works at our request:

In the construction of modern locomotives of improved design, especially those that are in passenger service, it has been generally conceded that a locomotive having four or six coupled wheels placed underneath the waist of a boiler, in combination with a wide or semi-wide fire box located at the rear of the driving wheels and extending a considerable distance over the frame on either side, is the most desirable type. In order to complete this combination, it is necessary to use a supporting or trailing wheel located underneath the fire box. It has hitherto been customary in the design of four-coupled engines of this type, which have generally been known as the wide fire box Atlantic type, to use a pair of trailing wheels, journalled in rigid pedestals forged on to the main frame, thus making the total rigid wheel base of a locomotive the distance from the center of the forward driving axle to the center of the trailing axle. This distance, on the majority of roads, is limited to between 14 feet and 16 feet, and where large driving wheels are employed, necessarily makes the distance from the center of the main axle to the center of the trailing axle uncomfortably short, thereby imposing a superfluity of weight upon the trailing axle and leaving an excessive overhang therefrom to the rear end of the engine, causing the rear end to sway around considerably, especially in passing through curves, and almost invariably causing an overheating of the journals of the trailing axles. This construction, moreover, while imposing an unnecessary and harmful weight upon the trailing axle, at the same time reduces the adhesive weight upon the driving wheels where it is required.

In order to overcome the objectionable features of this construction, the Brooks Locomotive Works has designed and patented an improved form of radial axle for use in this connection. The introduction of this radial axle for supporting the rear end of locomotives of the above described types, enables the locating of the trailing wheel at the extreme rear end of the fire box, thereby considerably reducing the weight thereon and affording a greater amount of adhesive weight upon the driving wheels, where it is required. The location of this axle, at the rear end of the fire box, also permits the use of a suitable ashpan arrangement and otherwise materially improves and facilitates the construction of this type of locomotive. An additional advantage is secured by the use of a radial axle in reducing



THE PLAYER RADIAL TRUCK.

the rigid wheel base of the locomotive to that of the driving wheels, thereby reducing flange wear on the drivers and lead truck to a minimum and at the same time permitting the engine to pass the sharpest curves with the greatest of ease, and also preventing heating of journals from the excessive hub friction occasioned by the use of a long rigid wheel base.

The use of certain forms of radial axle has been carried out upon the other side of the Atlantic for a number of years. In all the designs, however, in vogue, the lateral or radial movement of these axles is extremely limited and the vertical movement is practically nothing. We do not know of a single instance in the application of radial axles abroad where these have been equalized to the adjacent wheels, and consequently a very hard riding engine is produced. In the present improved design the radial motion can be made any amount that is desired; in some instances it has already been made to exceed 7 inches or 3½ inches either side of the center line, whilst the vertical movement of the axle, both above and below the center line, is made considerably more than that of the driving boxes in order to provide a perfectly smooth riding engine over even the roughest track.

In the construction of this truck it will be noted that the front and rear sides of the axle boxes are curved concentrically upon radii struck from proper center for each application. The two axle boxes are connected together, or preferably cast integral in one continuous structure. The inner faces of the pedestals are curved correspondingly with the axle boxes and the members of each pair of pedestals are connected at the lower end by bolts passing through a special form of thimble, which is also utilized to control the lateral movement of the truck. Each of the pedestals forms the outer end portion of the axle box guide, cast integral by connecting plate, and being provided at the top with an upwardly extending flange by which it is secured to the main frame of the engine. This construction obviates the necessity of forging separate pedestals upon the main frame, thereby effecting a material structural simplification and economy, and moreover, permitting increase of lateral or radial movement as desired, by simply reducing the length of the axle box guides or pedestals to suit any special case, which could not be done were the pedestals forged upon the main frames themselves.

In order to control the lateral movements of the axle-box frame in passing curves, and return it to, and maintain it in, its normal central position on tangents, a centering spring is provided, this spring being illustrated as enclosed in a spring box fixed to the lower sides of the vertical connecting plates of the axle box, with its ends abutting against followers which in turn abut against shoulders on the ends of the spring box. Two thrust rods, the outer ends of which are fixed to members connected with the main frame bars, abut at their inner ends against the followers; the distance between the inner ends of the followers being equal to the maximum amount of traverse of the axle-box frame and axle on either side of the center line of the engine. In the instance shown upon the drawing, the thrust rods are connected at their outer ends to the pedestal thimble, these rods passing therethrough transversely and being provided with adjustment by means of lock nuts clamped against the pedestal tie. By means of this adjustment the distance between the inner ends of the thrust rods may be increased or diminished as desired, or adjusted centrally so as to insure that the trailing wheels are properly adjusted to the exact center line of the engine, thereby preventing flange wear upon one side of the engine, as is frequently the case when all the wheels are not accurately adjusted centrally. It will be seen that the centering spring will be compressed by the lateral movement of the axle box in either direction and will return the same to its normal central position as the compression is released by the opposite movement of the axle box, thereby preventing jars or shocks and reducing liability to strain.

The weight carried upon the radial axle is transmitted thereto through two semi-elliptic springs, the rear ends of which are coupled by spring hangers to the main frames or foot plate, and are coupled at their forward ends by means of longitudinal equalizers to the springs of the rear pair of driving wheels. The spring bands rest upon a carrying bar, the ends of which are turned upward and form thrust blocks bearing against chafing plates attached to the inner sides of the main frames. The underside of the carrying bar is a true surface resting upon the top of the axle box, to which the weight is transmitted by the springs in such manner as to permit the lateral movements of the box to be effected without interfering with the position or action of the springs.

These improved radial trucks have been applied in the construction of a number of locomotives operating upon several roads, and have, in the severest kind of regular service, been found to successfully attain the objects for which they were designed. The employment of trailing wheels for the support of wide and deep fire boxes has, in recent practice, been very generally approved and adopted by railroad managers, and this invention enables their application to be desirably effected by reason of its capability generally for promoting the safe and easy passage of the engine through curves and also by reason of the fact that its spring arrangement is one which will not interfere with the sloping ashpans which are used with wide fire boxes. The construction is free from complication or undue expense and is particularly suitable to the requirements of American practice.

All the engines in service so far to which this invention has been applied are giving the most excellent results and are absolutely immune from heating of journals.

Center Plate Friction and Its Effect on Wheel Flange Resistance*

By Willis C. Squire

IN the early part of 1899 the question was raised and discussed by several well-known master car builders, some of whom are members of this Club, that the friction of side bearings when touching, or technically, "when down," added greatly to train resistance. Numerous road experiments were made with empty and loaded cars, having side bearings "free" and "down," and in the latter case carrying a considerable portion of the weight of car and lading.

These tests proved conclusively that no inconsiderable amount of power was absorbed in turning the trucks passing through curves and again in righting them upon entering tangents. It was also shown that the trucks failed to right themselves upon entering the tangents, and that they bore heavily against the rails for long distances.

After the reports of these tests were published and discussed, and I think that they were discussed by this Club at the time, the writer raised the question "that there would still be considerable saving in the power required to overcome train resistances if all center plates were well lubricated, and that our tonnage rating per unit of power could be increased on all divisions were this part of the equipment given proper attention."

Road tests were out of the question at the time, as they had already been made by others, hence a laboratory test was decided upon as the most reasonable means of determining the resistance of center plates under load.

Shortly after these tests were made, Mr. Clement F. Street, one of our members, made some similar tests, but used actual weights loaded upon the center plates. The results of these tests were widely published and discussed and they confirmed the results deduced from the tests made by the writer.

The experiments were conducted, as before mentioned, to determine if possible how much additional flange pressure was exerted by the wheels in a truck upon a rail by the friction of the center plates when cars enter a curve from a tangent, passing through curves and entering again upon tangents.

The experiments included dry and lubricated center plates.

Owing to the fact that the tests were to be made in a testing machine, it was necessary to use two pairs of plates in the machine for each test. In all, four sets of standard A. T. & S. F. malleable iron center plates, for cars of 80,000 pounds capacity, were used. The general arrangement of the plates, the method of moving them under load and the apparatus used is shown in Fig. 1.

Two sets of plates were placed between the movable head and platform of the testing machine, the upper set being inverted as shown. The two female plates were rigidly held in place and the male plates were free to turn with the lever A, which filled the space between the side lips of the plates.

The plates were turned under the loads imposed by means of a six-inch cylinder, laid horizontally and rigidly secured at the blank end.

The resistance or friction was measured by an indicator placed on the air pipe leading to the cylinder, and gave upon the cards the resultant pressure per square inch upon the piston.

The effect of the velocity of the air through the air supply pipe was eliminated by increasing the cross section of the flow at the point where the indicator was attached, thus avoiding in a great measure any reduction of pressure in the pipe leading to indicator piston, due to the velocity head.

At the end of each trial the load on the plates was

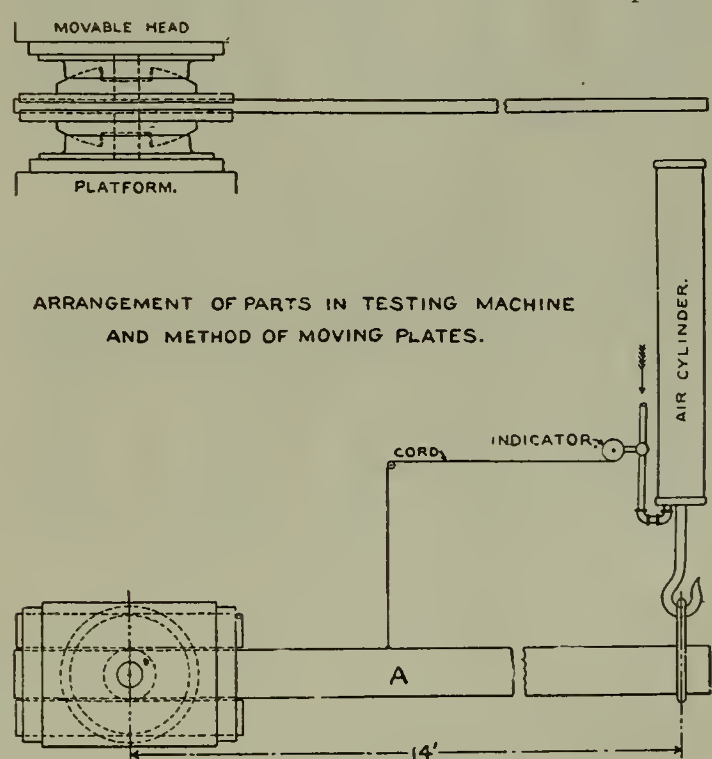


Fig 1.

released; the lever A, air piston and male center plates were returned to the normal or fixed point for the next trial. The load was again applied and the air was allowed to flow into the cylinder at a rate sufficient to drive the piston against a stop in exactly five seconds. All cards taken by the indicator that were made in less or greater time than five seconds were thrown out, as the addition or reduction of a second's time made a material increase in the friction load.

The initial load was 20,000 pounds, and for each series

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*Paper read at April meeting of the Western Railway Club.

of tests an additional load of 5,000 pounds was added until a load of 50,000 pounds was reached.

The rate of motion for turning the plates when reduced to miles per hour of a car entering a 7 degrees and 30 seconds curve, with trucks spaced 30 feet center to center, was found to be equivalent to a train speed of 27 miles per hour. That is to say, the trucks, or rather center plates, would turn at the same rate as those used in the tests when a train entered a curve at the speed mentioned. The 7 degrees and 30 seconds curve was taken as representing the sharpest curve on the line of road outside of the mountain districts.

As two sets of plates were used as described above, the friction loads were consequently double that of a single set of plates. Consequently the pressures registered by the indicator were divided by two to give the resistance of a single set of plates.

Table No. 1 gives the results obtained reduced to a single set of center plates. The first column gives the total load on the plates and corresponds to the weight

TABLE I.

Average load per set required to move center plates with a leverage of 14′ at a rate equivalent to a speed of 27 miles per hour on 7° 30′ curve.

Total load on Plates.	Sets 1 and 2. Rough, no lubricant.	Sets 3 and 4. Rough, lubricated.	Sets 3 and 4. Rough, no lubricant.	Sets 3 and 4. Rough, no lubricant. Plates interchanged.	Sets 1 and 2. Turned in lathe, lubricated.	Sets 1 and 2. Turned in lathe, no lubricant.
20,000	218.9	90.2	115.3	128.9	133.5	131.7
25,000	252.9	101.8	124.7	163.4	157.6	142.8
30,000	296.0	106.8	138.6	200.7	177.7	161.7
35,000	361.7	125.4	165.6	221.6	198.8	179.5
40,000	407.9	148.0	195.6	248.0	222.9	208.5
45,000	479.4	158.1	219.3	267.7	229.6	271.3
50,000	561.7	165.6	241.8	299.9	256.3	270.0

NOTE.—Above table plotted graphically on Fig. 2.
Tests made in the order of above table.

TABLE II.

Same as above with leverage reduced to 31", i.e. center of axle.
In service load would be exerted as flange pressure against rails.

Total load on Plates.	Sets 1 and 2. Rough, no lubricant.	Sets 3 and 4. Rough, lubricated.	Sets 3 and 4. Rough, no lubricant.	Sets 3 and 4. Rough, no lubricant. Plates interchanged.	Sets 1 and 2 Turned in lathe, lubricated	Sets 1 and 2. Turned in lathe, no lubricant.
10,000	1185	489	625	699	724	713
25,000	1371	551	676	886	854	774
30,000	1604	579	751	1087	962	876
35,000	1960	680	897	1201	1077	973
40,000	2210	802	1060	1344	1208	1130
45,000	2598	857	1188	1451	1244	1470
50,000	3044	897	1310	1625	1389	1463

FRICTION TABLE FOR SINGLE SETS.

of car body and lading upon each truck. Fifty thousand pounds were taken as the maximum load on any center plate for an 80,000-pound capacity car. The remaining columns give the loads per set of center plates, found necessary to move when applied at the end of the 14-foot lever. This, then, is an actual index of the friction between the plates.

Table No. 2 gives the same information in a different form, reducing the leverage to 31 inches as representing the distance between centers of plates and the horizontal axis of the axle. The data from table No. 1 is platted graphically in Fig. 2. Five cards were taken for each load in each combination of tests, except for the load of 50,000 pounds, for which 10 cards were taken. The table No. 1 is the average of all these cards.

FRICTION DIAGRAMS FOR SINGLE SETS.

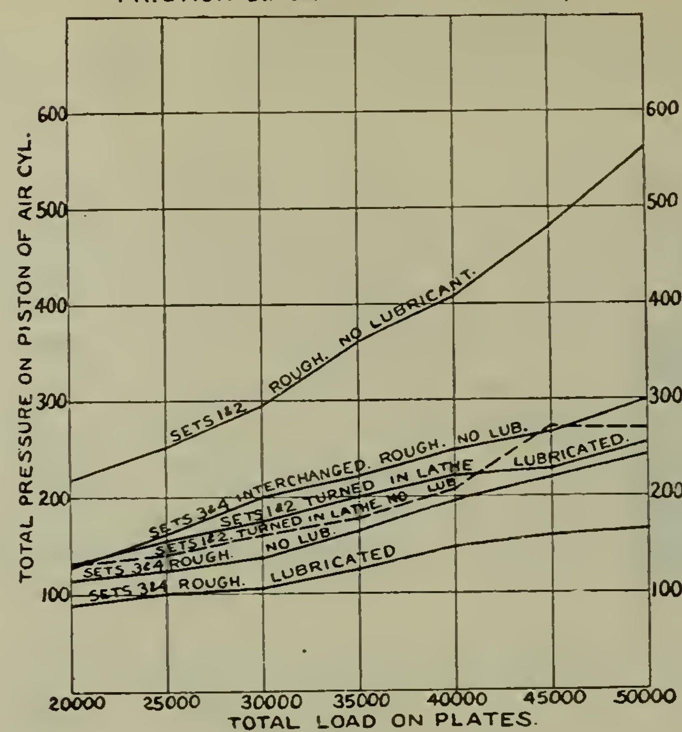


FIG. 2.

Fig. 2 shows plainly the comparative results. Sets Nos. 1 and 2—"Rough, no lubricant"—were probably a little more rough and uneven than the ordinary malleable plates, and were selected for this reason. The friction curve runs from 75 per cent to 100 per cent higher than for sets 3 and 4, "Rough, no lubricant," which sets were considerably smoother. However, there is reason to believe that the difference shown in this instance would have been less had not these plates, sets 3 and 4, been previously tested with lubricant on rubbing faces, and had become much more smooth in consequence.

The difference in the two lower curves for sets 3 and 4 varies from 25 per cent to 45 per cent, and it is fair to presume that the differences would have been greater had the first trials of these plates been made with "no lubricant." After these two sets of experiments with plates, sets 3 and 4, the plates were interchanged: that is, the male plate of set 3 was replaced with male plate of set 4, and the tests made without oil. The second curve from the top shows the results, a marked increase of friction.

After the first set of experiments with sets 1 and 2, the bearing faces of the plates were smoothed off and carefully fitted together in a lathe. Following this preparation these plates were placed in the testing machine, and tests made with "lubricant," and then followed by another set of experiments with "no lubricant." The results as platted seem unusual, for do not only both trials give higher friction loads than the first two tests of sets 3 and 4, but also below the center plate load of 45,000 pounds the friction is greater with a lubricant than without it. This is accounted for by the fact that previous to turning and fitting sets 1 and 2 in the lathes an attempt was made to file and grind the plates to an even bearing with steel emery. It is possible that the emery was carried or worked into the small depressions of the castings and was later forced out under

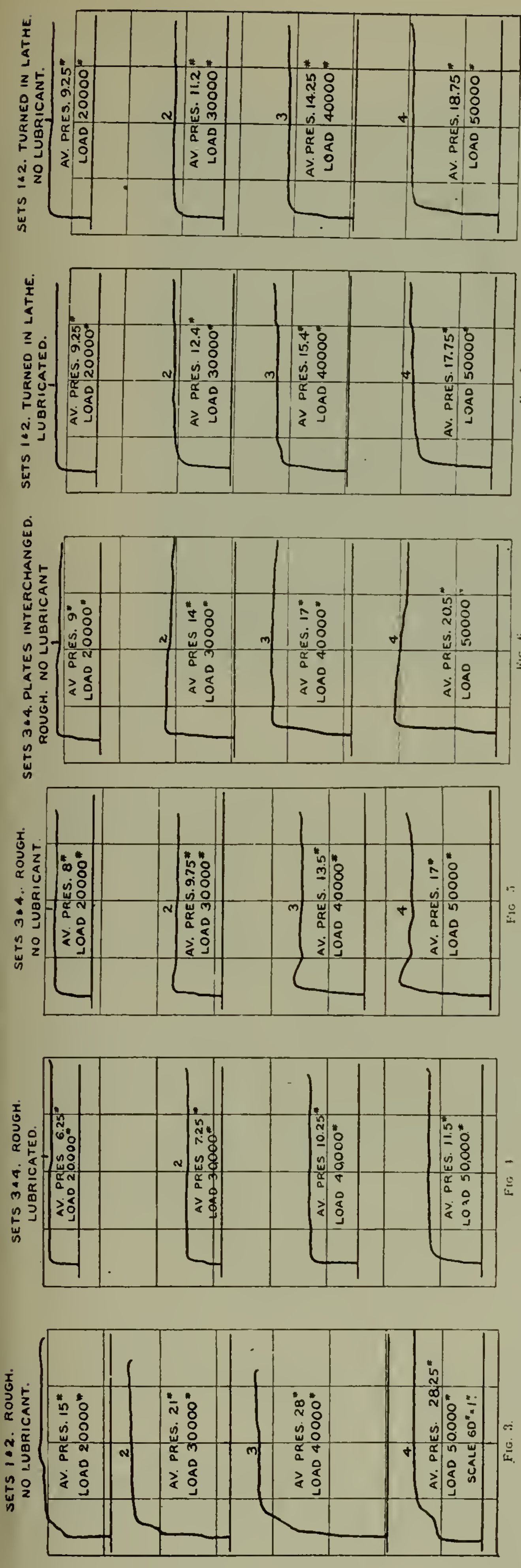


Fig. 8. Fig. 7. Fig. 6. Fig. 5. Fig. 4. Fig. 3.

Indicator cards, showing pressure per square inch in air cylinder required to move two sets of plates. Scale 24 lbs per square inch on all cards except No 4 in Fig. 3 of this page

CARDS FROM CENTER PLATE FRICTION TESTS.

pressure and carried by the oil to the entire surface of the plates.

Referring again to table 2: Since the truck is a rigid structure, any turning of the truck on the center plate relative to the car body must be accomplished by the wheel flanges pressing normally against the rails. This normal force is given in the table for each load and under the varying conditions expressed in the first table. The results of this pressure are to wear flange and rail and to increase the tendency of flange to climb the rail.

Pressure on the rail will increase the pull on the draw bar, but it is difficult to say how much or how little this amount is on the total train resistance, since there is, to the writer's knowledge, no reliable data from which to deduce a coefficient of friction for the particular case of a cast iron wheel rubbing and grinding against a steel rail. However, for the sake of argument, we will assume that it amounts to, say .15, then the flange pressure of 1,310 pounds (see column A, table 2), multiplied by the coefficient .15, gives 169.5 pounds per truck, or 393 pounds per car, increase of pull on the draw bar. As soon as the truck adjusts itself to the curve this resistance decreases, as far as the center plates are concerned, until the curve changes or merges into a tangent. Hence, a train in motion will at no time have this maximum resistance due to center plate friction for more than three or four cars on a single curve. It will naturally increase or decrease as the train pulls through single reverse curves or enters upon tangents.

Figs. 3 to 8, both inclusive, are reproductions of actual indicator cards taken during the tests; they are representative of the lot taken during each series of tests, and show clearly how the friction load varied during the 5 seconds' duration of each trial. It will be noticed that the friction remains nearly constant throughout the tests. In but few cases do the cards show excessive or increased friction loads in starting the plates. Those that do occur are probably due to irregularities in the surfaces of the bearing surfaces in contact.

This is contrary to the generally accepted theory that friction at rest is greater than the friction of motion; or, in other words, that it takes more power to move a body at rest than it does after that body is in motion. The conclusions derived from these tests are, that it is unquestionably beneficial to oil center plates. The tests indicate that oiling the center plates when first put on a car will greatly aid in reducing the surfaces to a fair bearing by preventing excessive cutting or piling of the metal even if no more oil be applied while car is in service.

The amount of tonnage increase due to oiling all center plates will not be hazarded at this time, as no definite data is at hand. That flange wear and rail wear will be materially reduced goes without saying. Fewer and less severe strains in trucks and car bodies will be another result.

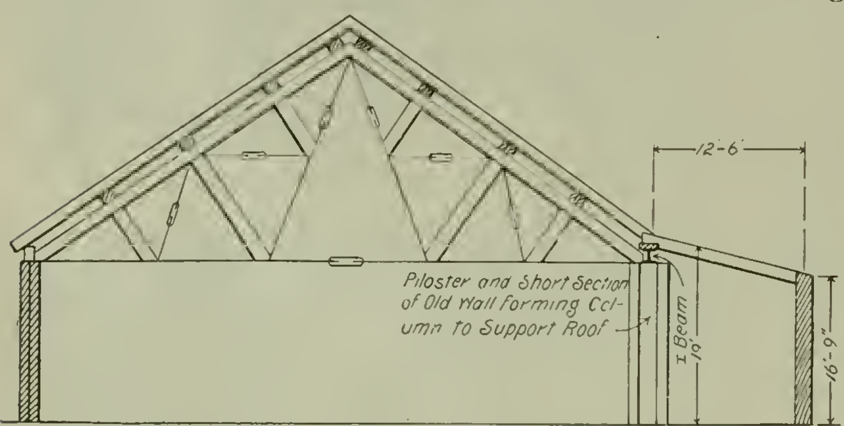
If the amount of friction load, as shown in the tables, is due to lubricated and unlubricated center plate resistance, how much will the side bearing friction amount to?

Lengthening Roundhouse Stalls

SOME time ago it became necessary to increase the length of the stalls in the Western avenue (Chicago) roundhouse of the Chicago, Burlington & Quincy road, to accommodate the large new engines coming into service. We give herewith a rough sketch showing the changes that were made.

When it first became necessary to increase the length of the stalls the doors were moved back and a frame extension built up to the wall. This, however, did not prove satisfactory as the converging of the tracks toward the center of the turntable pit did not admit of sufficient extension to give the desired amount of room. and the alternative was of course some way of lengthening out on the other end. It was finally decided to move the outer wall in one section of the house and try it in that way.

In order to make the change economically it was necessary to leave the roof and the roof trusses undisturbed. This was done by placing a 15-inch "I" beam under the roof plate supporting the lower end of the rafters, the wall being torn out so as to admit the "I" beam. the end of which was placed on a pilaster of the old wall and fastened to the roof truss timbers by a strap bolt at each end, as shown. After placing the "I" beams in position the wall was removed with the exception of a section between the windows about 3 feet long, containing



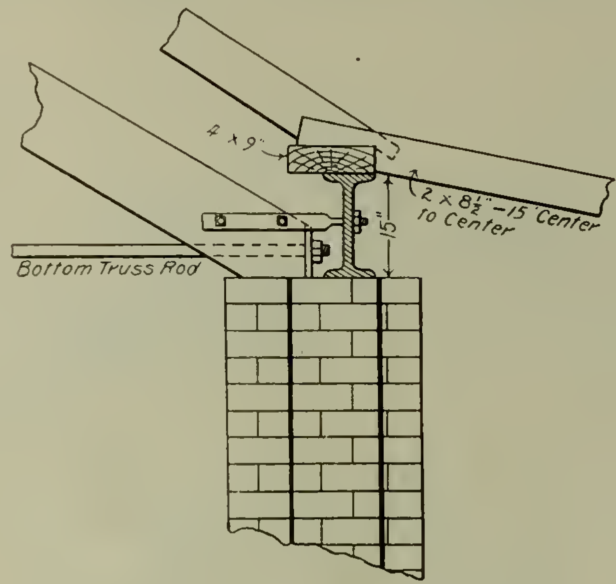
Each I Beam Spans 22'-6" from Center to Center of Columns
LENGTHENING ROUNDHOUSE STALLS.

the pilaster which formed columns to support the roof, and the new wall was built at a distance of 12 feet 6 inches from the old wall and was constructed of the old brick and stone. The "I" beams used were secondhand bridge material, which accounts for their being so large; they were used simply because they happened to be in stock and not because it was necessary for that size beam to support the weight to be carried.

The old windows and frames were used in the new wall. The additional roof required was made of paper laid on boards supported on rafters extending from the edge of the old shingle roof to the pitch of the new wall. The pitch of the new roof was made less than that of the old roof in order to have the side wall of a suitable height.

The length of the pits was increased 9 feet and the smoke jacks were moved 8 feet, or to a distance of about 4 feet from the edge of the old roof. The old roof plate that was used for supporting the smoke jack was not removed, but a cap was placed over the upper end and a new roof plate was set in a new position because it was considered cheaper to put in a new one than to remove the old ones.

No particular difficulty was experienced in moving the smoke jacks, because a four-foot section was taken off



DETAIL OF I-BEAM ARRANGEMENT.

the inside of the jack and placed on the outside of the roof. which raised it above the peak of the roof so as to get a draft. The counterweights and tackle used for operating the drop hoods were left on their old location on the pilaster or column for supporting the roof.

The section which was changed contained stalls for nine engines. The old dimensions were: distance from wall to wall, inside, 60 feet 6 inches; length of pit, 50 feet. The present dimensions are: distance from wall to wall, inside, 73 feet; length of pit, 59 feet.

The engines head into the house and of course the pit is too long at the back end at which point it is covered over with pit planks. While the smoke jacks were moved but 8 feet the pits were lengthened 9 feet, so as to get a little more room to work around the front engine truck wheels.

Traction Increasers

Boston, Mass., April 3, 1901.

To the Editor of the Railway Master Mechanic:

HISTORY is again repeating itself in the case of the traction increaser.

In 1851 two tank locomotives were built at the Boston & Providence railway shops. They were designed by the late Geo. S. Griggs, master mechanic. The water tanks and fuel were carried on an extension of the frame. They had one pair of driving wheels, with crank axle in front of the firebox, and a pair of pony wheels under the cylinders, and under the tank.

A right angle lever, of three to one, the short end resting on the driving boxes, was used. To the long end was attached a rod which passed through the back timber of the frame, where the rods were attached to a half elliptic spring. To the middle of the spring the draw head was secured. These locomotives were run on branch trains for several years. George Richards.

A Big Day's Work in Car Building.

On February 27 the American Car and Foundry Co. had at its Detroit works a banner day in the way of output. On that day it built 39 Nickel Plate box cars and 32 Nickel Plate coal cars, making a total output of 71 cars in one day—a record of which the company may well be proud. The leading dimensions of the box cars were as follows: Capacity, 60,000 lbs.; weight, 32,300 lbs.; length over end sills, 34 ft. 9 ins.; width over side sills, 8 ft. 9 ins.; height from sill to plate, 7 ft. 6 ins.; length inside, 34 ft. ¼ in.; width inside, 8 ft. 2¼ ins.; height from floor to carline, 7 ft. 7 ins.; height at eaves, 12 ft. 2¼ ins.; width at eaves, 9 ft. 6½ ins.; width of door opening, 5 ft. 4 ins.; wheel base, 5 ft.; outside of end sill to center of transom, 5 ft.

The leading dimensions of the gondola cars were as follows: Capacity, 60,000 lbs.; weight, 28,400 lbs.; length over end sills, 36 ft.; width over side sills, 8 ft. 6 ins.; length inside coal box, 34 ft. 5½ ins.; width inside coal box, 8 ft. 1 in.; height inside coal box, 2 ft. 6 ins.; wheel base, 5 ft.; outside of end sill to centre of transom, 5 ft.; cubic capacity of box, 696 cu. ft.

To commemorate this remarkable day a photograph was taken of one of the box cars with a foreground comprising a group of superintendents, foremen and other heads of departments of the American Car and Foundry Company's Michigan department. Through the courtesy of Mr. George Hargreaves, district manager, of Detroit, we are enabled to present a reproduction of this photograph.

Draft Gear Tests

We published in our last issue the report of some draft gear tests made on the Atchison, Topeka & Santa Fe Railroad. Certain comments which have been made regarding these tests seem to imply that they are much more conclusive than we consider them. The question of strength of the rigging itself to resist shocks, is by no means the only one involved in the consideration of the best draft gear. This whole subject is treated so well in a letter from Mr. H. H. Westinghouse to the Railroad Gazette, that we know our readers will be interested and we therefore reprint it in full. We understand that the M. C. B. committee on this subject is looking into these tests as well as those made recently of the Westinghouse apparatus. The report of this committee and the discussion of it will doubtless form one of the most interesting features of the June convention. Mr. Westinghouse's letter in the Gazette is as follows:

Referring to the report of the Atchison, Topeka & Santa Fe draft-gear tests, published in your issue of Feb. 22, I do not believe a careful analysis of the results of these tests warrants the conclusions expressed in your editorial comments, if my impressions are correct in the respect that you assume the four points discussed below to have been established.

1. That double-spring draft riggings are a great improvement over the ordinary arrangement.

To establish this point, comparative tests of the ordinary (single-spring) and double-spring arrangements must be made, otherwise the relative merit of the two devices is a matter of opinion or conjecture. So far as known, such comparative tests have not been made; and, while some may be disposed to assume that the double-spring device must be better, until tests have been made, showing, first, the benefits of the added spring capacity, and, second, the effect of the additional recoil, no comparison of relative merit can be made. I therefore think the Santa Fe tests do not establish this point.

2. That the double-spring device has withstood, without breakage of couplings, as severe tests as those to which the friction draft-gear has been subjected.

As to this contention, by referring to the tests in question, it will be noted that the tractive power of the locomotive operating the Pittsburgh Union train, equipped with friction draft-gear, was fully 55 per cent greater than that of the locomotive used in the Santa Fe tests of spring draft-gear. As the greatest strains exerted in these experiments were developed in the starting or "jerk" tests, it will be seen that the friction draft-gear was subjected to stresses 55 per cent greater than the spring draft-gear. Moreover, in the friction draft-gear experiments, sand was used in jerk tests, thereby greatly increasing the effective tractive power of the locomotive. The report of the Santa Fe tests does not mention the use of sand.

The Santa Fe report states that, for the purpose of making the conditions comparative, two locomotives of about the same united capacity as the single locomotive in the Pittsburgh Union train tests were used in tests with a loaded train. It should require no argument to convince anyone that it is impossible to jerk a train as severely with two locomotives as with a single engine having a tractive power equal to the two combined. Again, in the tests with the two engines, it is to be noted that every car in the train was heavily loaded, while in the Pittsburgh Union tests the cars were all empty. The data given in the report of the Santa Fe show that this train weighed 2,459 tons, or 1,872 tons for the 32 cars forward of those on which brakes were applied. The Pittsburgh Union train weighed but 585 tons forward of the braked cars. The impossibility of producing, with the same locomotive power, as severe jerking strains with the heavier train as with a train of practically equal length but less than one-third the weight and consequent inertia, is too obvious for comment. It should, therefore, be entirely clear that, on the basis of the recorded tests, the spring draft-gear has not stood or been subjected to as severe tests as the friction draft-gear, without breakage of cars or draft-gear.

3. That the Santa Fe tests show conclusively that it is possible to have a spring draft-gear of comparatively small spring capacity, so that the recoil is not likely to cause damage, which, in connection with dead blocks, will meet the extreme requirements of service.

Relative to this point, I fail to find anything in the Santa Fe tests proving conclusively that a draft-gear of comparatively small spring capacity in connection with dead blocks will meet the extreme requirements of service. I have had considerable practical experience with the operation of trains in reguar service, employing a draft-gear of the kind described, and, under conditions that commonly occur in such service, perfectly sound M. C. B. couplings were frequently broken; and I am therefore confident that the Santa Fe tests do not represent the extreme requirements of actual service. Furthermore, it would appear that, in regular service, an entirely satisfactory draft appliance should at least reduce the shocks to a degree that will furnish no good reason why a conductor should not ride in a caboose on the end of a freight train.

4. That these tests form a basis for fair comparison of the relative merits of the double-spring and Westinghouse friction draft-gear.

If I am correct in the conclusions I have stated, there remains no ground for a discussion of the fourth point, for reasons already set forth.

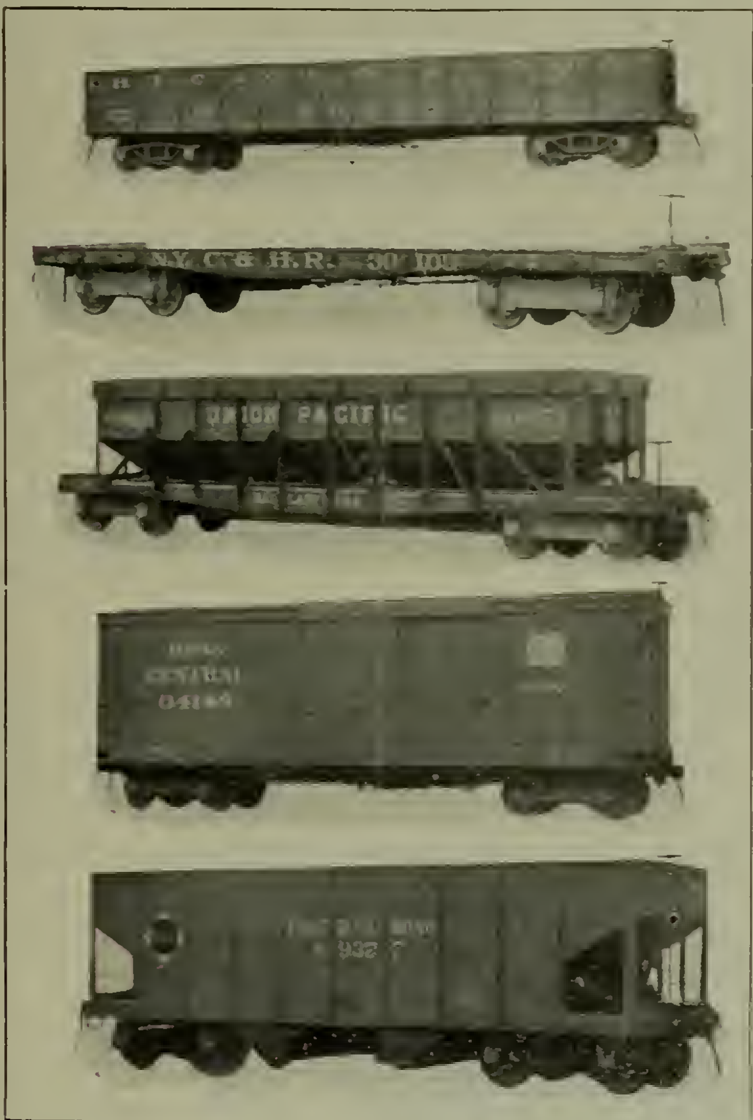
I would again call attention to the fact that the principles involved in the Westinghouse draft-gear are distinctly different from those involved in any spring draft-gear. The chief feature of the improvements in design of spring draft-gear attachments is the provision of a sufficient strength to resist, without breakage, the strains to which they are subjected, the springs affording a partial but inadequate cushion for these strains. There is no provision for dissipating or diverting the energy which produces the strains, for whatever energy is absorbed by the springs during a movement in one direction is simply stored there and is subsequently returned by reaction, in full measure, to cause movement and corresponding strains in the opposite direction. The effect is therefore that of destructive shock, which ultimately manifests itself at the weakest point of the car construction. The purpose of the friction draft-gear, which can be attached to the car as strongly as the spring gear, is primarily to receive, absorb and dissipate, in the form of non-returnable friction, a large part of the strain-producing energy inseparable from starting, moving and stopping trains, thus avoiding recoil and relieving the car structure itself from the excessive strains arising from suddenly accelerated or arrested motion. It also provides the slack motion necessary in starting heavy trains. While the strengthening of the spring draft-gear attachment may result in transferring the point of breakage from the draft-gear proper to the coupling itself, or to some other member of the car, this change does not to any extent remove or lessen the actual cause of damage and therefore does not eliminate the objection or meet the existing requirements, which demand not so much an increase in the strength of the weakest part, always difficult and often impossible of attainment, as a reduction of the excessive strains imposed. The friction draft-gear is designed to accomplish the latter fundamental purpose, and all the facts developed in severe tests and extensive applications warrant the belief that it realizes, in a practical manner, the theoretical advantages of the invention.

H. H. Westinghouse.

Some Typical Forms of Pressed Steel Cars

WE have grouped together views of five different styles of pressed steel cars turned out by the Pressed Steel Car Co., of Pittsburgh. The cars shown are a Chicago & Alton gondola, a New York Central flat car, a Union Pacific ballast car, an Iowa Central box car and an Erie hopper car. Among the special features of these cars are the standard pressed steel truck, solid pressed steel brake beams and standard twin spring draft rigging, all manufactured by the Pressed Steel Car Company.

The manufacture of the solid pressed steel brake beam is a comparatively new feature of this company's work. And it is something that is meeting with general favor, as the company is not only equipping practically all the cars it builds with this beam, but is also receiving large orders for other cars. Another new feature of this company's work is the manufacture of cars with wooden bodies and steel underframes. Some additions have been made to the plant, so that it has a capacity of 30 to 40 combination cars, in addition to the regular steel output. In addition to the Iowa Central box car and the Chicago & Alton gondolas, there were also recently shipped a lot of Erie box cars embodying the combination features.



Some Typical Forms of Pressed Steel Cars.
Made by the Pressed Steel Car Co., of Pittsburg.

In the following paragraphs we give all the leading particulars of the cars shown in our engraving:

Chicago & Alton Railway Co.

500 gondola cars, with steel underframes and wooden sides and floors. Capacity, 100,000 lbs.

General dimensions.—

Length over end sills .... 43 ft. 3 ins.
Length of car inside of body........ 41 ft. 4½ ins.
Width of car over side stakes.............. 10 ft.
Width of car inside of body............ 9 ft. ½ in.
Height from top of rail to top of body.. 8 ft. 3⅝ ins.
Height from top of rail to top of brake mast .... 9 ft. 1⅝ ins.
Height from top of rail to top of center channels .... 3 ft. 6 ins.
Depth of car body from floor to top of sides .... 4 ft. 3 ins.
Distance from center to center of trucks 31 ft. 3 ins.
Height from top of rail to center of coupler .... 2 ft. 10½ ins.
Size of journals.................... 5½x10 ins.
Wheel base of trucks .... 5 ft. 7 ins.
Centers of journals .... 6 ft. 5 ins.

Truck frames: Pressed steel diamond type, manufactured by the Pressed Steel Car Co.

Wheels: Cast iron, 650 lbs.

Journal boxes: McCord.

Brakes: New York.

Brake beams: Solid pressed steel, manufactured by the Pressed Steel Car Co.

Drop doors: Operated by winding shaft and chain.

Draft rigging: 300 cars equipped with P. R. R. quadruple spring draft rigging; 200 cars with Dayton malleable iron draft rigging.

Couplers: Tower.

Union Pacific Railroad Company.

Ballast car; 100,000 lbs. capacity coal; 110,000 lbs. capacity ballast; light weight 37,600 lbs.

General dimensions.—

Length over end sills.................... 40 ft.
Length of car inside of body........ 32 ft. 7¼ ins.
Width of car over all................. 9 ft 4 ins.
Width of car inside of body.......... 8 ft. 8½ ins.
Height from top of rail to top of body... 8 ft. 3 ins.
Height from top of rail to top of brake mast .... 5 ft. 5¼ ins.
Height from top of rail to top of center sills .... 3 ft. 3½ ins.
Height from top of rail to center of coupler .... 2 ft. 10½ ins.
Distance from center to center of trucks, 31 ft. 1 in.
Size of journals .... 5½x10 ins.
Wheel base of trucks .... 5 ft. 6 ins.
Centers of journals.................. 6 ft. 5 ins.

Drop doors: Cars are equipped with two doors, which together extend along one side the full length of the bottom of the car body. They are operated in unison by a single operating shaft through the medium of a toggle lever and spreader device. This arrangement is controlled from the platform at the end of the car by means of a lever attached to the operating shaft, and permits of the doors being opened as much or as little as may be desired. Through this device the positive closing of the doors is guaranteed at all times.

Extension side and end pieces: Cars are fitted with wooden extension side and end pieces, these being secured to the top of the permanent steel sides by means of removable stakes, having "U" shaped guides, open at top, and of such dimensions that the boards may be easily slipped in and out. When lifted out of the "U" shaped guides, these extension pieces are prevented from falling to the ground by means of chains attached to the top of same and to the removable stakes. This arrangement is of special advantage when the cars are being loaded with coal, etc., at which time the extension pieces are allowed to hang at the side of the car until the lading has reached a height necessitating their use, thereby greatly facilitating the shoveling.

Truck frames: Fox pressed steel pedestal type, manufactured by the Pressed Steel Car Company.

Wheels: Cast iron, 33 ins, 650 lbs.

Journal boxes: Cast iron.

Brakes: New York.

Brake beams: Solid pressed steel brake beams manufactured by the Pressed Steel Car Co.

Draft rigging: Pressed Steel Car Co.'s standard twin spring draft rigging.

Couplers: Buckeye, 6 ins. x 6 ins. shank.

IOWA CENTRAL RAILWAY COMPANY.

36-ft. box car with pressed steel underframing. Capacity, 80,000 lbs.

General dimensions.—

Length over end sills ....36 ft. 7 ins.
Length inside...........................36 ft.
Width over side sills................9 ft. 1¼ ins.
Width inside ....8 ft. 6 ins.
Height under carlines.................9 ft. ½ in.
Height of floor from rail.............3 ft. 10 ins.
Width of door openings ....5 ft. 6 ins.
Height of door openings ....8 ft. 7½ ins.
Height from rail to center of drawbar, 2 ft. 10½ ins.
Height over all.......................14 ft. 4 ins.
Width at eaves....................9 ft. 11¾ ins.
Height at eaves....................13 ft. ¾ ins.
Center to center of trucks............26 ft. 7 ins.
Size of journals...................5 ins. x 9 ins.

Truck frames: Fox pressed steel pedestal type, manufactured by the Pressed Steel Car Co.

Journal boxes: McCord.

Wheels: Cast iron, 650 lbs.

Brake beams: Solid pressed steel brake beam, manufactured by the Pressed Steel Car Co.

Draft gear: Standard couplers, in combination with the Pressed Steel Car Co.'s standard twin spring draft rigging and pressed steel draft sills.

Roof: Chicago roof.

Side and end doors: Side doors fitted with Dunham hangers and the National Railway Supply Co.'s locking strip. Small end doors to be made of pressed steel, with pressed steel guides top and bottom.

Grain doors: Chicago, fitted with hinged leaf.

Air brakes: Westinghouse.

ERIE RAILROAD COMPANY.

Double Hopper Bottom Coal Cars. 100,000 lbs. capacity

General dimensions.—

Length over end sills................31 ft. 6 ins.
Length of car inside of body.........30 ft. ⅛ in.
Width of car over side stakes..............10 ft.
Width of car inside of body............9 ft. 6 ins.
Height from top of rail to top of body.......10 ft.
Height from top of rail to top of brake staff...........................11 ft. 2 ins.
Height from top of rail to top of center channels ....3 ft. 6 ins.
Height from top of rail to bottom of center channels at bolster................2 ft. 8 ins.
Height from top of rail to center of couplers ....2 ft. 10½ ins.
Length of drop doors in clear........3 ft. 5⅞ ins.
Width of drop doors in clear ....2 ft. 4½ ins.
Distance from center to center of trucks, 21 ft. 9 ins.
Size of journals....................5½ x 10 ins.
Wheel base of trucks.................. 5 ft. 7 ins.
Centers of journals...................6 ft. 5 ins.

Truck frames: Pressed steel diamond type, manufactured by the Pressed Steel Car Co.

Wheels: Cast iron, 33 ins. diameter, 650 lbs.

Journal boxes: Cast iron.

Brake beams: Solid pressed steel brake beams, manufactured by the Pressed Steel Car Co.

Drop doors: Pressed steel, operated by the Schoen vertical guide device.

Draft rigging: Pressed Steel Car Co.'s standard twin spring.

Dead blocks: Malleable iron, Erie pattern.

Couplers: American.

NEW YORK CENTRAL RAILROAD.

40 foot flat car; capacity, 80,000 pounds; light weight, 28,100 pounds.

General Dimensions:

Length over end sills ....40 ft.
Width of car over stake pockets............10 ft.
Width of wooden floors ....9 ft. 5¾ ins.
Hight from top of rail to top of floor. 3 ft. 10¾ ins.
Hight from top of rail to top of brake mast.. ....6 ft. 3 ins.
Hight from top of rail to top of center channels ....3 ft. 6 ins.
Hight from top of rail to bottom of center channels at bolster...............2 ft. 8 ins.
Hight from top of rail to center of coupler. ....2 ft. 10½ ins.
Distance from center to center of trucks. 27 ft. 6 ins.

Truck Frames: Fox pressed steel type, manufactured by the Pressed Steel Car Company.

Wheels: Cast iron, 33 ins. diameter, 650 lbs.

Journal Boxes: McCord type, malleable iron.

Brakes: New York air brakes.

Brake Beams: National hollow steel brake beam.

Draft Rigging: Pressed Steel Car Company's standard twin spring draft rigging.

Couplers: Gould type M. C. B. automatic couplers.

Throttling

Buffalo, N. Y., March 23, 1901.

To the Editor of the Railway Master Mechanic:

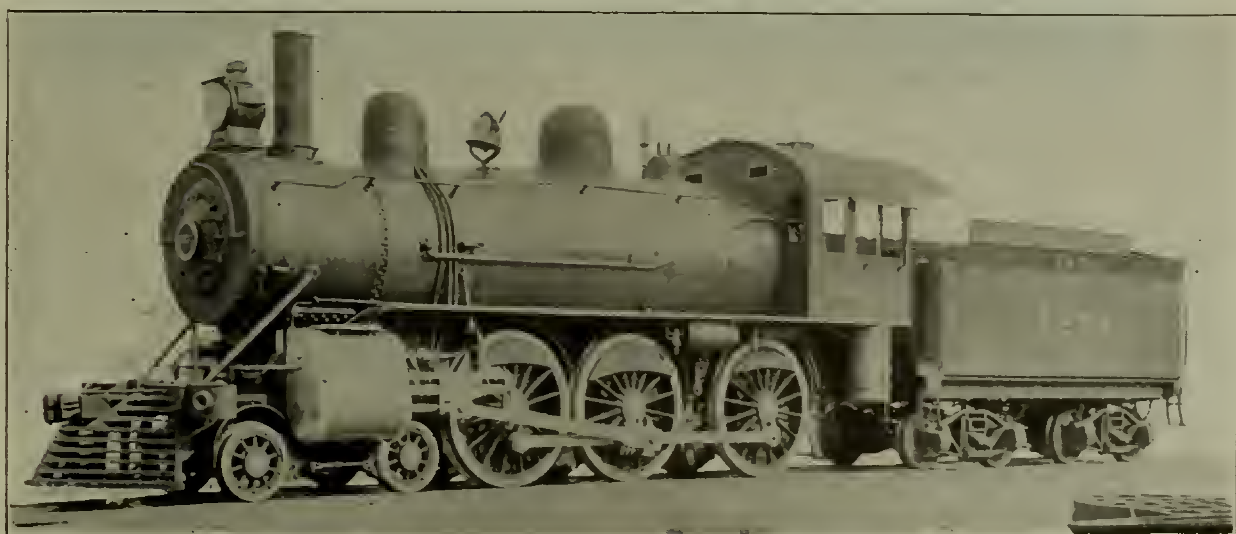
THERE are good reasons for using the throttle instead of running an engine wide open which were not given in the extract from "Locomotive Engineering" in your March issue. In the first place, the great fault of all steam engines, and the greatest obstacle to economy, is cylinder condensation. Economy is promoted by the use of dry steam, and this is not so easily obtained, at least in locomotives. If an engine is running slowly, with the throttle wide open, the cylinders are taking the steam in gulps, so to speak, and there will be a pulsation in the steampipe in consequence. This will affect the boiler, which will be making steam more rapidly at one instant, less rapidly the next; and there will be more priming than if the throttle were used and the flow of steam through it were even and regular. Then again, the expansion of the steam as it passes the throttle into the steampipe has the effect of slightly superheating it, and many of the particles of water it is carrying with it receive heat enough to convert them into steam; more of them are evaporated by contact with the hot sides of the dry pipe and steam pipe. And the result is that drier steam is delivered to the cylinders than if it were not throttled.

It is not unusual to find a reducing valve placed in the steam pipe of a Corliss stationary engine, close to the boiler, the engine working with a lower pressure of steam than the boiler carries. There is sufficient cushioning of the steam in the steam pipe to make the delivery from the boiler more nearly continuous, and as drier steam is furnished the engine, there is better economy.

Geo. B. Snow.

Water Pails for Fire Protection

After years of experience the fact still holds good, says Cassier's Magazine for April, that open pails and buckets, filled with water, have not yet been surpassed in efficiency as "first aids" in fire-fighting, and that more fires are annually put out by such pails and buckets than by all other appliances put together. One trouble with water pails for fire protection in manufacturing establishments always has been that, while they might be provided abundantly enough in places where they were likely to be of service, the water was apt to be wanting at a critical time, either because of evaporation, or its use by some borrower, and failure to replenish the supply. It seems worth while, therefore, to give the following particulars of the arrangement adopted by the superintendent of a certain large mill with the object of overcoming this difficulty. The hooks from which the pails were suspended were fitted up with pieces of spring steel strong enough to lift the pail when nearly empty, but not sufficiently so to lift a full pail. Just over each spring, in such a position as to be out of the way of the handle of the pail, was set a metal point, connected with a wire from an open-circuit electric battery. So long as the pails were full, their weight, when hung on their hooks, kept the springs down, but as soon as one was removed or lost a considerable portion of its contents by evaporation or otherwise, the spring on its hook would rise, come in contact with the metal point, thus close the battery circuit and ring a bell in the manager's office, at the same time showing on an annunciator where the trouble was. As the bell continued to ring until the weight of the delinquent pail was restored, it was impossible to disregard the summons, and no further reason was found in that establishment to complain of the condition of the fire buckets.



Cooke Southern Pacific Ten-Wheeler

THE Cooke Locomotive & Machine Co., of Paterson, N. J., recently turned out a ten-wheel locomotive for the Southern Pacific R. R. The order, which the locomotive company is now filling, was for four engines with piston valves and four with the American balance slide valves.

These engines weigh 173,000 pounds, of which 134,000 pounds are on the drivers. They have 20x28-inch cylinders; 69-inch drivers; extended wagon top, radial stayed, wide fire-box boilers, 66⅜ inches in diameter, and designed to carry 200 pounds working pressure; heating surface of 2,499 square feet, of which 2,325.34 square feet is tube and 173.66 square feet is fire-box surface; and a grate area of 30.22 square feet. The fire-box is 108⅛ inches long and 40¼ inches wide. The tender, which has a steel channel frame, has a capacity of 6,000 gallons of water and 10 tons of coal.

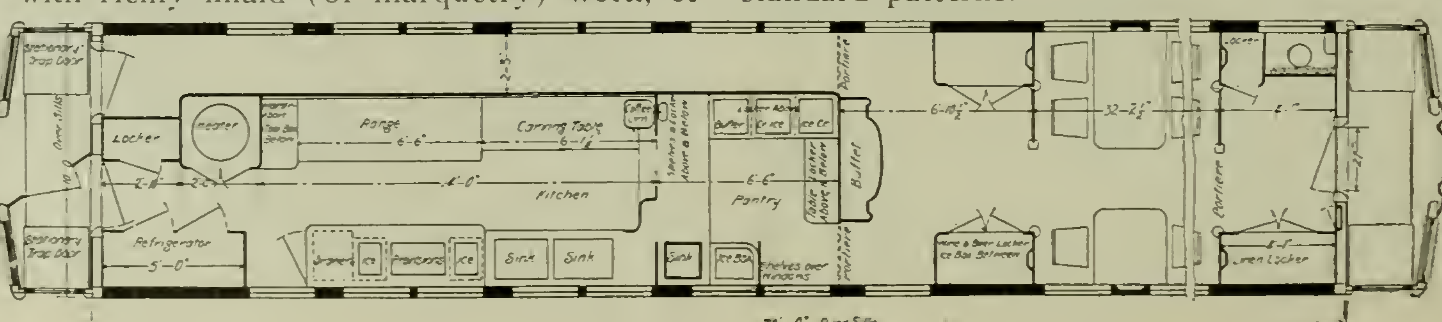
The special fittings and equipment of these engines include cast steel driver centers; Carbon boiler shell and fire-box steel; Latrobe driver tires; Krupp tender and engine truck wheel tires; Nathan injectors; Aschroft steam gages; Buck headlights; Leach sanders; French springs; Franklin boiler lagging; Shelby steel tubes; Lone Star couplers; Nathan lubricators; Consolidated safety valves; Jerome piston packing; Westinghouse American brakes, and Cooke whistles, journal bearings and brake beams.

The "Nickel Plate's" New Diner

THE New York, Chicago & St. Louis Ry. has just received from the Barney & Smith Car Co., of Dayton, O., a new dining car of patented design, known as the "dome deck" style of car, of which the Barney & Smith Company are the originators. The interior contour presents at once a strikingly radical change from the old threadbare lines, and the result has been a welcome departure, not only to the railway officials in getting something novel, but to the traveling public, who are truly weary of the sameness which has characterized car building in the past.

The accompanying illustrations will explain these changes. The interior is of choice St. Jago mahogany, elaborated with richly inlaid (or marquetry) work, of special design, appropriate for a modern dining room. The dome ceiling is done in artistically blended colors, ornamented in gold. The buffet is semicircular in plan, and mounted with a dome-shaped top, of cathedral art glass, presenting a particularly handsome and pleasing appearance.

The car is 70 feet long over sills, with additional length of full width pattern of wide vestibules. The construction of the body is of the most modern type of solid filled framing. The whole structure is designed for the safety, comfort and enjoyment of its patrons. The car is mounted on six wheel trucks, having steel-tired wheels, 36 inches in diameter. The exterior of the car is painted and decorated with the Nickel Plate railway company's standard patterns.



Floor Plan.

Cautauqua Type Passenger Locomotive.--Chicago, Rock Island & Pacific Ry.

THE Brooks Locomotive Works recently turned out for the Chicago, Rock Island & Pacific Ry. a number of passenger locomotives of the "Chautauqua" type, and we are informed that they are meeting with exceptional success in service. One of these engines we illustrate in this issue. This engine weighs 167,500 lbs., of which 37,000 lbs. are on the leading wheels, 93,500 lbs. on the driving wheels, and 37,000 lbs. on the trailing wheels. It has 20¼x26-inch cylinders; 78½ inch drivers; a wagon-top boiler, 66 ins. in diameter and designed to carry 210 lbs. working pressure; heating surface of 2,806 sq. ft., of which 2,617 sq. ft. is tube and 189 sq. ft. firebox surface; and a grate area of 55.7 sq. ft: The fuel is bituminous coal. The firebox is of the wide type. It is 108 ins. long, 74 ins. wide, 74 ins. deep at front and 64 ins. deep at back.

The tender is steel framed and has a capacity of 5,500 gallons of water and 8 tons of coal.

The special fittings and equipment include piston valves, cast steel driver centers, American driver brakes and Westinghouse train and tender brakes, Westinghouse pump, Nathan lubricator, Ashton safety valves, Nathan injectors, Sewall steam heat equipment, Scott springs, Jerome metallic piston rod packing, and Brooks Locomotive Works valve stem packing.

A Theory in Boiler Repairs

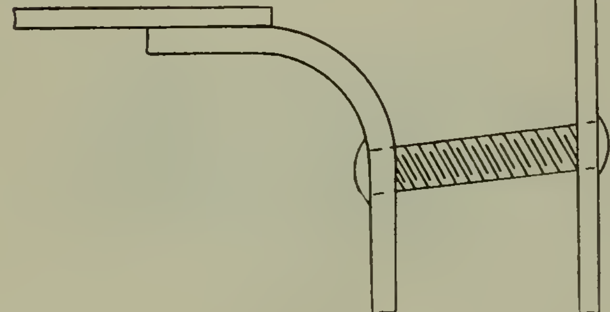
To the Editor of the Railway Master Mechanic:

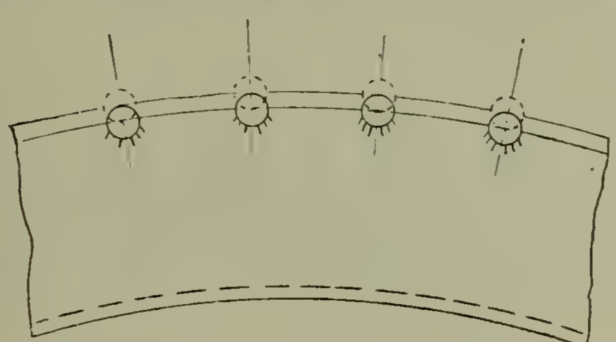

THERE appears in your April number (page 103) an article relative to boiler repairs which I would like to supplement.

The conjectures relative to cause for cracks about stays marked "A" may all have some bearing on the subject, and undoubtedly do. However, the base of the trouble is the unequal expansion due to insufficient staying.

The first row of stays from the flange are offset, as per sketch 1. If we study the direction of cracks, we will find that the predominating direction is as shown in sketch 2. This shows that the metal has been cracked about the staybolt due to insufficient staying, and the trouble greatly increased and direction largely determined by the nature of the stress produced by the staybolt. Cracks do not appear in the outside throat sheet on account of additional thickness of metal, which holds the staybolt firmer and because it is not subjected to the varying temperatures of the firebox throat sheet.

Wm. H. Mussey.


SKETCH 1.


SKETCH 2.

The C. B. & Q. Dining Cars

IN our last issue we gave quite full illustration of the new dining cars placed in service by the Chicago, Burlington & Quincy Ry. These cars, built for the road by the Pullman Company, have attracted a great deal of attention, because of the original scheme of interior decoration employed.

At the time of our first presentation of this car the photographs were not available. We now, however, give reproductions from two views of the interior. Reference to our previous article will refresh memory as to the notable decorative details of these cars. In brief the scheme of decoration is the use of a high Flemish oak wainscoting, the black tone of which is relieved by a yellow ceiling, and by crimson carpets and shades. The wood finish is absolutely plain and without polish, and there is no stencil work or other ornamentation on the ceiling. Relief from long perspective lines is given by the Flemish oak bands running up from the wainscoting and traversing the ceiling.

Our photographic views were taken before the cars were dressed with their napery and silver and china, and do not reveal the interior in its true beauty—indeed, nothing but color photography could do so.

These cars ride on six-wheel trucks, are heated by the Gold duplex system, and are lighted by the Adams & Westlake acetylene system.

THE C., B. & Q. DINING CAR.

The Dayton Draft Rigging Applied to Pressed Steel Sills

In this rigging is provided a heavy ribbed malleable iron sill plate which is secured to the center sills of the

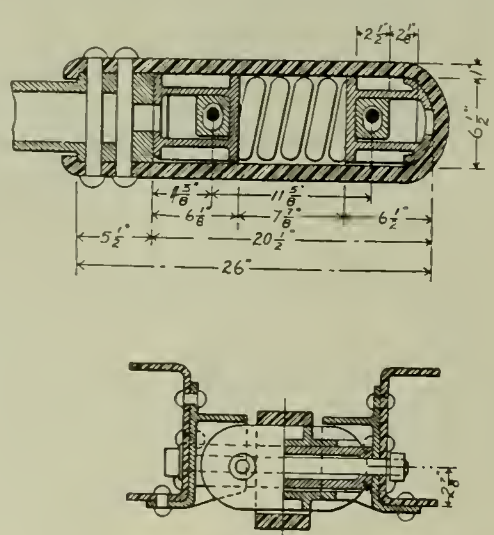


FIG. 2.

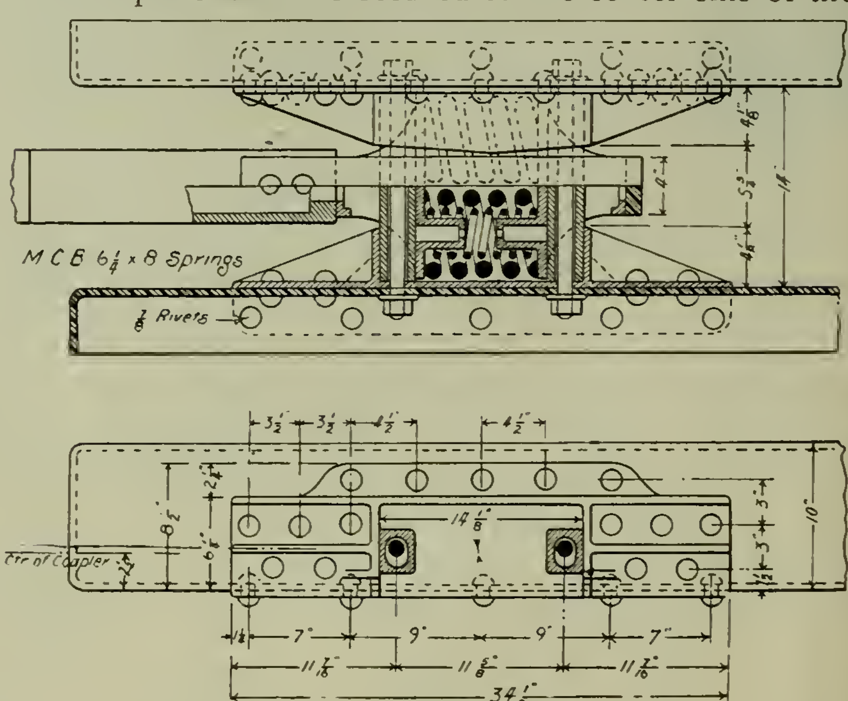


FIG 1.

THE DAYTON DRAFT RIGGING.

THE C., B. & Q. DINING CAR.

car by means of 20 rivets. This sill plate is provided with a flange on its lower side which extends beneath the lower flange of the center sill and is riveted thereto. This sill plate is very stiff and prevents any tendency to buckle or to become distorted on the part of the center sills. As the sill plate is very long, it distributes the strains over a large area of the sill.

The stop bars and followers used with this rigging are the same as those applied to all the different types of the Dayton rigging. The stop bars are carried by $1\frac{1}{8}$-inch bolts, which pass through their center and also through the sill plates and center sills, tying the structure together at the point where it is subjected to the greatest strain.

There is shown in the drawing a tail strap having a rounded rear end. This strap can be applied to any of the Dayton draft riggings, and as the greatest number of failures of tail straps occur in the sharp corners which customarily appear, this is a strong point.

The Dayton company manufacture this same rigging for application to cars having rolled steel sills, and in so doing uses the same patterns, excepting that the lower flange, which extends beneath the lower flange of the center sills, is not used, as it is not deemed necessary to a rolled section.

There are furnished per car four sill plates, four stop bars and four followers, which comprise the rigging complete, with the exception of the springs, tail straps, bolts and rivets. The rigging is designed for use on cars of 80,000 to 100,000 pounds-capacity, and is made by the Dayton Malleable Iron Co., of Dayton, O.

Spirit of the Railway Press

Being the Cream of the Literature of Railway Mechanics Appearing During the Past Month

Red, Yellow and Green Signal Glasses

[Railroad Gazette, April 5.]

Red, yellow and green signal glasses were discussed again at the last meeting of the Railway Signaling Club, but with the usual unprofitable results. In speaking of yellow, and what it looked like when it did not look yellow, some members appear to have had in mind a light yellow and others a dark one, though they did not say so. We call the discussion unprofitable because no one seems to have made any progress toward converting others to his view. (Though, whatever may be the views of those who discuss, one road after another adopts yellow and puts it in use.) Those who felt doubtful about the propriety of using yellow, cited two objections, one of which is easily removable and the other imaginary. The first is that greens and reds are variable. A number of signals will be found to have a variety of shades of green, or of red, or of both. Some greens look like light yellow, and some reds are about the same shade as a dark yellow in a fog when the sun is rising. The answer to this objection is, make your glasses uniform. This should be looked upon as a necessity, regardless of whether one uses yellow or not. Uniformity in the lamps of each color is due to the enginemen of fast trains, whatever colors are used. We are not prepared to admit that even a pale red looks like yellow, in any fog that ever occurs around New York; but the only rational standard is to have a deep red, uniform in all signals. Uniformity is of equal or greater importance in green signals, if that color is used as the night "proceed" signal. To demand a uniform color in all glass orders will not please the purchasing agent, as it will often narrow the range of competition and increase the cost, but the total cost for all the signals of any road is small compared with the advantage. We judge that the best glass-makers are ready to do their part toward uniformity, as one of them tells us that he is filling orders for one color at cost or less, for the sake of inducing railroads to use the best kind in all of the colors.

The second objection is that an engineman who is constantly encountering yellow distant signals which look like red home signals will some time reach a home signal (without seeing the distant), and assume that that is the distant, and therefore make no effort to stop before passing it. To make this objection worthy of attention one must admit not only that yellow will sometimes look reddish, but that red will sometimes look yellowish. We do not think this admission necessary, but for the sake of argument will assume that it is. What then? English railroads, with ten or a hundred times as many signals as there are in America, have for many years made their distant-signal and home-signal night colors exactly alike, and have had no trouble at all. Of the scores of accidents investigated by the British Board of Trade during the last dozen years we do not recall one where an engineman missed his distant signal and assumed that the home was the distant. With the thousands of train movements carried out every month in that country, about every possible kind of negligence must happen, sooner or later; and with the very thorough investigations made by the Board of Trade all peculiar and unusual kinds are pretty sure to be shown up in their true light. In the light of this great mass of experience, a discussion about the troubles likely to result from an engineman taking a home signal for a distant seems to us decidedly academic.

The Effect of Boiler Scale

[Railroad Gazette, April 5.]

It is quite true that exact data about the effect of boiler scale are meager. But we have never seen any tests, reported fully enough to enable one to judge of their merits, which showed that scale has little effect on the evaporation, while reliable tests have shown the contrary. This is leaving out of question all of that class of evidence which is simply based on general impressions gained by working around boilers which may or may not be of value.

Those who are interested in the subject will find a full account of some careful experiments made for the Illinois Central with a locomotive boiler and described by Prof. L. P. Breckenridge, of the University of Illinois, in our issue of January 27, 1899. The tests were made with the special object of determining the effect of scale on the evaporation. The standard method of conducting boiler tests was followed with the engine at rest in the round house, and two trials were made under each condition as a check on the result. The boiler when first tested had been in service 21 months, and the thickness of scale varied from 1-32 to 3-64 in.; after being thoroughly cleaned the tests were repeated. The loss of efficiency due to this scale was found to be about 9.5 per cent.

In fact, all boiler scale is not alike in its physical properties or in its effect upon evaporation. In Mr. William Kent's new book on "Boiler Economy," just published, he says: "The effect of scale in a boiler ordinarily is to reduce both its steam generating capacity and its economy. . . . The amount of the loss of economy due to scale deposit is often overestimated. . . . It is probable that the decrease of heat transmitted depends upon the kind of scale as well as upon its thickness, but increases at a slower rate. If the scale is dense and hard, so as to be practically waterproof, a thin coating of it may be an effective non-conductor. . . . If it is porous, as many scales are, it will allow water to pass through it to the metal surfaces of the boiler, and the decreased transmission of heat will be very slight." This sounds like a reasonable and scientific statement, and it comes from a gentleman who has for years made a specialty of the accurate study of boiler performance. It may be appropriate to say a word as to a fact which perhaps partly accounts for the notion that scale has little effect on the evaporation. It is said on good authority that a locomotive when first coming out of the shops, after general repairs, often does not show as good fuel performance as it did just before it was taken out of service and when there was more or less scale in the boiler. This in some instances has given rise to the conclusion that the scale has little effect on lowering the evaporation. We imagine, however, that this condition is really due in the most part to the draft apparatus being badly adjusted when engines first come out of the shop, and in any case nothing can be told accurately from the ordinary fuel records.

Unless something of a very convincing nature can be brought out to the contrary, we must continue to believe that scale seriously affects the evaporation of boilers.

Narrow and Wide Fire-Boxes

[Railroad Gazette, March 29.]

On another page are the results of some road tests with narrow and wide fire-box engines, burning soft coal, which are of importance to mechanical engineers in general and to locomotive engineers in particular. These experiments show conclusively that the present movement toward wider grates for soft coal burning engines is a step in the right direction. The tests on their face do not show a wonderful performance as the result of wider grates, but the difference under ordinary conditions of working is important.

The two engines tested were practically the same size, and we would first point out that the wide fire-box engine with a larger grate can be satisfactorily worked with a larger exhaust nozzle than the narrow fire-box engine. This to a good many people is conclusive proof of better efficiency and further contradicts some statements to the contrary which were discussed in our issue of Nov. 30 last. In this particular case, the cylinders of the wide fire-box engine were 19x24 in., against the 19x26-in. cylinders of the narrow fire-box engine. Other things being equal, one might expect to find a larger exhaust opening used with the larger cylinders, but for all this the exhaust tip of the wide fire-box engine was 1/4 in. larger in diameter.

In the first tests where the firing was carefully done, but where no special precautions were taken, the wide fire-box boiler showed about 10 per cent greater evaporation per pound of coal; the coal burned per foot of grate was about 70 lbs. an hour for the wide, against about 117 lbs. for the narrow fire-box engine. This would indicate that the claims for the wide grates were well founded; that an unskilful fireman can do better work with the wide fire-box, and that the larger grates are not worked so near the economical limit so far as combustion is concerned. Where extraordinary precautions were taken in firing and where the grates were shaken every few minutes there was little or no difference found in the boiler efficiency; it was possible to get perfect combustion with both fire-boxes. This can scarcely be urged as an argument in favor of narrow fire-boxes, because it is out of the question to handle locomotives in that way in everyday service. Plainly that boiler is to be preferred which will give the best results with ordinary firing and ordinary attention.

Another point which is worth noting is that even in the engine with 16-ft. tubes the temperatures in the front end were usually between 800 and 900 deg. Fh., which would indicate that the forward part of the flues must be of value as heating surface. It has been generally taken that there is nothing gained by making the tubes longer than 50 diameters, and yet in the wide fire-box engine tested the flues are more than 70 per cent in excess of this rule, and high smoke-box temperatures were noted. These results would seem to warrant tubes even longer than 16 ft.

Flange Fractures in Cast Iron Wheels

[Railway Review, April 20.]

In connection with the attention which is now being directed to the increase in the breakage of wheel flanges in evidence with the heavier class of freight cars, it may be well to note that the flanges do not break off in a horizontal line, but that the plane of fracture generally extends down from the flange fillet in a line not far from perpendicular to the tread, or in other words, a whole section of the flange breaks off instead of a piece of it. This would seem to indicate that the wheel could be strengthened by adding stock to that part of the flange which lies above the level of the rail. As these cracks start in the fillet of the flange, and as the fractured piece sometimes shows an initial seam at this point, there may also be possible some chance of improvement in the manufacture of the wheel by investigating the cause what these occasional seams indicate. It seems almost out of the question to think of the steel tire in freight service, yet the flange breakage in the large capacity cars has increased to an extent which compels the cast wheel to need attention with a view to strengthening its flange, or by some other means to conduce to it a greater freedom from flange fracture.

Give Credit Wherever it is Due

(Machinery, April, 1901.)

A contributor to the American Manufacturer comments on instances where he has observed that college graduates have not succeeded in handling men. He believes that in many cases these graduates are inclined to forget that what the mechanic may lack in education he may compensate for by his practical knowledge of his trade, and adds that the mechanic knows that the college graduate has gained only a theoretical knowledge of mechanical pursuits at college, and is ready to resent any action of his which tends to assert his superiority as a man or a mechanic. He says that "the successful manager or foreman is the man who thoroughly understands the mechanical pursuits in which he is engaged, and has acquired the knack of not driving, but leading, men to do his bidding.

"Such a man does not quarrel with his men, or do anything to humiliate them in the presence of his fellow-workmen. When their work or conduct is not satisfactory, he goes quietly to the workmen, and advises or instructs them what to do to improve matters and make affairs satisfactory."

All this is well and good, and the writer goes on to formulate a number of rules that a person must follow to become a successful manager. He emphasizes that one must control his temper, be firm and polite, etc., etc., which is also well and good, and finally adds:

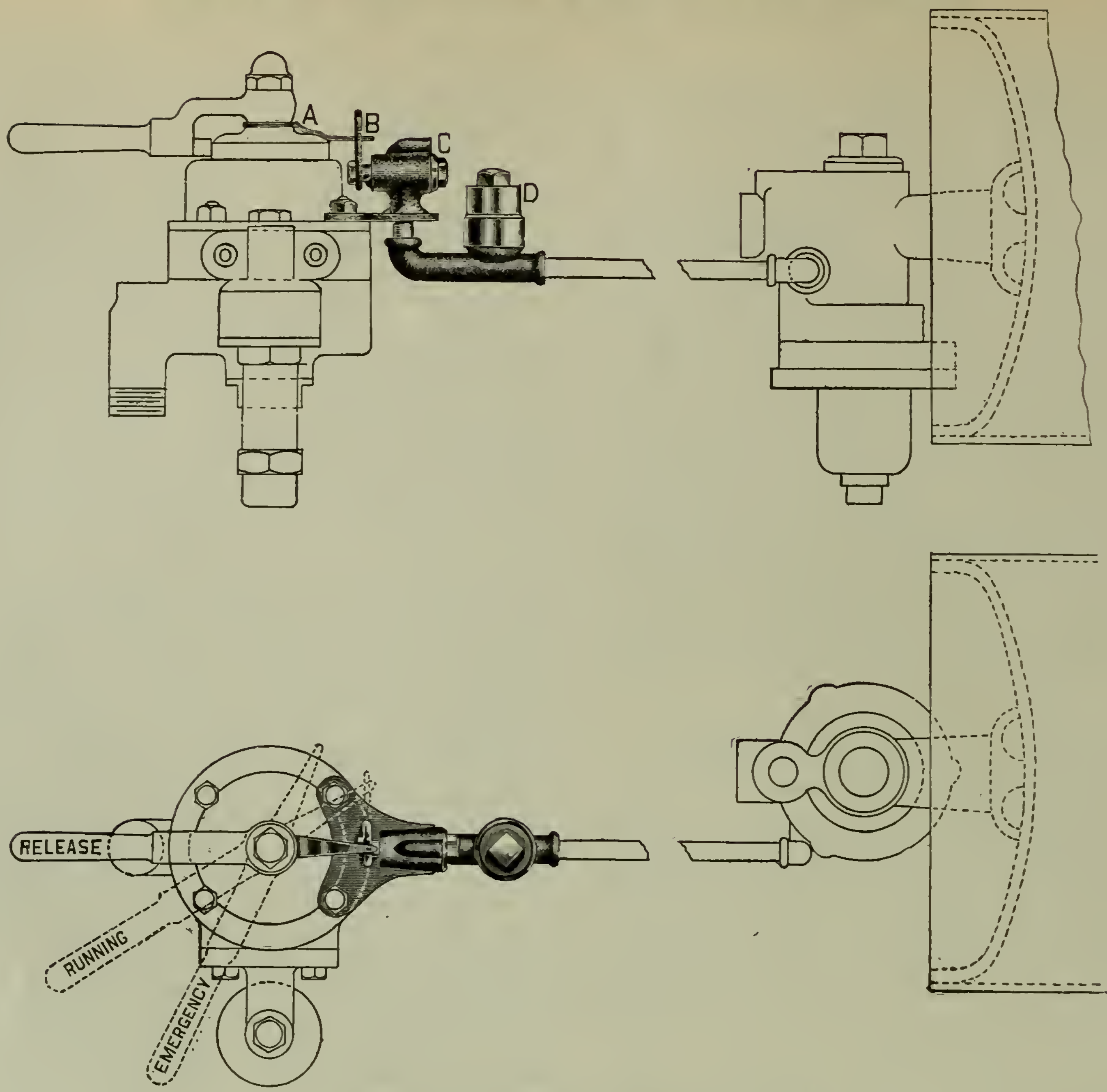
"Always remember that you do not know it all, and cultivate the habit of learning from workmen under your charge, and others, all you can without exposing your own ignorance. Learn to apply such knowledge without giving others credit, and to improve upon it or present it in such a way that the man from whom you obtained the knowledge will not recognize it as his own, and will give you credit for knowing more than he did."

We cannot imagine worse advice to a young man who aspires to rise as a manager of men, and who hopes to hold his self-respect and the confidence of those about him, than that contained in the last paragraph. Does the writer of the article referred to suppose for a moment that such action on the part of a manager, superintendent or foreman will go unnoticed? And does he suppose that when it is discovered, as it will be, that he is using the ideas of others and is taking the credit himself, it will add to his influence over those who have heard of his methods? There is, perhaps, no one thing in which people oftener try to deceive themselves than in the belief that they can enhance their influence by taking other people's ideas and assume to know more than they do, by taking the credit also. A manager who is willing to learn from the lowliest about him, and is willing to give even the most humble their just dues, will lose nothing in dignity, will be more respected, and will exert more influence than one who does not; because he is actually just what he appears to be, and because his ways are as just to those below him as to those above.

The Michigan Driver Brake Rctainer

The Michigan automatic driver brake retainer, shown in our engraving, is employed for the purpose of keeping the train bunched after the train brakes have been released, in order to prevent shock to the train on a second application of the brake, and also to prevent the train from parting when the train brakes have been released, caused by the forward end of the train surging ahead while the brakes are not fully released on the rear end. The use of this device also facilitates handling the train at crossing and water crane stops, where the train can be handled with better dispatch on account of being able to have all the brakes on the train fully released when the train comes to a stop, allowing the engineer to get away quickly without waiting for the release of brakes.

These points are gained by retaining pressure in the driver brake cylinder at will. The retainer valve consists of two parts, C and D, and is connected with the exhaust port of the triple valve by a ⅜-inch gas pipe, The valve is operated by the reciprocating handle A, which engages with the member B. The retainer valve is bolted to the top flange of the brake valve, using the



The Michigan Driver Brake Retainer.

brake valve's regular joint bolts. The handle A is fastened over the post of the brake valve as shown.

It will be seen that the retainer is operated by the movement of the brake valve handle. The pressure is retained in the driver brake cylinder when the brake valve handle is in full release position, and released when the brake valve handle is in running position. When the brake valve is brought to full release, the handle is left in that position until all brakes on the train have been released; and in this position 15 pounds of pressure is held in the driver brake cylinder, which keeps the train bunched. In the event of making an application of brakes, and it is not desired to come to a stop, the brake valve can be brought to full release and returned to running position, which will release all brakes, including the driver brake.

This device warns an engineer that his driver brake is set when warning port is open; it also causes the engineer to place his brake valve in running position before starting, because his driver brake is set when the brake valve handle is in full release position. This retainer is manufactured under letters patent by the Michigan Lubricator Co., 661-673 Beaubien street, Detroit, Mich.

The Car Foremen's Association of Chicago

April Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Chicago, Wednesday evening, April 10th. President Sharp in the chair.

Among those present were the following:

Boutel, H.
Bond, L. E.
Brown, J. W.
Bates, G. M.
Borrowdale, J. M.
Baasch, Henry.
Blohm, Theo.
Chadwick, A. B.
Cardwell, J. R.
Darlington, R. H.
Deen, Chas.
Depue, Jas.
Delsing, F.
Donovan, A. G.
Earle, Ralph.
Evans, W. H.
Elkin, Jno. L.
Goehrs, W. H.
Grieb, J. C.
Guthenberg, B.
Hughes, Chas.
Hedrick, Elias.
Johannes, A.
Johnson, A. G.
Keebler, C. F.
Kroff, F. C.
Kline, Aaron.
Milehan, C. M.
Morris, T. R.
Marsh, Hugh.
Mehan, Jas. E.
McAlpine, A. R.
McAlpine, J. D.
Nordquist, Chas.
Olsen, L.
Prickett, Jas.
Parke, P.
Richardson, H. H.
Stagg, C. S.
Sharp, W. E.
Stimson, O. M.
Swift, C. E.
Sielaff, R.
Spohnholtz, C.
Schmeckpiper, R.
Skilling, J. K.
Shannon, S.
Stewart, H. A.
Smith, R. D.
Terry, O. N.
Wolfe, Chas.
Wentsel, Geo.
Williams, Thos.
Wensley, W. H.
Weschler, H.
Wessell, W. W.
Wharton, R.
Waughop, Chas.

President Sharp: The first order of business is the reading of the minutes of the last meeting. As they have been printed in the Railway Master Mechanic and distributed, if there are no objections we will dispense with reading the same.

Secretary Kline: The following have made application for membership:

R. R. Bradley, wrecking master, B. & O. R. R.; J. N. Coker, car inspector, Swift Refrigerating Transportation Co.; Wm. P. Effinger, car department clerk, B. & O. R. R.; Jos. Flannigan, clerk, Provision Dealers Despatch; J. B. Gipp, representative, Pickering Spring Co.; Wm. F. Luebke, clerk, Illinois Central R. R.; M. L. La Flare, care foreman, B. & O. R. R.; Chas. V. Marquart, car foreman, B. & O. R. R.; E. B. Purel, car foreman, Swift Refrigerating Transportation Co.; Wm. Tomlinson, car inspector, C. & E. R. R.; E. J. Trudeau, M. C. R. R.; Ed. N. Tuckermann, stenographer, C., M. & St. P. Ry.; Geo. W. Taylor, general foreman, C. & A. R. R.; Edw. Wells, foreman car shops, B. & O. R. R.

President Sharp: These names have been passed upon by the board of directors and they will be enrolled as members.

This brings us to the regular program of the evening. Subject No. 1 on our printed program, is as follows: "What is the proper method of procedure, both as to repairs and bill, in the following case: A car owner finds one of its 60,000-pound cars with a wrong pocket and wrong draft spring; the car bearing a repair card reading 'One Gould coupler,—broken.' Owners procure a joint evidence card reading 'One wrong draw bar pocket ¾x4x10 inches, should be 1x4x10¾ inches; one 7-inch draw bar spring, should be 8-inch.' Wrong attachments were on the coupler covered by the repair card."

I will ask Mr. J. D. McAlpine of Cleveland, to open the discussion on this subject.

Mr. McAlpine (L. S. & M. S. Ry.): This question is intended to bring out the point as to whether an intermediate road should be held responsible for simply re-applying wrong parts which were found in a car when repairing adjacent or contiguous parts. It seems to me an intermediate road ought not to be held responsible in a case of that kind unless there is some provision made for reimbursing them for making the repairs right. I should like to have had the association take this question up last month when they were considering revision of the rules, and recommend an addition making car owners responsible for wrong repairs which were corrected by an intermediate road. I do not understand now that the owners are responsible. It may be said that the intermediate road could secure joint evidence card and bill on the owner, but I do not so understand it. It would not be joint evidence in the sense intended by the rules, for a joint evidence card is intended to be used by the owners to make bill on and not to make bill against the owners, so until there is a provision made for reimbursing the intermediate road for making such repairs I do not think they should be held responsible for re-applying parts that they found wrong. In the case that has been read we might concede that it was not good practice to apply a pocket smaller than was standard to the car, there was also a spring in the car that was too small—7 inches in place of 8 inches, and we may say the inspector knew, or should know that it should not be replaced in a 60-000 pound car, but unless he knew that his road would be paid for putting in a proper spring he would be justified in not making proper repairs. It is putting too much responsibility on an inspector or repairman to say what parts he should replace without a rule such as suggested, because here comes a car with wrong parts and he says: "I will make proper repairs to that car," but when the owners get the bill, they say "we will not pay for that; we have cars running right along with those parts, and perhaps apply them ourselves." Take the case of a car having a spindle coupler and the spindle 2 inches too long. That is wrong repairs. If we washer it out will it be satisfactory to the owner or will he hold us for making improper repairs. Take the case of a bent brake staff and wrong brake wheel on the staff. We straighten the staff, are we responsible for the wrong wheel? I think it is placing too much on the judgment of the inspector to decide. Now in regard to what the rules say: There are arbitration committee decisions on this subject and the last one, I think, is 594, in which the committee rules that their prior decisions, in cases 394 and 395, held the intermediate road responsible for wrong repairs, (when there was no repair or defect card on the car), because they were delivering roads defects, but in case 594 it was owners defects and they ruled that the intermediate road could not be held responsible and all that could be required would be joint evidence. In the case before us some wrong repairs had been made, but they were owners defects and I do not think under the arbitration committee's ruling in case 594 that the intermediate road should be held responsible for anything more than joint evidence, even if joint evidence was worth anything, so as I said before, I wish this case had come up at the last meeting and that the association had recommended a change, or an addition to Rule 3 similar to the one that was talked of at Buffalo, at the Central Club's last meeting, for I do not know of any club or association that has as much weight as the Car Foremen's Association of Chicago in such matters.

Mr. Mehan (C,. M. & St. P.): It would seem to me that whether or not the defects were owners the intermediate road should not be held responsible. Section 1, of Rule 3, states: "Defect cards shall not be required for defects for which owners are responsible, except for missing material on cars offered in interchange, as provided for in Sections 20 and 32 of Rule 3; neither shall they be required of the delivering road for improper repairs that were not made by it." Now this car was offered to the party who applied the coupler, and evidently the wrong attachments existed at that time. He could not protect himself by demanding defect card, under this section. He was compelled to accept the car, providing it was safe to run. Here is the second paragraph to the preface of the rules: "Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident, and for improper repairs made by them, and they should make proper repairs at their own expense, or issue defect card covering all such damage or improper repairs." Now it seems to me if we are going to hold the intermediate road responsible, it would be manifestly unjust as well as a direct violation of the rules. It seems to me the correct procedure in this case would be for this man to re-apply the wrong parts, let the car go home and the owner would be amply protected by the joint evidence card and the party applying the wrong parts could be located through their repair card stub, which in all cases gets to the car owner whether bill is made or not. If you hold the intermediate road responsible you are going to let the real culprit go.

Mr. Darlington (C., M. & St. P.): It seems to me, after some years experience in the handling of defect and repair cards where bills are made and where bills are not made, that the gentleman who last spoke labors under quite a serious delusion. He says that the stubs of repair cards find their way to the owners of the road whose car has been repaired, in every instance, whether bills are made or whether bills are not made. In the way in which he treated that subject he reminded me of some clergymen I have heard preach. They take the bible and say we must live according to the bible—every professing Christian lives according to the bible. This gentleman takes the Master Car Builders rules and says the M. C. B. rules say so and so and every respectable railroad company lives up to them. Now in hundreds, I may safely say in thousands of cases I have had during the time since the Chicago agreement came into effect, I have received joint evidence cards that our cars have been improperly repaired by foreign roads and I neither received repair card nor repair card stubs. I have piles of joint evidence cards and piles of bills attached to them where we made proper repairs, some of them amounting to $25 and $30, and not one word—not one report, from any railroad company that they ever put a bolt in those cars. In several instances I have taken it up through our Mr. Beecham that C., M. &

St. P. car so and so returned to us at Chicago, or Kansas City on such a date, would it be possible for you to give me the roads over which this car passed while off our line, and if possible the points on the foreign roads. Then I have turned around and written the superintendent of motive power of such a road: "Please send me copy of repair card applied to C., M. & St. P. car so-and-so by your company at your so-and-so shops about such a date," and I have got the cards and attached the joint evidence cards to them and sent them forward and got the bill, but that shows that they do not report except you go after them. Mr. Grieb will show you some that we have received within the last few days in which the repair card said one thing and when the case was traced up to the road making the repairs they say another thing. Now I will maintain that in 99 cases out of 100 where wrong repairs are made to the attachments of a coupler it is made by the party who applied the coupler, notwithstanding the statements made to the officers of that company by their repair card. They knew they could not bill for the rear end attachments because the parts were not damaged. They have a Gould coupler and they say: "What is the use of going to the trouble of cutting off those rivets from the broken coupler and bothering to rivet the pocket on to this coupler, we'll put in this new Gould coupler which is ready fitted up and say nothing about the attachments," so the coupler is applied, whether the attachments are O. K. or not, and repair card reads "Gould coupler applied." That is the experience of our road, and on every road in the country it has been the same. You gentlemen are well acquainted with the repair tracks and you know that such things will be done, and have been done thousands of times to some of your knowledge. Take another instance that I can easily excuse. In the country stations the car repairers are men of very limited education, some of them read badly and write worse. They get the M. C. B. rules and read them to the best of their ability and think they understand them. They have a book of repair cards and think, "Well, I am out here now and have two men under me, we must not be repairing a lot of cars and using up company material without making bills for them; if I say nothing of such a part it will not make a combination," and they turn around and put a bill in that way. They do not think they are doing any harm, but do it to keep their job and make money for the company that employs them. The coupler is pulled out and the draw timbers pulled out with it, which takes out a piece of the end sill. They turn around and apply the draw timbers, replace the coupler—there is no damage to it, put on a new deadwood—the end sill is covered over, and make bill. Taking into consideration the subject we are on, I think a fair course to pursue in a case of this kind is to submit a joint evidence card, accompanied with evidence that the coupler has been applied, to the company making the repairs and put it to their honor and their honesty whether they would give authority for standard repairs or not.

Mr. Mehan: Mr. Darlington makes the assertion that the party applying the coupler in this case put up the wrong repairs. I claim this is only an assertion. If the matter went before the arbitration committee he would have to prove that such was the case, unless the party applying the parts makes mention of them on the repair card. Mr. Darlington, it seems, would like to legislate to cover one or two dishonest parties to the detriment of the others, and reminds me of a paper Mr. Barr wrote at one time, on "The 90 and 9."

Mr. Bates (C., B. & Q.): From what I have heard of the case I am of the opinion that the draft spring was applied by the party applying the coupler, for this reason: The pocket standard to this car was 10¾ inches in length, while the one applied was only 10 inches. I think it will be conceded by all that you cannot get two 1½ inch followers and an 8 inch draft spring into a pocket 10 inches in length, and I think that this is evidence enough that the wrong spring was applied at the time the coupler was and the party putting in this coupler should be responsible for the wrong spring as well as the pocket.

Mr. McAlpine: I think we are losing the point that this 7-inch spring was actually put back in the pocket. It is not denied that the 7-inch spring was put back, but it is a question of who is responsible. Is the intermediate road responsible for simply reapplying it?

President Sharp: As I understand Mr. McAlpine, the intermediate road only re-applied the wrong spring.

Mr. Cather (I. C.): That is the point that I think should be borne in mind throughout the entire argument of this question. It is not so much the matter of this particular 7-inch spring, but who is responsible for wrong parts re-applied. We have got to go on the grounds that they were re-applied. Now if they were applied wrong by the party applying this coupler then the party applying the coupler is responsible for it. But the point is, who is responsible for the re-application of that wrong part and of all similar wrong parts?

President Sharp: It might refresh your memories to read this decision that has been quoted by Mr. McAlpine. Decision: The papers in this case show the defects to be that of the owners; the intermediate road cannot be held responsible when it did not make the repairs. Joint evidence is all that can be required from the C., R. I. & P. Ry.

Mr. Prickett (C. & E. I.): In nine times out of ten I find light followers and springs in broken couplers when the broken shank is taken down and in most all cases I replace the same back, unless the followers are defective, such as bent or cracked, then in this case I would remove them and apply standard parts. In all cases where a foreign car comes in on my repair track with a broken coupler I have the tail loop cut off from the broken shank and take it to the blacksmith shop and have it riveted on a new body or a second-hand body as the case may be, and apply repair card to car for a coupler complete and two rivets 1⅛ or 1¼x10 inches, as the case may be, with the size of the rivet holes in the old tail loop, and put back the same spring and followers if good. In doing this I do not think I have made any wrong repairs; I am only placing back the parts I found. I remember a case some time ago where a car belonging in Chicago came on my repair track loaded, with two broken draft timbers, old defect, draft bolts broken in one timber, old defect. This timber pulled out from the draft key letting the coupler also pull out. The broken parts of the draft timber and coupler, which was a Janney coupler, with the spring and follower with spring bolt attachments and all in their proper place in the tail loop, were brought in with the car to the repair track. Those followers were light, but they came out of this car and I had two draft timbers and dead wood applied to the car and placed this same coupler back which was pulled out. Owners came back and claim wrong repairs. Who knows who first applied those followers? They may have been applied by a repair man of the owner of the car. A car in a train becomes a cripple; train man sets it out at some byway station and wires the head of his department that he has set it out in bad order—something wrong with the coupler. Your car foreman starts out a car repairer to make repairs. Nine times out of every ten he don't take what he needs to make the repairs as he don't know just what to take with him. Well, he finds he wants a follower plate or he wants a spring. He hasn't got one. There may be a section shanty at the station and these men always pick up all scrap that may be lost on their section. The repair man goes to this shanty and looks around; he finds a spring or a follower, that is just what he wants, although it is not standard for the car. He uses it to make repairs, marks car O. K., goes back home, reports car O. K. to his foreman. The next train comes along and the conductor finds the order board against him. The agent comes out, gives the conductor of this train orders to pick up this car and take it to some other connecting line. The inspector comes along, inspects the car and it goes out on his line. There is no record of a wrong spring or a wrong follower in this car. The repair man did not say he put in any wrong material. The connecting line breaks a coupler in this same end, where the wrong follower or spring is. This company's repairers apply a new coupler body, cutting off and using the old tail loop; also the spring and followers, applies repair card reading one new coupler complete and two rivets. The car goes home, the owner takes down his coupler and finds a wrong follower or spring. He sends for the inspector from delivering line, who looks at the parts, signs the little joint evidence card and that is all. The owner does the rest. The man that puts this coupler in gets a letter from the head of his department asking "Why did you make wrong repairs?" The answer back is: "I used same follower and spring that I took out." In cases of this kind I do not think it is right that owners should get pay for changing of followers and springs where the repair cards do not show that they had been applied by the party who put the coupler in.

Mr. Kroff (P., F. W. & C.): I am of about the same opinion that Mr. Prickett is. I do not think that the owner will have any redress, only the joint evidence card.

Mr. Grieb (C., M. & St. P.): I would much preferred to have listened to the discussion and got a little more information. In the early portion of the discussion mention was made of holding the intermediate road responsible for wrong repairs. That is rather deceptive and it should be definitely understood that this case lies between the owner and the party making the repairs. The party held responsible for the wrong pocket and the spring, although his card only covers the coupler and makes no further mention of any attachment, has acknowledged that he applied the pocket. It is therefore a little unusual that he should seek to escape responsibility owing to the mere fact that he has omitted to state all the repairs that were made. He seeks relief from the responsibility for the spring on the claim that he removed that same 7-inch spring and used it in the coupler that he put in. The repair card applied to the car reads: "One new Gould coupler." The joint evidence card shows that attached to this Gould coupler was a wrong draw bar pocket $\frac{3}{4}$x4x10 inches, should be 1x4x10$\frac{3}{4}$ inches, also a 7-inch draw bar spring, should be 8-inch. I think the point made by Mr. Bates is very pertinent and that if they found a 7-inch spring in a pocket that was 10$\frac{3}{4}$ inches long there was sufficient evidence of slack work that would warrant them to make the standard repairs. There is no question about knowing what was required. I do not think anybody will try to avail themselves of that excuse, and furthermore, in reply to Mr. McAlpine's inquiry as to what chance the party making the repairs would have to reimburse themselves for the application of standard spring in place of the 7-inch, I would say that the owner voluntarily authorized bill for the replacement of this spring, on presentation in return some information, preferably on a joint evidence card so that he could use it as legal evidence with the party that originally applied the wrong spring. This latter feature was only brought out after a good deal of correspondence had taken place and of course there was a considerable lapse of time, nevertheless it showed the willingness of the owner to reimburse the party re-applying that wrong spring, if such actually is the case, which, of course, is an open question, in view of the fact that they did not mention the pocket on their repair card, still acknowledging that they put it on. I have a little more to say on this subject, but I would rather wait a while and hear some others speak.

Mr. Mehan: I would like to know if Mr. Grieb considered that the party who put in that coupler made repairs to the pocket and spring. Because he reapplied them is that considered repairs?

Mr. Grieb: I thought I had answered that in saying that the party applying that coupler acknowledged that he put in the pocket, although his card does not mention it. His card shows only one Gould coupler. Repair cards do not show all the items that are replaced. Everybody knows that and it is our experience that more items are renewed than are made—than are actually covered by the repair card. Replying to Mr. Mehan's question as to the matter of making repairs, I beg to quote from Webster giving his definition of the word "make." It seems to me the whole question resolves itself in this one short word "make." Section 6 of Rule 5 says defect cards shall be furnished by railways for the wrong repairs if they made them. Webster defines the word "make" "To compose; to constitute as parts; materials or ingredients united in a whole," therefore I take it that a legitimate interpretation of the card allows the statement that a coupler applied means a coupler and its contiguous and contained parts. That is partially acknowledged by the party who put in the coupler in assuming responsibility for the pocket. It was not shown on the repair card, still he is willing to admit it after some correspondence, and it seems to me that the definition of the little word "make" settles the whole question.

Now this case is one that has gone into history to some slight extent, it having been arbitrated twice, not by the arbitration committee, because one road did not think there was any principle involved nor any important point involved in interpreting the rules as they exist. On that account an independent arbitrator was selected by the two roads and Mr. G. W. Rhodes kindly consented to act as arbitrator. I can read his decision if anybody would like to hear it. It fully upholds the position I take, that the party applying that wrong spring is responsible to the owner, whether applied in the first instance or whether it simply involves a re-application or perpetuation of the wrong repairs. The rules as they exist at present, and this has been exemplified by a number of decisions of the arbitration committee, will not relieve any one from responsibility for making wrong repairs on the claim that they did not know what was standard. That does not go. The car is of 60,000 pounds capacity and everyone knows what spring is required. He has the privilege of holding the car and finding out for his own protection. Then again, at the other end of the car was a coupler with pocket and attachments in toto, of the C., M. & St. P. standard, so that he could very readily have verified his understanding of what is required without and delay, assuming only that this was the only C., M. & St. P. car he had ever gazed upon. This is a rather sweeping assertion to make, as I dare say several of our cars have passed over this particular line and through this particular point, as this is quite a large repair point. This was one of our large van cars that go into a particular territory for a special commodity and they are all equipped with the same attachments.

Not only was this case passed upon by Mr. G. W. Rhodes in the affirmative, but later on at the request of another road, to whom the same correspondence was referred as a matter of information, by Mr. J. H. McConnell of the Union Pacific Ry., who re-affirmed the position we take.

Mr. Mehan: Mr. Grieb seems to hinge his argument on the fact that some individuals upheld him, and quotes Mr. Rhodes and Mr. McConnell. I do not think we ought to take the opinion of any man. For instance, Mr. Renshaw of the Illinois Central and Mr. Marshall of the Lake Shore, thought the other way. We should have brains enough to pick out our own conclusions. Now he seems to think in this case the party whose repair card was on car made repairs to the pocket and spring. Let us see what is meant by the term "repairs." Section 14 of Rule 4—Use of repair card, says: "When repairs of any kind are made to foreign cars a repair card shall be securely attached to outside face of intermediate sill between cross-tie timbers. This card shall specify fully the repairs made, and reason for same, the date and place where made, and name of road making repairs." Now we take out a pair of defective wheels; we take down the oil box; we take the oil box bolts out; we take out the brass and key. What do we put on our repair card? Simply the wheels. Do we state that we applied an oil box, oil box bolts, journal bearing and journal bearing key? No, simply because we do not consider that those parts have been repaired. So it is with the attachments of an M. C. B. coupler. There is the line between repairs and replace.

Mr. Wensley (C. & E.): The young gentleman that last spoke says they do not charge for the journal bearings. We do. Relative to this wrong repairs to the coupler, if the party whose repair card was on car applied the wrong coupler, pocket, spring and followers and the owners can prove by joint evidence card that they did, they are certainly entitled to bill. I had a case with the Michigan Central some time ago. I applied a coupler body to one of their cars and the repair man notified me that there were two wrong followers in the coupler removed. I told him to put them back in the coupler applied as I did not consider it our business how many wrong followers there were in there. I received a joint evidence card a couple of weeks later for the wrong followers and I told them that we had put back the same followers that were in the broken coupler. I haven't heard anything more of it yet. If we make wrong repairs and get caught at it we should issue card.

Mr. Waughop (C. J. I.): Under the rules the joint evidence card would simply hold the party that did the wrong repairs. You cannot hold the delivering company under any circumstances unless they acknowledge the responsibility.

President Sharp: I believe the question that is brought out here is the responsibility of the intermediate road for perpetuating wrong repairs.

Mr. Waughop: The intermediate road would be responsible if they re-applied the wrong parts the same as if they had applied them first. The repair card, or rather the joint evidence card would hold the delivering company responsible for any wrong repairs made by them, but in the absence of an acknowledgment by the delivering company that they made the repairs, the rules would hold and the delivering company would not be responsible and it would be the owners lookout to see who did the wrong repairs in the first place. The intermediate road would not be held responsible if they refused to acknowledge.

Mr. Boutet (C. J. I.): I would state, that if a car was offered to one of the lines at Cincinnati with wrong attachments—wrong pocket and spring, and the coupler had been applied and we gave joint evidence for the wrong repairs—if I was the road owning the car and had got joint evidenec that the repairs were wrong it would become necessary for me to prove that the person making repairs had put on the wrong material.

Mr. Waughop: For my own information and for St. Louis, I would like to ask Cincinnati if, in such a case, the owner of the car should ask the question from the delivering line after such joint evidence was given and the delivering company had decidedly said that the repairs were not made by that company, what action would Cincinnati take? If the owner of a car receives joint evidence from you as a joint inspector, from the delivering company, and refers the joint evidence to the delivering company asking them if they made such repairs and they decidedly say "no," they did not, what action, then, should the receiving company or owner take?

Mr. Boutet: Simply make the repairs proper and charge it to his own company.

Mr. Smith (C., B. & Q.): The way this was first stated it was my understanding that there was an intermediate road. It was afterwards stated, I believe, that there was no intermediate road. Am I correct in understanding that on one part of a line they changed a coupler and at another point of the same line they gave a joint evidence card for wrong rear end attachments in same coupler.

President Sharp: I believe that is the correct understanding.

Mr. McAlpine: I understand by an intermediate road one between the party that made the wrong repairs and the owner.

Mr. Smith: It would seem to me to make quite a difference if there was an intermediate road or if the joint evidence card was given at another point of the road that made the repairs. I know it would affect my vote on the question considerably.

President Sharp: What I would understand by an intermediate road is the road that hauled the car from the road that made the repairs to the owners.

Mr. McAlpine: The road making repairs admit applying the wrong pocket, but state that they applied a pocket of the same dimensions that was on the coupler removed. After the correspondence started they furnished a card for the wrong pocket. The question I wanted to get before the association was whether an intermediate road should be held for the wrong spring which they merely reapplied. I did not understand that it was going to be brought in as an actual case, but on a general principle, so if there is going to be a separate ruling on the pocket and a separate ruling on the spring, it may be admitted that the wrong pocket, in this case, was applied by the party whose repair card was on the car.

Mr. Waughop: I wish to modify my other statement since hearing Mr. McAlpine from the standpoint of the statement that he makes. From my standpoint the party whose repair card was on car is responsible without any other question. They re-applied a wrong part which they should have applied properly.

Mr. Grieb: This question of the intermediate road here is a kind of a bug-a-boo. We acknowledge that the road making repairs did not deliver this car direct to us. We received it from the Illinois Central, but we did not take the question up with the Illinois Central because they made no repairs whatever to the car. We go direct to the party who applied this Gould coupler on which we found the wrong pocket and in which we found the wrong spring. That removes entirely the question of an intermediate road. The rules require that we shall go, in the case of wrong repairs, to the party that made them. That cuts out all question of the intermediate road. Now I thought it would be fair to quote acknowledged authorities in support of our position. I did not think that the old nestor of the M. C. B. association and arbitration committee, the Hon. G. W. Rhodes, would be questioned. Neither did I think that the opinion of an old sage like J. H. McConnell would be so flippantly dealt with. However they are not the only ones who take the same view as we do. I have a few cases that came in our mail to-day touching upon the principle at issue, that I would like, with the president's permission, to read. I will have to take a little of the association's time in order to give them the full benefit of the entire circumstances attending the cases. I think this question is one of paramount importance. It is the only one we have any contention about at present. From the Atlantic to the Pacific, from Maine to Texas we get cards every day on precisely the same basis. Then there is another feature, that these parties who do not agree with us (I do not like to be personal, still we must be frank), are parties that appear most often before the arbitration committee and have a record which everybody has access to, which shows they have lost more cases than they have won. This point is worthy of consideration in pondering on the questions.

The first case comes from G. D. Brooke of the Iowa Central. They show a new standard coupler applied to one of our cars. We get this car, not from the Iowa Central, but from another road, so that the circumstances are identical with the present one. We find on that coupler a pocket secured by bolts in place of rivets, also one wrong follower in that same pocket. Mr. Brooke says: "Attach this card to your bill as authority for same and bill will be accepted."

Here is the International & Great Northern who applied to one of our cars a new Tower coupler and we found the pocket attached with bolts instead of rivets, and one wrong follower plate. They send us a card without any further comment.

A gentleman over in Michigan reports his repair card applying a Janney coupler and a spring. We found that that Janney coupler had a pocket in which the customary hole for spring bolt, which is standard to the C., M. & St. P. Ry., is missing, the spring bolt and thimble also missing, and in addition, two wrong followers. The gentleman writes a little letter stating that "Section 6 of Rule 5 covers this case and you have the necessary authority under the rules for bill."

Still another one from the west, and this is a very peculiar one; one that we asked very much in the blind. They put in two draft timbers and deadwood, with the necessary bolts. We found that the draft timbers were wrong; also the deadwood. There was an end post patched 20 inches from the bottom, one end post and one corner casting broken; Buckeye coupler with wrong draw bar spring, all at same end of car apparently done at same time. We took this up simply to find out whether he did it or not. He sends us his defect card for the wrong framed draft timbers, end post patched, corner casting broken and the wrong draw bar spring. We must be guided by the consensus of the opinions of individuals. The opinion of one cannot be held paramount to the majority. It is only for this reason that I have asked special liberty of the President to introduce further evidence. Now I will say further that the roads differing with us on this point can be run down to the number of five and can easily be followed up and wrong repairs can readily be located on particular roads for particular wrong repairs, or even particular shops can be picked out. We find on our own road some fellow has a pension for applying wrong bottom rods. Another man applies wrong coupler and attachments—they may be not so well fitted as they are at some other point to make standard repairs, which shows that it is the fault of the individual. The rules are all right as they are, they are very broad and plain and the fault lies in the misinterpretation of the rules,—the man not being sufficiently broad-gauged to admit of a liberal interpretation of the principle.

Mr. Stimson (S. R. L.): I would like to ask Mr. Grieb how he got joint evidence. Did he procure it from the Illinois Central or the road making the repairs?

Mr. Grieb: I would like to have Mr. Stimson give the purport of his question before I answer it.

Mr. Stimson. That brings up the question of this intermediate road in this case.

Mr. Grieb: The question of responsibility is not taken up with the intermediate road at all. It is taken up with the party making repairs which excuses all mention of intermediate road. It is quite beyond my comprehension how any one could get joint evidence from a road that did not deliver a car to them.

Mr. McAlpine: I said the road making repairs was the intermediate road and delivering road; they applied directly to us and not to the Illinois Central. We were not actually the delivering road, but were treated as such. I would like to have the members bear in mind that the arbitration committee is on record as deciding that an intermediate road is not responsible for the wrong repairs of owners' defects which they did not make, when there is no repair or defect card on the car to show who made them, and I would like to ask Mr. Grieb if, in those cases he has received recently, any of the parties disclaim having made the repairs. In the case in question disclaimer is made of having made the wrong repairs in the case of the spring.

Mr. Cather: We had a case similar to the one that has been broached tonight, and we have had every reason to believe in the honesty and integrity of the party making the repairs, just as much so as the owner has in the belief that the wrong repairs were made by this employe of the Illinois Central. We took this ground—that no company making repairs is responsible for wrong repairs unless the wrong repairs are made by them. There is a question, of course, and one that deserves consideration in applying couplers, as to whether or not the attachments shall be considered as a part of the job complete, and on the other hand it is a fact that it is possible for people to re-apply wrong parts to a coupler that they did not apply primarily. Now, under the circumstances that Mr. Grieb has just stated, take the International & Great Northern case, for instance, who applied a wrong pocket to a Tower coupler. Now assume that that car comes north through St. Louis onto our line. Now, some of our people may have to put in another coupler. We may have to re-apply the same identical pocket and attachments that were there. It is not impossible for such cases to arise. Now then, the I. & G. N. road apply those wrong parts primarily and it is possible for the Illinois Central to re-apply them at another date. In a case of that kind, it seems to me the question should rest wholly in the honor of the roads applying the couplers. If they maintain that they did not apply other coupler attachments and they have record of making no other repairs, record clear that they re-applied parts, it seems to me the matter should drop there. They should not be held responsible. On the other hand, if, as in the question that has been brought up here tonight, the road applying the coupler is the one that applied the wrong pocket, the evidence seems sufficient to place responsibility.

They applied a coupler, that is repairs "made." The springs and followers are not necessarily involved in that made repairs. You might carry that a little further and say that a road applied a draft spring. Here comes a joint evidence card for two wrong followers in that end. Is it fair to say that the party applying that spring be responsible for those followers? I will admit that the majority of such cases are with the road applying the coupler. The only case we had of that kind was with the Milwaukee road. In that case the pocket was ¾-inch too long or too short, I don't remember which, and we accepted their statement, but there is a wide divergence of opinion on that matter. We have had cases where the argument comes both ways. We have never gone to the Arbitration Committee because we took the man's word for it after investigation, as to whether or not he did apply the wrong part.

Mr. Cardwell (A. C. O. Co.): I think we should discourage wrong repairs all we possibly can. The intermediate road could have applied a proper spring to the car and charged the owner for it. They certainly applied the spring, because they put in a coupler. Whether they are first or not should not cut any figure, and therefore they should be held responsible.

Mr. La Rue (C., R. I. & P.): It seems to me we have drifted away from the first statement of the case. In the first statement all the parts were re-applied. Afterwards the statement is made that the yoke was applied that is identically the same. I think that shows this question should be decided on the basis that all of the attachments were returned, and that is the way I understood the question before I came to the meeting.

Pres. Sharp: I think you misunderstood me. We will have to decide the question the way it is printed in the program.

Mr. Grieb: I think Mr. McAlpine will be kind enough to corroborate my statement that the facts are correctly stated as they appear in the program. The item of pocket was not stated on the repair card, but afterwards it was claimed that a pocket of the same dimensions was applied, and they seek to escape responsibility for the wrong spring, claiming that they put back the same spring that was removed.

Mr. La Rue: I had almost the same kind of a case last year. The attachments were all returned and I claimed then, as Mr. Cather claims now, that the road re-applying all of the wrong parts should not be responsible. At that time there was a question of ½ inch difference, but all of the parts were returned, and they were in good, serviceable condition. We did not put on something identically the same, it was all returned.

Mr. Cather: I think that this question should be decided on the general principle, is it right to replace wrong parts? In this particular case here in the proceedings it shows that the road making repairs did apply another pocket. Now, then, there is a joint evidence showing that it is wrong and the applying road is responsible for that pocket. They admit applying a different pocket. They may say it was identically the same as the one removed, but the preponderance of evidence is against its being such. But the fact remains that roads do re-apply wrong parts and it should be decided who is responsible. The settlement of this particular case will leave us in doubt as to what is proper in the general principle involved.

Pres. Sharp: I will say that the parties to this dispute have agreed to substitute another case pertaining particularly to the pocket when we are through with this question which will have some bearing on this case.

Mr. Evans (B. & O.): Before we leave this question, I think there is a point that has not been touched upon this evening, and that is the party that applied the Gould coupler went away from what is the recommended practice of the Master Car Builders' Association in applying a ¾x4-inch pocket, and I think that the preponderance of evidence in all cases would lead car men generally to arrive at a decision that the party applying the coupler that had a wrong pocket, and also have a wrong spring, should be responsible for the whole. Of course the case as stated now, resolves itself into taking care of a 7-inch spring, admitting that it was in the pocket that they removed, but I think there should be some consideration taken in endeavoring to adhere to the M. C. B. recommended practice in regard to the pocket.

Mr. Taylor (C. & A.): I have a somewhat similar case up at the present time with the Milwaukee road, but in this particular case it is a case of the followers being wrong. I made the claim that we not having applied the wrong parts, they could not render any bill against us for the wrong followers. The car was delivered to us by the Milwaukee road here, went to the St. L., I. M. & S., and came back to us. We broke the pocket. Of course we re-applied a new pocket and put on a repair card, showing that there were no other repairs made. But we found that the follower plates were too small. Now they get joint evidence card and ask me for authority to bill for the wrong followers; would your spring in this case govern a case of this description?

Pres. Sharp: My personal opinion would be that it would. That would be a matter for you and the Milwaukee to agree to abide by the decision of the Car Foremens' Association.

Mr. Mehan: I would like to know what authority the road making repairs in this case would have for standardizing that spring. Could they bill the owner for it? Certainly not. It is not a billable defect, and owner is not responsible for the wrong material. If he standardizes it, what authority has he for making bill? He certainly should be reimbursed for doing it.

Mr. Grieb: In reply to Mr. Mehan's inquiry, I would state that the Milwaukee road stands ready to forward any one authority for bill for making good any wrong repairs to contained parts that they may find in the car previous to the removal, and in this particular case it did authorize the other road to do that, and only asked to be favored with a joint evidence card so that it could still further carry back the item of responsibility. Mr. Evans touched upon a very important point that I was in hopes would be brought up earlier in the evening. The car repairers in the case must have been, or ought to have been, aware what is the proper size for spring for a car of 60,000 lbs. capacity. Now it may serve to bring this case more directly home to disregard, for the moment, the initials of the car and consider that this car is one of your own that is repaired at one station of your road with wrong material, and found at another point on your road with this wrong material. How would you regard the party at fault who applied it in the first instance or re-applied it subsequently, as having served the interest of your company? We stand ready to authorize charge for wrong repairs that he makes good and we are ready and quite willing to do that because it is our interest to do so. Instead, this road claims to have put in the same wrong spring that was in. We get that car back and lose its service; it has got to be culled out of a string of cars, set on the repair track and the same amount of labor and same loss of service to the car again repeated. Anybody can see that they are not protecting our interest, and that they ought to suffer in consequence. Possibly they do suffer innocently. The rules, however, cannot legislate for the exception. What happened on that road may happen on the Milwaukee road tomorrow. It will even up in the long run, but it simply shows that they failed to give us protection in not making standard repairs when they ought to have done so and could do so, without any expense, and thus saved us the additional expense of making those wrong repairs right and losing the service of the car. For that fact alone they ought to be held responsible. Now I do not like to take up the entire evening, but there are a number of arbitration decisions that I can cite which holds parties responsible for perpetuatingg wrong repairs just as much as if they had made wrong repairs in the first instance.

Mr. Mehan: Mr. Grieb seems to hinge on the point that the car owner is put to the expense of again taking the car out of service, placing same on the repair track and going to the expense of taking those parts down again. How much service does he lose to repair the car? The car can be repaired by the owner in a day. I claim that the road making repairs served the car owner a good purpose by re-applying the wrong parts. Mr. Grieb knows that we get cases at West Milwaukee and take them up with the owners to ascertain what is standard, and I know of cases where it has taken three weeks to get the authority. What is the result? The car owner loses the mileage of that car for three weeks. It seems to me the car owner is better served by the re-application of the wrong parts and getting the car into service.

Mr. Kroff (P., F. W. & C.): I would like to ask Mr. Grieb in what part of the rules he finds the party has the right to make standard repairs where he finds wrong repairs on the car?

Mr. Grieb: This permission was given that particular road and is given everybody that makes wrong repairs standard on C., M. & St. P. cars.

Mr. Kroff: I do not know that we have received any such instructions. It is not a matter of what the C., M. & St. P. does. It is a matter of what the M. C. B. rules say is right.

Mr. Grieb: I do not know whether the gentleman has had any similar case of the same nature, but the same permission is just as readily given him as would be given anybody else. He need not have any compunction about making standard repairs to any of our cars.

Mr. Mehan: I will have to ask again, supposing that he does give another road authority to make standard repairs, he expects to be reimbursed, does he not? Now I would like to know what authority he has to make rebuttal bill against the party making the wrong repairs?

Pres. Sharp: He has said that the joint evidence that is to be furnished him by the party who makes the standard repairs, is to be used to secure authority from the party making wrong repairs, to render rebuttal bill for cost of making such repairs.

Mr. Mehan: Does this Car Foremen's Association think that the joint evidence card is legal authority for bill without the signature of the owner?

Mr. Cather: I would like to make a motion that it is the sense of this meeting that in the case at issue, where the wrong draft spring is found in a coupler applied by the road making repairs, and also a wrong pocket applied by the same, that the repairing road is responsible for the wrong pocket and spring.

Mr. McAlpine: Mr. Grieb keeps repeating what the Milwaukee road would do, but the members must bear in mind that the question before this Association is its general application, not what the Milwaukee road will guarantee to do, but what will be understood generally as to its general application, and they must remember that they will be held according to the way their votes say it shall be. For instance, if in replacing a pair of wheels, they put back a wrong oil box, they will be responsible for that oil box if it is decided that an intermediate road is responsible for putting back wrong parts. That is the way I intended the case to be presented, not as a case between two particular roads. The association is not particularly interested in any one or two roads. I would like to keep before you the question of putting back wrong parts found on a car. If the question has to be separated, I would like to have two separate motions made, because the question as to the responsibility for the pocket is not a dispute at all, as defect card was given for that without protest, but the defect card for the spring was given under protest after the adverse decision by the independent arbitrator. The point I want to get before the association is the spring, and I do not see any harm in allowing the question to stand and consider the pocket and spring re-applied. We have Mr. Grieb's assurance what the Milwaukee will do, but we want to understand it is to apply to every road. I think the case is thoroughly understood by all the members present, that the question to be decided by the vote of this association is whether the party making the repairs which he has acknowledged—repairs to the coupler and re-applying wrong parts—is responsible for the re-application of wrong parts if proven by the owner to be wrong.

Mr. Stimson: The question is, "What is the proper method of procedure in a case of this kind?" I wish to make an amendment to the motion which is now before the house, that it is the consensus of the opinion of the Car Foremen's Association of Chicago, that the proper method of procedure in a case of this kind was first to procure joint evidence card from the delivering line and then endeavor to locate the party making the wrong repairs.

From the evidence presented here tonight, joint evidence was procured, and the association also believes that the additional evidence is sufficiently strong to hold the party who applied the Gould coupler responsible for the entire wrong repairs.

Mr. Mehan: Before that motion is put, I would like to state that I have a verbatim report of the revision of the rules of interchange where the amendment was made to the rules, inserting the words "if it made them," showing what the idea was in having those words inserted. The idea was to facilitate the movement of the car, not to be holding it up at interchange points. Now if a railroad company is going to receive a car with wrong attachments for which they cannot protect themselves on receiving the car, and while the car is on their road they have to take down those parts to repair other adjacent parts, they are going to hold the car out of service. They are not going to stand the repairs themselves, but will hold the car out of service and get authority to standardize the repairs. That means holding the car out of service for two or three weeks, and I claim that that is against the spirit of the rules.

Mr. Stimson: That the amendment may be perfectly clear and understood by all, I will repeat it: "That it is the consensus of the opinion of the Car Foremen's Association of Chicago, that the proper method of procedure in a case of this kind was first to procure joint evidence card from the delivering line and then endeavor to locate the party making the wrong repairs. From the evidence presented here tonight, joint evidence was procured, and the association also believes that the additional evidence is sufficiently strong to hold the party who applied the Gould coupler responsible for the entire wrong repairs."

There can be no doubt in my mind but what the circumstances surrounding this case, as brought out by the evidence, are such as to cause us to make such decision.

The motion and amendment were both put and carried by a large majority.

Pres. Sharp: The second section of this subject, as agreed upon by the contesting parties here this evening is: When an inspector, in replacing a broken coupler in a foreign car, finds that the pocket, spring or followers are not proper, should apply proper parts and bill the owner of the car; and if he does not substitute proper parts, is his road responsible for the wrong parts which he simply re-applied? In case he did not make proper repairs, would the car owner, under the present rules, be obliged to accept bill for expenses, whether accompanied by a joint evidence card or not?

Mr. Grieb: I would make a motion that in all cases the car repairer should make standard repairs and bill the owner of the car, if they were not made on his road, but if possible he should afford the owner some means of locating the responsible party, and should, therefore, furnish him a joint evidence card, and if that is not practicable, his statement, accompanied by the repair card, presented with the above in the first instance.

Mr. Wensley: It seems to me that might go all right in Chicago. I do not see how you are going to find out, in case somebody else made wrong repairs on a car. This may be all right amongst ourselves, but I do not think it will work outside.

Mr. Cather: As a matter of fact the rules definitely state that any road not making wrong repairs are not responsible for them. It does say that the owner can procure a joint evidence card and, armed with that, he can locate the party making wrong repairs. A road may re-apply some parts in connection with new repairs. It is not evidence that they primarily applied them. Now the question here is, should the intermediate road be held responsible for re-applying wrong parts? If the inspector knows that it is wrong he should apply proper parts and bill the owner for it. I think I will say this, however, that 99 roads out of every 100 will object if you go to making repairs along those lines—say we have applied a pocket to a car because the old one was ½-inch too short. The owner asks, how do you know it was ½ inch too short? It is serviceable, and has been in service a long time. Now, then, the owner must have some consideration here, just as well as the party making the repairs. I think that the joint evidence is all that can be furnished and if the party applying the coupler says they did not apply the wrong parts, they are not responsible, according to the present rules, unless there is every evidence that they did apply them. The mere fact that the wrong followers were found in the coupler which they applied should cut no figure. Why are they responsible for the existence of those parts simply because they applied a coupler? Say the car came on the Illinois Central with wrong parts and we re-apply them, who is responsible? There is the joint evidence, for the same wrong pocket as when car came to us, who is responsible? It is not fair to say that any road is responsible simply because it reapplied wrong parts that in no way affected the safety of the car. A road applying a coupler and attaching to that coupler the same pocket and spring and followers removed from coupler taken out, is no more responsible for such parts, if wrong, than if no repairs at all had been made to car. The responsibility rests with road previously applying parts according to existing M. C. B. rules, right or wrong.

Mr. McAlpine: I would like to have some member make a motion as you first understood it. That seems to me to be the point in this question—whether the intermediate road should be wholly responsible for re-applying wrong parts.

Mr. Waughop: I was about to rise a minute ago and ask the question. Supposing a car was delivered to the Big Four at St. Louis, a Milwaukee car, if you please, equipped with Janney couplers, and we found on its delivery to the Big Four that it was equipped with a common link pin instead of a Janney pivot pin in one of those couplers, to which the Interstate Commerce Commission most seriously object, what action would be taken by the Big Four in such a case? My personal opinion is that it would be the duty of the Big Four to replace that pin with a proper one, charging the Milwaukee road and giving them all the evidence of the wrong parts that they have removed. It is not in the law, but it is mighty good practice. We will accept those things in our country. I think it is proper for the intermediate company to change any part of the car that is found wrong, and charge the owner of the car for making any improper repairs proper, that is dangerous to the running of the car, giving the owner of the car all the facts in the case and giving him an opportunity to get back at the party making the wrong repairs.

Mr. Grieb: I would like to say in reply to Mr. Waughop that the Milwaukee road is very willing to accept any bill from anybody that makes standard any such repairs that he has mentioned, and there will not be any delay in vouchering such bill when it is presented.

Mr. Waughop: I would like to go a little further with the case I have stated. In 99 per cent of such cases as I mentioned, the original Janney pivot pin has been broken on the delivering line's road and the wrong pin has been substituted by a switchman, the first thing he could get hold of. I would like to state that I think 99 per cent of such cases are never charged to the owner to which they are entitled to pay, and if the intermediate company repairs it properly the owner is out nothing if he pays the bill.

Mr. La Rue: I would like to ask Mr. Waughop if he would make the same kind of a decision for a wrong oil box that did not impair the condition of the car.

Mr. Waughop: We would pay no attention to an oil box. Let it go home to the owner, if in safe condition. Supposing a Milwaukee car is delivered by the Missouri Pacific to the Big Four with two wrong draft timbers. The Big Four in handling the car between East St. Louis and Cincinnati, break these two wrong draft timbers. Who is responsible for replacing the two wrong draft timbers if they break them?

Mr. Boutet: That may be all right in some cases, as stated by Mr. Waughop. Would it, for example, if we found a Milwaukee car at Cincinnati (we are not as well versed as to standards on Milwaukee cars as you are here in Chicago) with an axle ½ inch longer than standard? We have no axle of that kind to replace it with. Those wheels are condemnable and are both removed. We take those wheels off and refit that axle with another pair of wheels on that very identical axle. The car comes to Chicago and the owners get joint evidence card from the delivering line for the wrong axle. Should the road that replaced that wrong axle be responsible to the Milwaukee road for it? I am not stating any individual road, but we have those cases come up continually, and where is our authority for bill under the rules? It is possibly right in a good many cases, but it is going to work a hardship on the road handling the cars. On the other hand, you are going to have the advantage of replacing the car in service. The owner of the car gets the use of it, where if we held it to procure a proper axle it would have delayed the car a long time.

Mr. Grieb: We had a case that answers Mr. Boutet's imaginary one. This was a Pennsylvania Co. car that had a pair of wheels slid on our line and we found the axle was wrong. Our folks re-applied the same axle, after pressing on a pair of wheels. The owner got joint evidence against us and we gave them defect card. We held our men responsible for perpetuating wrong repairs in the first instance, and for failing to protect the owners' interests in removing that same pair of wheels and delaying the car, arguing that the men should have known what axle was standard to the car from the other three under it, and if there was such a general mix-up that they could not tell, it was their business to wire the general office and find out what was standard.

Pres. Sharp: The motion before the house is, that when you are making repairs to broken parts and re-apply wrong parts, as stated in this question, which I understand applies in a general way if you were applying a coupler and re-apply wrong attachments, spring, followers, etc., that you, by re-applying these wrong parts, become responsible to the car owner for the wrong repairs. The second phase of the motion was that you should render bill against the car owner for making such wrong repairs standard, giving him such information as you may have at hand to protect him.

Motion carried.

Mr. Waughop: We are here today for the purpose of arranging for the annual meeting of the Joint Inspectors of the United States, Canada and Mexico, which will be held in Chicago. We have decided to make our headquarters at the Great Northern Hotel on Sept. 19th and 20th next. As the president of that association, I extend, on behalf of the members, to the Car Foremen's Association of Chicago, a cordial invitation to be present with us on that occasion. I believe that at that time we will go over the new rules which may be made at the next meeting of the Master Car Builders, and will be glad to entertain any question from anybody interested, on the subject of rules of interchange, and will endeavor to answer them from the standpoint of the joint inspectors.

Mr. Boutet: I would like to go a little further and extend the invitation to the members to come and participate in the discussions of the joint inspectors. Not only participate in the discussions, but become better acquainted. We expect to bring our foremen, and I think it would be very wholesome and pleasant. I know it would be for our people, and I think it would to the Chicago foremen, and I think there will be a better feeling among us and things will go smoother if we become a little better acquainted.

Pres. Sharp: On behalf of the Car Foremen's Association of Chicago, I want to thank the gentlemen for the very kind invitation to attend their meeting next September, and I want to assure you, gentlemen, that the members of this association will be glad to join with you. We are also glad to have you with us this evening and thank you for participating in the discussion.

Mr. Boutet: Would it not be well for your association to arrange to meet in the same room and on the same date that we meet, that we may have our meetings together?

Pres. Sharp: The matter will be submitted to the board of directors for their action.

Meeting adjourned.

The program for the May meeting was printed in our April issue. The program for the June meeting is as follows:

1. In case a new Janney coupler, complete, is applied to a foreign car account Janney head broken, knuckle and pin lost, what is proper charge against owners?

2. In making bills for repairs to foreign cars, should malleable iron brake heads for metal beams be considered under the heading of manufactured articles, or should they be charged at the regular price of 3c per lb. for malleable iron per M. C. B. rules?

3. When billing for destroyed bodies of twin hopper bottom gondola cars, should bill be governed by the prices set forth in Section 25 of M. C. B. Rule 5, or can body be considered as that of a car designed for special purposes, and bill rendered at present cost price, per Section 27 of M. C. B. Rule 5?

4. Report of committee on loose draft rigging and neglected bodies of cars.

Mr. J. C. Grieb will present a paper on "Passing car at terminals with defects, for which defect cards are requested and subsequently obtained."

After May 1st communications for Secretary Kline should be addressed care C., M. & St. P. Ry., Western avenue, Chicago.

Supply Trade Notes

Simplex bolsters will be used on the 2,000 Michigan Central cars for which a contract was recently let to the American Car & Foundry Company, on the 600 Wheeling & Lake Erie cars to be built at the South Baltimore Car Works, the 400 Northern Pacific stock cars to be built at the same place, and on 250 Louisville & Nashville cars to be built at the company's shops.

The Southern Car & Foundry Company, upon removing its headquarters from Gadsden, Ala., to Birmingham, secured commodious offices in the Fox building, corner of Fourth avenue and Nineteenth street. Plans for the proposed plant for the manufacture of steel cars are still in course of development. The company's general business is good. The reopening of the Memphis plant has required considerable attention to the organization. Both the wheel foundry and the soft castings foundry will be kept busy, and it is expected that at Memphis all told from 300 to 500 hands will be employed.

The Bethelehem Steel Company's western office will on May 1 be removed from 1433 Marquette building to larger quarters in rooms 1520-1521 Marquette building, Chicago, under charge of Mr. E. Nelson as sales agent.

The Watson-Stillman Co., of New York, has issued its catalogue No. 59, covering its fine line of hydraulic benders. This firm, widely known for its hydraulc jacks, has given special attention also to the careful development of special hydraulic machines for varied bending purposes. These machines are handsomely illustrated in the catalogue, and are given more careful description than is commonly accorded in catalogues.

The Industrial Water Co., 15 Wall street, New York, is sending out a handsome little pamphlet entitled "The cause of foaming in locomotive boilers." It comprises several articles written by Mr. C. Herschel Koyl on water purification, appearing originally in the Railroad Gazette. The booklet is well worthy of careful reading by all interested in the problem of securing pure water for use in locomotive boilers.

The passenger department of the Baltimore & Ohio is always clever in getting out its printed matter. Its monthly "Book of the Royal Blue" never fails to be filled from cover to cover with matter of more than ordinary interest; and its frequent flyers are, first, carefully prepared and meaty, and, second, handsomely clothed. One of the latest pamphlets, just sent out, is a guide to Washington. This is a handsome work, finely illustrated, which tells one briefly all about the main points of interest in our national capital.

The hammer shop of the Schenectady Locomotive Works, a frame building, 60 by about 250 feet, was destroyed by fire on Saturday, March 23. The building and contents were insured in the Manufacturers' Mutual Insurance Companies of New England, who adjusted the loss the following Monday, and contract was immediately made for a new building, 85 by 365 feet, to be constructed of steel and brick; meanwhile, the old building was patched up so that several of the hammers could be started into service temporarily, and with contracts let with outside forges for shapes, the work of the Schenectady Locomotive Works was not seriously interfered with by the fire.

Mr. R. C. Hallett, for some time connected with Julian Yale & Co., has severed his connection with that firm to engage in business for himself, his retirement dating from April 1.

The American Steam Gauge and Valve Manufacturing Company, of Boston, celebrated, on April 16, at Bismarck and Boylston streets, Jamaica Plain, the fiftieth anniversary of its organization. Dancing was a feature of the evening.

Mr. Robert Spencer, now of Philadelphia, for many years well known in the railroad service of this country, has associated himself with Julian L. Yale & Co., of Chicago, and will have charge of their eastern business.

The Simplex Railway Appliance Company has opened an office in the Washington Life building in New York City, in charge of Mr. W. W. Butler, vice-president of the company.

The name of the American Steam Gauge Co., Jamaica Plain, Boston, Mass., has been changed to the American Steam Gauge & Valve Manufacturing Co. In announcing this, the company says the American Steam Gauge Co. was organized in 1851, when it made only steam gages. From time to time a variety of specialties was added, and the idea in changing the name was to make it better suited to the present output of the works. Besides a number of styles of locomotive gages and valves (plain and muffled) the company makes similar devices for air-brake and steam-heating systems and marine work, as well as the Thompson improved indicator, adopted by the United States and foreign navies, and which received highest award at the Paris Exposition of last year.

B. M. Jones & Co., 81 Milk street, Boston, Mass., sole representatives in the United States for "R. Mushet's" Special and Titanic steels and "Taylor's" best Yorkshire bar iron for staybolts, piston rods, axles, crank pins and forgings of all descriptions, announce the retirement from the firm of Frank E. Barnard. This change took effect March 31.

The Chicago Pneumatic Tool Co., Chicago, states that it has just brought out a pneumatic hand drill for stone and marble boring.

The eKasbey & Mattison Co., the owners of the patents for magnesia covering, have commenced suit in the United States Circuit Court for the Southern District of New York against the Philip Carey Mfg. Co., George D. Crabbs, J. E. Breese, Schoellkopf, Hartford & Hanna Co., J. F. Schoellkopf, Jr., James Hartford, W. W. Hanna, C. P. Hugo Schoellkopf and Jesse W. Starr to restrain the defendants from making and selling magnesia coverings for boilers and steam pipes containing more than 50 per cent. of magnesia, and especially coverings containing 85 per cent. of magnesia. The bill prays for a preliminary writ of injunction, to be continued during the pendency of the suit, and upon the final determination thereof to be made perpetual; and also demands an accounting and damages. The Keasbey & Mattison Co. respectfully requests all persons to refrain from purchasing covering infringing these patents, as such purchasing, that firm urges, must of necessity lead to suit.

The Atchison, Topeka & Santa Fe Railway has placed orders for 32 passenger cars, and among the devices stipulated to be used on these cars is the Pintsch gas lighting system. This is of considerable interest, in view of the fact that no road has permitted so many experiments with various systems of electric car lighting as has the Atchison. The fact of the Pintsch light being used on these new cars suggests a belief in the reliability and practicability of the compressed gas system. When these cars are in service, the Atchison will then have 106 of their passenger cars equipped with the Pintsch light system.

The Buhl Malleable Iron Co., of Detroit, is constructing a new core room, 40x80 ft., and an additional foundry house, 85x85 ft., to be completed by May 1.

Up to April 1 the Westinghouse Air-Brake Company had shipped draft-gears for over 200 locomotives and 10,000 cars. There remained on the books at that date orders for upward of 150 engines and 11,000 cars. The shipments include about 30 railroads.

Improved "Michigan" triple lubricators will be used on the two 10-wheel locomotives which the California & Northwestern has ordered from the Richmond Locomotive Works, as noted elsewhere in this issue.

The Philadelphia Pneumatic Tool Co., which recently enlarged its factory at Ridge avenue, Eleventh and Noble streets, Philadelphia, Pa., has moved its offices to the factory building. The new address is 1038 Ridge avenue.

The Eastern Granite Roofing Company will, on May 1, remove its offices from Jersey City, N. J., to the Gerken building, 90-92 West Broadway, New York City. During the same month the company will celebrate the opening of its new works, which are large and thoroughly equipped with the latest machinery, most of which is of the company's own invention. These works will give the company a most satisfactory plant for the production of its stone-surfaced roofing, and the company believe that its perfected granite roofing—"ready to wear"—will continue to hold its high place as regards durability, sightliness, ease of application and fireproofing qualities.

The Falls Hollow Staybolt Co. is now rolling hollow bolts by its recently improved process, which enables it to produce hollow bars, eight to nine feet long, any size, outside or inside diameter, and perfect in every detail. The bars are ready to cut, thread, and apply; which saves the expensive process of drilling. The Falls hollow staybolts were specified in many of the recent orders for new locomotives. This company also manufactures a superior solid staybolt, made of the same high grade charcoal iron used in the hollow bolt. The company guarantees every bar to meet railway companies' specifications and to give perfect satisfaction.

The Consolidated Railway Electric Lighting and Equipment Company, of New York, has established a branch office in Chicago, room 519, The Rookery, with its general agent, Col. John T. Dickinson, in charge.

The Norfolk & Western has placed an order with the Richmond Locomotive Works for ten class "W" consolidation locomotives which are to be exact duplicates of the ten engines now under construction for the same road, by the same company. The general dimensions of these engines are as follows: Cylinders, 21 x 30 in.; Diameter of driving wheels, 56 in.; driving wheel base, 15 ft. 6 in.; total wheel base 23 ft. 11 in.; weight in working order, 170,000 pounds; tank capacity, 5,000 gallons.

The Bullock Electric Manufacturing Company, of Cincinnati, and the Wagner Electric Manufacturing Company, of St. Louis, have combined their selling organizations. By thus combining forces in the field they are mutually benefited, inasmuch as the products of the two companies are totally different, and where the product of one is used, the other is likely to be necessary. The product of the Bullock Company consists of a complete line of direct and alternating current machines, from a ½-horse-power motor to a 10,000-kilowatt generator, controllers of various types, and rotary transformers. The Bullock "Teaser" power system for driving large daily newspaper presses has become world famous, and is to-day installed in the pressrooms of the leading dailies in Europe and America. The product of the Wagner Electric Manufacturing Company covers a full line of static transformers of all types and of the largest sizes; ammeters, voltmeters, indicating wattmeters, switches, switchboards for all purposes, and single-phase, self-starting, alternating current motors. The entire absence of complicated starting mechanism especially adapts the Wagner single-phase motor to pumping plants and machinery of like character. Thus it will be seen that the two lines are admirably adapted to be sold by one organization, which will be under the management of Mr. E. H. Abadie, formerly sales manager of the Wagner Company.

The New York Central & Hudson River R. R. Co. is building in its own shops 20 of its standard milk cars and 20 caboose cars—10 of the caboose cars to have 4-wheel trucks, and 10 are to have 8-wheel trucks. The New York Central has let a contract with the American Car & Foundry Co. for 600 box cars. The Pullman Company is building 25 excursion cars for the same road and Harlan & Hollingsworth have a contract for 50 standard New York Central 60-foot road coaches.

The Richmond Locomotive Works recently received an order from the California Northwestern Ry. for two ten-wheel locomotives. The leading dimensions of these engines are as follows: Cylinders, 18 ins. x 24 ins.; driving wheels, 56 ins.; total wheels base, 22 ft. 8 ins.; driving wheel base, 12 ft. 4 ins.; weight in working order, 114,000 lbs.; weight on drivers, 88,400 lbs.; diameter of boiler, 56 ins.; fire-box, 96 ins x 34 ins.; 215 tubes No. 12 gage, 2 ins. x 12 ft. 11 ins.; tank capacity, 3,500 gallons.

Railroad shops proposed or under construction are reported during the past month by our exchanges as follows: The Cornwall R. R. will soon build a new roundhouse in Lebanon, Pa.—The coal pockets of the Long Island R. R., situated on Newtown Creek in the yard at Long Island City, were burned on April 7. The structure was about 175 feet long.—The C., B. & Q. is said to be planning a new roundhouse at St. Joseph, Mo. —The Lake Erie & Detroit River R. R. is said to be considering sites for new workshops.—The Northern Pacific will build a 32-stall roundhouse at Duluth, Minn. —The Kansas City, Fort Scott & Memphis is building a brick addition, 60x60 feet, to its blacksmith shops at Springfield, Mo. The addition, including the mach'nery, will cost about $25,000.—The Baltimore & Ohio is said to contemplate removing its shops at Grafton, W. Va., to the West Side.—The Cleveland, Cincinnati, Chicago & St. Louis has set aside $100,000 to be used in the enlargement of the Bellefontaine shops and for the purchase of new machinery for the shops. The improvements are to be made this year.—The Philadelphia & Reading has awarded the contract to George W. Baird & Co., of Reading, Pa., for the construction of a power house, 50 by 175, and a boiler house, 60 by 175, in connection with the shop now under construction at Lebanon, Pa.—Work has begun on the foundation for the new car and machine shops of the Boston & Maine at Mechanicsville, N. Y., to replace those burned in February last. The new buildings will be of brick and will be much larger than the old. The roundhouse capacity will be increased from eight to fifteen stalls.—The Pennsylvania R. R. will erect a new tin shop at Pitcairn for the repairing of the tin roofs on coaches, box cars, etc., and for general repair work. The building will be about 50x150 and will employ about 30 or 40 skilled workmen. —The Chicago, Rock Island & Pacific will build a 13-stall brick roundhouse at Brooklyn, Iowa.—The Pittsburg, Bessemer & Lake Erie will build new shops at Greenville, Pa.—The Chicago, Milwaukee & St. Paul is considering plans for the enlargement of its West Milwaukee shops.

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LATE figures as to the equipment of cars and engines with air brakes were reported by a committee at the spring meeting of the American Railway Association. This committee reported the following figures as covering the situation on January 1, 1901:

Freight cars in service	1,340,241
Fitted with air brakes	967,537
Not so fitted	372,704
Engines in service	34,522
Equipped with power brakes	34,183
Not so fitted	339
New equipment, other than passenger, under contract or construction:	
Freight cars to be fitted with air brakes	54,118
Freight cars not to be fitted with air brakes	0
Engines to be equipped with power brakes	1,097
Engines not to be equipped with power brakes	0

THE STANDARD BOX CAR was again considered at the spring meeting of the American Railway Association. A committee reported recommending as the standard car one 36 feet in length, 8 feet 6 inches in width, and 7 feet 6 inches in height, all inside dimensions, with a cross sectional area of 63.75 square feet and a capacity of 2,295 cubic feet. The essentials of a standard box car, in the opinion of the committee, are the following: That the height and the width be as great as are permitted by the physical limitations of the important railroad clearances and the present established height of loading platforms; that the length be determined by economy in construction, maintenance and operation and the requirements of economical stowage. The committee further expresses its belief that the traffic rules governing the use of the standard car should be so framed as to provide that there be no pecuniary advantage to any interest arising from the use of cars larger or smaller than the unit car; that a premium be placed upon compact and economical stowage; that unnecessary movement and detention of cars be avoided; that the clerical work demanded be not excessive, and that the railroad be sustained in the control of its equipment. The committee further recommends that the minimum for each article taking a carload rate be adjusted to the capacity of the unit car to hold that commodity under conditions of most economical packing, either from weight or dimension limitations without increasing the charge to the shipper; that to conserve cars 34 feet in length the minimum demanded for their use approximates nearly their capacity, and that for each article it be fixed at the capacity of a car 34 feet long, 8 feet 6 inches wide, and 7 feet 6 inches high, to hold the article; that for cars shorter than 34 feet the minimum be that of the 34 foot car, thus making them relatively uneconomical to the shipper with the anticipation that they will eventually disappear and while in service be used for the transportation of heavy articles; that for cars longer than 36 feet the minimums increase at a ratio in excess of the increase in length of cars, making it relatively uneconomical to the shipper to use cars of abnormal length. At the request of the committee the report, after it had been discussed, was referred back for further consideration.

Throttling

Tremont, New York City, May 20, 1901.

To the Editor of the Railway Master Mechanic:

IN Mr. Snow's article on throttling in your May issue he refers to an engine "running slowly." The extract from Locomotive Engineering certainly deals with an engine making considerable speed, as a 6-inch cut-off is referred to, which alters the case entirely; the flow of steam at high speed is practically constant and can produce no pulsation upon the boiler. When an engine is working with, say, 6-inch cut-off, the steam is throttled at the cylinders by the reverse lever, as the valve travel is shortened and the port openings restricted. This I believe to be one of the principal reasons an engine can be operated more efficiently with the throttle partly closed; when throttle admits just the amount of steam cylinders are using, the flow is more rapid, and a given volume of steam spends a lesser amount of time in transit from the throttle to the cylinders, which reduces condensation—the movement of steam through the dry pipe is more sluggish when being checked at the cylinder by the reverse lever and throttle left wide open.

Further, Mr. Snow speaks of the "'hot sides of the dry pipe" evaporating the entrained particles of water which are carried over by the steam. This I could never imagine to be so, as the heat is transmitted to the dry pipe through the medium of the contents of the boiler; therefore it can certainly be no hotter than the steam and water which surround it. When the steam gets to the forward end of dry pipe it is in the coldest part of the boiler, and also where the cold feed-water is delivered; in some engines there may be heat absorbed from the steam pipes in smoke box; this depends upon length of tubes and temperature of fire gases when escaping from same. Further, the saddles and steam chests are perfect refrigerators, as these are very seldom lagged over; therefore whatever tends to get the steam through these steam passages in the shortest possible time will produce the best results.

If an engine is throttled when running with a short cut-off, the indicator will invariably show a higher M. E. P., which is generally attributed entirely to the superheating idea. The benefit derived from superheating the large volume of steam passing to the cylinders I believe to be greatly overdrawn, as a small volume of steam, when being throttled, will superheat very much more in proportion than will a large volume.

The writer of the extract from Locomotive Engineering, in your March issue, advises lengthening the cut-off from 6 inches to 8 inches when the throttle is partly closed. This, to say the least, is very peculiar advice—first, because it is understood the engine is developing sufficient power to do the work required at the 6-inch point; second, when the throttle is partly closed the M. E. P. will rise; third, with a higher M. E. P. (the cut-off remaining at 6 inches) the engine will exert a greater drawbar pull and be performing more efficient work.

P. Emerson Waddell.

Mr. W. H. Canniff.

President New York, Chicago & St. Louis R. R.

Mr. Canniff commenced railway life in 1863 as night watchman on the Michigan Southern & Northern Indiana road at Osseo, Mich. Through operating lines he rose until, in 1896, he became general manager of the Lake Shore & Michigan Southern. Since May, 1898, he has been president of the Nickel Plate.

Suggestions as to Railway Club Methods

One of the interested and active members of the Western Railway Club writes us suggesting that the very excellent work of this club, and possibly that of other clubs, might be still further improved if the present practice of reading papers that are up for discussion, was discontinued, thus affording more time for speaking. Our correspondent continues as follows: "The reading of papers at the meetings is a practice handed down from the times when it was not the custom to print and send out advance copies. The active men of those in attendance at club meetings can be depended upon to have read the advance copies of papers to be discussed and to have prepared the outlines of their remarks; or else they secure copies of the papers just before the opening of meetings and hastily read same, and are quickly in shape to join in discussions. If printed copies of current papers were laid on a table immediately at the entrance to assembly rooms and the members educated into procuring copies as they entered the room, there would be still less necessity for public reading of papers and no excuse for those present not taking part in the discussions because of not being supplied with the text of the subjects up for attention. In some club meetings copies of papers can be found on the table at which the presiding officer and secretary sit, but many men are modest or indifferent and so do not go forward to get copies; but they would pick up copies if displayed upon a table at the entrance to the room. It is true that the secretaries of the clubs mail advance copies of papers to the members, but only a few find the time, or take the interest to read them in advance of meetings, or bring their copies to the meetings; they set aside the time of the meetings to do their reading, thinking and talking.

"Another suggestion for improving the work of the clubs is this: Frequently subjects are of such importance, are handled so fully in the papers presented on them, and there is evidenced so eager a disposition to discuss them, that the time of one meeting is not sufficient to do full justice to them; why not continue them over to the succeeding meeting?

"Still another suggestion is made that the subjects of papers for the next following meeting be announced at all meetings and the chairman call for volunteers for preparing discussions on same; there is always time for this between the receipt of advance copies and the holding of meetings. It is thought that by the work of volunteer leaders in discussions the time would be more fully and profitably occupied and the backward members spurred to activity."

Personal Mention

On the Plant System changes in the mechanical department were made May 1 as follows: Mr. J. F. Enright, master mechanic Third division, Waycross, Ga., was transferred to Montgomery, Ala., in the capacity of master mechanic at that point, Fourth division, relieving Mr. W. H. Dyer, master mechanic, transferred to Brunswick, Ga., in the capacity of master mechanic, Second division, Second district, relieving Mr. S. M. Roberts, master mechanic, transferred to Waycross, Ga., in the capacity of master mechanic Third division.

Mr. C. F. Winn, master mechanic of the Chesapeake Beach Ry., has resigned to enter the employ of the Baltimore & Ohio at the Mt. Clare (Baltimore) shops of the latter road.

Mr. W. L. Harrison resigned the superintendency of shops of the Eastern Railway of Minnesota, at West Superior, to accept the position of superintendent of shops of the St. Louis Southwestern Ry., with headquarters at Pine Bluff, Ark. This change took effect May 1.

On the Cincinnati, Hamilton & Dayton the following changes have been made in the mechanical department, dating from May 15: Mr. A. J. Ball has resigned as assistant superintendent of motive power and this position is abolished. Mr. J. C. Homer has been appointed master mechanic of the Cincinnati and the C., H. & I. divisions, with headquarters at Cincinnati. Mr. W. H. Sloat has been appointed master mechanic of the Delphos and Wellston divisions, including Dayton terminals, with headquarters at Dayton, O.

Mr. S. P. Bush has resigned as superintendent of motive power of the Chicago, Milwaukee & St. Paul, to become general manager of the Buckeye Malleable Iron & Coupler Co., of Columbus, O. There is a general feeling of regret that Mr. Bush should leave the railway service, in which he has made a most enviable record. His long service on the Pennsylvania Lines as apprentice, draftsman, master mechanic and superintendent of motive power was followed by about a year at the head of the mechanical department of the St. Paul System, and in every station he has occupied he has won encomiums for his good work. He has also been actively identified with the work of the Master Car Builders' and Master Mechanics' associations and of the Western Railway Club and the Car Foremen's Association of Chicago. Mr. Bush will be seriously missed in railway circles.

Mr. H. T. Herr has been appointed division master mechanic of the Chicago Great Western, with headquarters at St. Paul, Minn., succeeding J. M. Robb, resigned.

Mr. Geo. A. Gallagher has been appointed master mechanic of the Eastern of Minnesota Ry., with headquarters at West Superior, Wis., succeeding T. E. Adams, resigned.

Mr. E. A. Richardson has been appointed general foreman of the locomotive department of the Chicago & Alton, vice G. Gregg. Mr. Richardson will have headquarters at Bloomington, Ill.

Mr. J. Piccioli, general foreman of the Colorado & Southern at Denver, Colo., has been appointed master mechanic at Trinidad, Colo., in place of Mr. O. M. Fowle, resigned.

Mr. S. R. Callaway, president of the New York Central & Hudson River Railroad, has resigned to accept the presidency of the new combination of locomotive builders now being formed. Mr. Callaway's career has been, in brief, as follows. He was born Dec. 24, 1850,

Mr. S. R. Callaway.

at Toronto, Ont. He entered railway service in 1863, since which he has been consecutively to 1869, junior clerk in auditor's, chief accountant's, secretary and treasurer's office Grand Trunk Ry.; 1869 to 1871, chief clerk to superintendent Great Western Ry.; 1871 to 1874, private secretary to general manager same road; 1874 to 1878, superintendent Detroit & Milwaukee Ry.; 1878 to 1881, general superintendent Detroit, Saginaw & Bay City Road; 1881 to 1884, general manager Chicago & Grand Trunk Ry. and president Chicago & Western Indiana Road and Belt Line Ry.; Sept. 1, 1884, to June 30, 1887, second vice-president and general manager Union Pacific Ry. and controlled lines; September, 1887 to January, 1895, president and receiver Toledo, St. Louis & Kansas City Railroad; January, 1895, to Aug. 18, 1897, president New York, Chicago & St. Louis Railroad; Aug. 18, 1897, to April 27, 1898, president

Lake Shore & Michigan Southern Ry.; Aug. 18, 1897, to April 27, 1898, president Lake Shore & Michigan Southern Ry.; April 27, 1898, to date, president New York Central & Hudson River Railroad.

Mr. James F. De Voy, draftsman in the Brooks Locomotive Works, at Dunkirk, N. Y., has been appointed chief draftsman in the Chicago, Milwaukee & St. Paul shops at Milwaukee, Wis.

On the Union Pacific the following changes have been made in the mechanical department: Mr. W. R. McKeen, Jr., heretofore foreman at North Platte, Neb., has been appointed master mechanic of the Wyoming division, with headquarters at Cheyenne, Wyo., to succeed Mr. J. H. Manning, resigned. Mr. Z. T. Sprigg, foreman of the shops at Denver, Colo., has been appointed master mechanic of the Colorado division, with headquarters at Denver, Colo. Mr. R. A. Mould, heretofore with the Pressed Steel Car Company at Pittsburg, Pa., has been appointed foreman of the blacksmith shop at Omaha, Neb., in place of Mr. A. A. Gibson, who has resigned.

Mr. John Player, superintendent of machinery of the Atchison, Topeka & Santa Fe, who has been in California for some months, returned to Topeka, Kan., on May 2, much improved in health. He was given a hearty reception by the officers and employes of the mechanical department at Topeka, who gathered in a body at the depot to welcome their chief home.

Mr. Charles T. Rommel, Jr., has been appointed master mechanic of the Lehigh & New England, with office at Pen Argyl, Pa.

Mr. Thomas L. Derr has been appointed foreman of roundhouses of the Philadelphia & Reading at Reading, Pa., in place of Mr. Charles Spangler, deceased.

Mr. W. H. Whalen, master mechanic of the Chicago & Northwestern at Baragoo, Wis., has been appointed assistant superintendent of that road at Oshkosh, Wis., and Mr. F. G. Benjamin, heretofore master mechanic at Eagle Grove, Ia., has been appointed master mechanic at Baraboo, to succeed Mr. Whalen.

Mr. R. A. Dugan has been appointed assistant to the president and purchasing agent of the Chicago, Lake Shore & Eastern road.

J. W. Comer, purchasing agent of the Central of Georgia and the Ocean Steamship Co., has retired and will hereafter devote his time to personal interests.

Mr. Frank Carlson, who has been foreman of the Atchison, Topeka & Santa Fe shops at Gainesville, Tex., for a number of years, has resigned.

Mr. Charles Lay, who was master car builder of the old Galena & Chicago Union Co., died at Chicago on April 26, aged 88 years.

Mr. J. H. Manning, formerly master mechanic of the Union Pacific at Cheyenne, Wyo., has been appointed western manager of the Standard Pneumatic Tool Co.

Mr. T. F. Sullivan, foreman of the Atchison, Topeka & Santa Fe roundhouse at Bellville, has exchanged places with Mr. Clinklaus, foreman of the roundhouse at Cleburne, Tex.

The Northwest Railroad Club has elected the following officers: President, Mr. T. A. Foque, mechanical superintendent, Soo Line; first vice-president, Mr. A. Lovell, superintendent motive power, Northern Pacific Ry.; second vice-president, J. J. Flather, professor of mechanical engineering, University of Minnesota; secretary and treasurer, Mr. T. W. Flannigan, chief clerk, mechanical department, Soo Line; assistant secretary, Mr. F. B. Farmer, Westinghouse Air Brake Co.

Mr. Rolla Wells, president of the American Steel

Mr. Rolla Wells.

Foundry Co., having been elected mayor of St. Louis, has been made chairman of the board of his company.

Mr. F. N. Hibbits has been appointed mechanical engineer of the Union Pacific. Mr. Hibbits is a graduate of the Rose Polytechnic Institute at Terre Haute, Ind., and entered railroad service in 1886 as a machinist and draftsman on the Cleveland, Columbus, Cincinnati & Indianapolis. This position he held until August, 1891, when he was appointed engineer of tests on the New York, Lake Erie & Western. The next year he became mechanical engineer, later becoming master mechanic. From 1875 to 1899 he was freight trainmaster of the Erie, and in June, 1899, was appointed superintendent, at Carbondale, Pa., of the Erie.

Mr. Thomas Follentine, foreman of the blacksmith shops of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, has retired after forty-four years' service with the company.

Mr. A. E. Taber has been appointed master mechanic of the Great Northern, with offices at Great Falls, Mont., succeeding J. McGie.

Mr. G. S. Wright has been appointed assistant to superintendent of motive power of the Elgin, Joliet &

Eastern and the Chicago, Lake Shore & Eastern. He will have charge of stores and store accounts and also of mechanical and fuel account. His headquarters will be at Joliet, Ill.

Mr. R. P. C. Sanderson has resigned as assistant superintendent of machinery of the Atchison, Topeka & Santa Fe. Mr. Sanderson, born in England, received a technical education abroad, and entered railway service in 1882 as a draftsman on the Norfolk & Western Ry. He remained with this road in various capacities in the mechanical department until February, 1900, when he was appointed to the position from which he now leaves. Mr. Sanderson's future movements are at this writing not announced. He may be addressed at 22 State street, New York, N. Y., or care of J. W. Taylor, Rookery building, Chicago.

Mr. G. R. Henderson, assistant superintendent of motive power and machinery of the Chicago & Northwestern, has resigned to accept the position of assistant superintendent of machinery of the Atchison, Topeka & Santa Fe. Mr. Henderson's first railway service was with the Pennsylvania as shop apprentice. He was later draftsman and assistant chief draftsman on the same road. In 1887 he went to the Roanoke Machine Works as assistant superintendent, and was later mechanical engineer of the Norfolk & Western Railroad. After a short service with the Schenectady Locomotive Works, he was in July, 1899, made assistant superintendent motive power and machinery of the Chicago & Northwestern.

The employes of the mechanical department of the Union Pacific on April 25 gave a banquet to their retiring chief, Mr. J. H. McConnell, at the Mallard Hotel, Omaha. About seventy were present, and letters were read from many whose duties detained them elsewhere. Toasts were responded to in the form of reports on mechanical subjects, with perhaps more variety than ordinarily characterizes such reports. Mr. Thomas H. Dailey, the veteran chief clerk of the department, acted as spokesman in the presentation to Mr. McConnell of an order for a watch to be built according to his own plans and specifications, and to cost not less than $1,000. Mr. McConnell in response gave a feeling tribute to the rank and file of the department and proposed the health of his successor.—Railway Age.

Mr. James F. Roddy has been appointed road foreman of engines of the Middle and Oklahoma divisions of the Atchison, Topeka & Santa Fe, with headquarters at Newton, Kan., in place of Mr. J. D. Coffey, appointed trainmaster of the Middle division.

Mr. J. H. McConnell, formerly superintendent of motive power of the Union Pacific, has gone abroad.

Mr. J. P. Neff, heretofore foreman of shops of the Chicago & Northwestern at Waseca, Minn., has been appointed general foreman of that road at Huron, S. D., in place of Mr. A. B. Quimby.

Mr. Reuben Wells, formerly superintendent of the Rogers Locomotive Works, has accepted a position with the Great Northern Railway as consulting locomotive expert.

Mr. Frank L. Bates has resigned as master mechanic of the Coast division of the Southern Pacific at San Francisco, Cal.

Locomotive Progress

Our Usual Annual Review

DURING the past year our railroads have placed large orders for locomotives, and abundant opportunity has been given for improvement in design and for increase in size and weight.

Never before has good engineering been so successfully applied to locomotive design, nor on so grand a scale. Traffic conditions have required still greater tractive power in freight engines, and higher speed, with heavier trains, in passenger service. These severe requirements have only been filled by pushing the rail pressure of driving wheels to the extreme limit, so that rapid rail wear due to actual crushing will prevent the use of locomotives of much heavier weight per wheel than some of those which have been produced since June, 1900.

The most marked change which has taken place in locomotive design is in the use of a firebox which extends beyond the frames and which is usually over 5 feet wide for bituminous coal.

It is a remarkable fact that the width of fireboxes for bituminous coal was for years arbitrarily fixed at 42 inches, simply because it was a convenient dimension which placed the outside sheet flush with the frame, and lent itself easily to the remaining design, but without any regard to the amount of coal to be burned in a unit of time. The same is true of the length of tubes. Sixteen feet was fixed as a maximum without any good reason, and because no one had used longer ones. This doubtless fixed the design of many locomotives to usual and prevailing types, when the use of a larger tube might have improved the design and changed the type. Builders do not hesitate now to use tubes 19 feet long, and the limit will soon be pushed to 20 feet.

The large amount of coal burned per hour by modern locomotives compelled an enlargement of the firebox, and the success of a few bold experimenters with boxes extending over the frame for bituminous coal, soon led to their general adoption for both passenger and freight service, and now few, if any, large engines are built with the narrow box.

The Atlantic type has lent itself naturally to a design for wide firebox by providing in the small trailing wheel a support for the firebox, which allows the box to extend over it. The radial truck, seldom before used in this country, has been successfully adapted to the Atlantic type for the trailing wheels. The Atlantic type has steadily grown in favor, and is very satisfactory for fast trains of medium weight; but for heavier trains six-coupled drivers are by some thought necessary, while others, in the effort to avoid the additional pair of drivers, have again brought out and successfully applied the traction increaser, by which a good portion of the weight on the trailing wheels is thrown on the drivers at the time of starting from stations.

The combinations of pony trucks and four-wheel trucks with two, three or four pairs of coupled wheels, and especially the use of trailing wheels in these combinations, are now so numerous that it is becoming necessary to make a new classification of locomotives, so as to define clearly their exact wheel arrangement. At present each locomotive builder, and each road which brings out a new combination of truck and driving wheels, give their own name to it, but it would seem best for the Master Mechanics' Association to adopt a standard classification of locomotives, having reference to their wheel arrangement.

It is not so many years since 14,000 pounds was regarded as a maximum load for one driving wheel, and the growth of the locomotive was for years stunted and retarded by a stolid adherence to this limit in locomotive specifications. During the past year, however, locomotives have been built where the maximum weight per driver is just double the old limit, or 28,000 pounds. We find this weight in the consolidated engines built by the Pittsburg Locomotive Works for the Pittsburgh, Bessemer & Lake Erie railroad. The total weight of the engine is 250,300 pounds, and the weight on four pairs of drivers is 225,200 pounds, or 28,000 pounds per wheel. The cylinders are 24 inches in diameter and have 32 inches stroke; the boiler is 84 inches in diameter and the boiler pressure is 220 pounds. The tractive power is 63,000 pounds.

We may compare these dimensions with the Brooks 12-wheel engine, built for the Illinois Central railroad, and referred to in our review of Locomotive Progress last year as the largest locomotive in the world. The Pittsburg engine has 32,000 pounds greater weight on drivers, the boiler is 2 inches larger in diameter, and the hauling capacity is 100, compared with 85.6 in the Illinois Central engine. The net hauling capacity on the level is 7,847 tons for the Pittsburg engine, and 6,717 tons for the Illinois Central.

Until recently 6,000 gallons was considered a large capacity for tenders, but the Illinois Central has now in service tenders holding 7,000 gallons of water. The light weight of the tender is 57,500 pounds, and the coal capacity is 16 net tons, which, added to 58,333 pounds of water, makes the weight of tender loaded 147,833 pounds.

Track tank water scoops for tenders are getting into more general use on Eastern roads, where numerous high speed trains are in service. It was formerly the practice to slow down to 20 to 25 miles per hour when taking water with the tank scoop, and difficulty was experienced in lifting them when the speed exceeded 30 miles per hour. The shape of the mouth of the scoop and the lifting device have now been so much improved that it is possible to take water at any speed, and they have been used at nearly 80 miles an hour. At 50 miles per hour the spashing does not extend beyond the rails. This is an important improvement, which makes is possible to run high speed trains long distances without slow downs for water.

The most notable passenger locomotives built during the past year, remarkable for their great power and large steam making capacity, are those built for the New York Central Ry. and for the Lake Shore. The Central engine is an example of the Atlantic type, where the tractive power exceeds the normal adhesion, and a part of the weight on trailing wheels is transferred to the drivers by an air-cylinder and levers. The normal weight on drivers is 95,000 pounds, and this is increased by the levers 12,000 pounds, making the total weight on the four drivers at starting 107,000, or 26,750 pounds per wheel. The cylinders are 21x26 inches; the driving wheels 79 inches, and the boiler pressure 200 pounds. The piston valves are 12 inches in diameter. The boiler is 70⅝ inches in diameter, and the firebox is 75⅜ inches wide. The heating surface is the largest ever used in a passenger engine, the total being 3,505 square feet. This engine probably represents the ultimate growth to which the Atlantic type can be adapted, on account of the heavy rail pressure which it produces; but it is best not to speak positively about such matters, as we find in each year's record advances beyond those which were considered maximum conditions.

The Lake Shore passenger engine Class J is one of which both the railroad and the builders may be proud. With the exception of the Delaware, Lackawanna & Western 10-wheel passenger engines, it is the heaviest and most powerful locomotive built for passenger service. Yet the design is so symmetrical and the outlines so smooth that the unusual size is not apparent. There are six coupled wheels, 80 inches in diameter, a pony leading truck, and a radial trailer. No specific name has yet been given to this new wheel arrangement. The cylinders are 20½x28 inches, and the boiler pressure 200 pounds. The firebox is 84 inches wide; the tubes 19 feet long, and the total heating surface 3,343 square feet. In this engine the greatest care was taken to secure the largest steaming capacity and tractive power with the least weight, and steel castings were used to a greater extent than ever before in American practice. The total weight of steel castings in the engine is 28,000 pounds; and besides the cylinder and grate, very little cast-iron is used.

The compound locomotive appears to hold its own, but does not make any prominent advance. Few of the larger passenger engines have been compound, and they are of the four-cylinder type. The two cylinder compounds for use in this country are, with few exceptions, for freight service.

Taking the year's work as a whole, the progress in locomotive construction has certainly been unprecedented. The performance of modern American locomotives is now so satisfactory that there is little room for further improvement. The modern steam machines are so efficient in every way that it will be still more difficult for the electric locomotive to compete with them in regular main line traffic.

The Freight Car Coupler Situation

By Edward Grafstrom

SINCE the report of the M. C. B. committee on freight car couplers at the 1899 convention a number of railroads have tried to avail themselves of the suggestions made by the committee, but the conditions have been such that these efforts have generally been futile. It is also difficult to see how a drop testing machine at Purdue, as proposed at last year's convention, could be of material benefit to the railroads, except for experimental work; for to hold a shipment of couplers at Cleveland, Pittsburg or other place of manufacture, while samples were selected, sent to Purdue and finally tested at the convenience of the college people, would mean a serious delay to the manufacturers, and even more so to the railroads, and would necessitate keeping a considerable stock of couplers ahead, which during the present strenuous times is out of the question. It is even doubtful whether the drop testing machines erected by individual railroads, at an expense of from $1,500 to $2,000, have proved a good investment, for the reason that to ship a sufficient number of representative couplers to a drop testing machine, located perhaps several hundred of miles from the place of manufacture, and possibly over foreign roads, has been found both expensive and annoyingly slow. Many of the larger manufacturers of couplers have their own drop testing machines, but none of them, as far as the writer knows, has a complete M. C. B. machine. Some of the railroads having their own machines have found it expedient to send inspectors to the place of manufacture to gauge the requisite number of couplers ordered, and to make what tests are possible on the manufacturer's machine. If successfully passing these, a pair of couplers picked at random have been forwarded by express to the railroad company's machine to complete the tests, the whole lot being accepted or rejected on the results obtained by these. Even this has been causing expensive delays, when the cars for which the couplers were wanted were standing waiting for them and the coupler manufacturers were behind with the delivery, and it appears therefore that the course of most of the railroads to accept couplers on gauge and on the reputation of the manufacturers, or on guarantee, will be the most popular one for both parties.

The M. C. B. drop testing machine is still far from being perfect, and this has caused hesitation on the part of the manufacturers, as well as the railroad companies, to invest in them. The most serious defect is perhaps attributable to the irregularity of the springs under the anvil base, due to their taking a permanent set, and the lack of means of convenient adjustment. If the springs on one side settle more than those on the opposite side, the base plate becomes tilted. This in itself would not be serious, but its most objectionable effect relates to the columns used for the jerk test, which also rest on the spring bed. If these columns lean to one side, while the guide posts for the tup, which stand on a solid foundation, remain vertical, the tup will not strike the yoke resting on the two coupler knuckles in the center, from which follows that one coupler will receive more of the blow than the other, and perhaps more than it can stand. The writer has seen the caps on these columns, from which the coupler is suspended during the jerk test, 1½ inch closer to the center line of the drop on one side than on the other, on a machine originally erected as square as ordinary care could make it.

Another weakness brought out on these drop testing machines is that the fork into which the shank of the coupler is fitted for the jerk test will spread out regardless of bolts, unless a heavy clamp is forced down over it. This is, of course, only a weakness of design and not of principle, and can be remedied by re-enforcing the metal.

The coupler contour gauge has met with more favor than the drop testing machine, and will presumably play an important role in the buying and selling of couplers hereafter. This also applies to the twist gauge, except that it is too heavy for an inspector to handle conveniently in routine work or if a large number of couplers are to be gauged, and a galvanized iron imitation of it has been found more desirable. If frequently checked with a master gauge, there should be no objection to the use of such a substitute.

It is difficult to understand what the function of the "worn coupler gauge" really will be. To place this in the hands of the ordinary car inspectors for indiscriminate use would mean that the business of the railroads would practically be brought to a stand-still, for 25 per cent of the general run of cars in the average railroad yard would be subject to detention on account of worn couplers. The time is not yet at hand when railroads can refuse to accept cars in interchange on the strength of couplers condemned according to this gauge.

One of the most interesting evolutions in the coupler field during the year is the so-called "angling test."

This consists of coupling two couplers together and swinging one of them to either side, so that the center lines of the couplers, extended, will intersect at the stipulated angle of 14 degrees. This test has demonstrated that some of the manufacturers have added all the metal which the contour gauge would possibly allow, thus producing the best conditions for maximum wear, yet this would prevent the coupler from "angling" more than 10 or 12 degrees, and in some cases it has required a pressure of as high as 65,000 pounds to bring them to the 14 degree angle. This shows what strains the carrier irons or other parts of the draft rigging may have to resist.

If it is expected that the couplers should be able to swing 14 degrees to either side, the M. C. B. recommended clearance in the carrier iron should be increased beyond the present limit, but it is an open question whether the amount of angling is necessary for practical purposes. The angle between the center lines of two 40-foot cars on a 20-degree curve is 8 degrees 30 minutes, and on a 30-degree curve it is 12 degrees 36 minutes. The M. C. B. clearance in the carrier iron is equal to 2 degrees 45 minutes. This would then allow the couplers to angle 5 degrees 45 minutes and 9 degrees 51 minutes, respectively, without producing transverse strains on the carrier iron.

The question of increasing the dimension of the coupler shank has been freely discussed during the past year, and several roads have adopted the increased shank. The advisability of this step is still doubtful, however. A number of tests show that the present standard size of shank, either in malleable iron or in steel, can be made to stand as much as the present pivot pins and knuckles can, and as long as the present contour lines prevail it is difficult to understand what is gained by increasing the size of the coupler behind the head.

For the last two or three years the railroads have been satisfied to take whatever couplers they could get. The rush is now over, however; the present equipment has been provided for according to law, and the new equipment for the year has been contracted for. The railroad men will now have a breathing spell and may have time to consider the question of how to get what they want in the coupler line. From this it appears that the M. C. B. standing committee on couplers could advantageously broaden its scope so that, besides saying what a good coupler should be, it would also point out how to get such couplers in a practical and satisfactory manner.

Modern Freight Cars

Our Usual Annual Review

THE introduction of steel freight cars of large capacity is now so general on roads both East and West that the chief interest in construction and repairs centers in the steel car.

The Pressed Steel Car Co. has been busily engaged to its full capacity during the past year, and it is now turning out more than 100 steel cars per day. It has built some fine specimens of box and furniture cars with steel underframe and wooden box. It has also designed a box-car with pressed steel posts, braces and carlines, covered with wood siding and roof. These cars are so light and cheap that they can compete with box-cars having an entire wooden superstructure.

While much attention is now given to the repairs of pressed steel cars, where large members are bent out of shape in wrecks, and some complaints are heard about the length of time required to make such repairs, yet this is not really a serious matter. The Pressed Steel Car Co. reports that in proportion to the number of cars it has in service the number of repair parts ordered from it is surprisingly small.

Active competition in the steel car business is rapidly developing, and most large car companies are now building steel cars of rolled structural shapes. A number of good designs have been made for both hopper and box cars by these companies, wherein the proportion of light weight to paying load has been kept down to the usual limits in pressed steel.

A fine example of modern box-car construction is the 90,000-pound box-car built for the Northern Pacific railroad by the American Car and Foundry Co. This car is 40 feet long inside, and the weight empty is 39,600 pounds, and the maximum paying freight it will carry is 69 per cent of total weight of car and load. The principal feature of this car is the side truss, which is designed to carry part of the load. The upper chord is a 4-inch by $3\frac{1}{2}$-inch angle; the lower chord a 5-inch by $3\frac{1}{2}$-inch angle. The wooden posts and braces are fitted to malleable iron pockets, which are riveted to the chords. The center sills are two 15-inch, 33-pound steel channels, with a $\frac{1}{4}$-inch covering plate on top between bolsters, and with bottom flanges tied by lattice bars. Composite steel and wood coal cars on somewhat similar plans have been built by the Norfolk & Western railroad, with a capacity of 100,000 pounds and light weight only 38,000 pounds.

As an example of large capacity ore cars, built entirely of wood, we may refer to the 50-ton cars built by the St. Paul R. R. This car has no through center sills, but double side silss are used. The light weight is 29,300 pounds, with a ratio of 77 per cent paying load. The car weighs only 500 pounds more than a pressed steel ore car of similar shape and capacity.

It is probable that hereafter few, if any, long furniture cars will be built, as the American Railway Association has about agreed to adopt a standard box-car, and the agreement as to minimum lading will be such as to offer no advantage to the longer car. The size of the standard car proposed is 36 feet long, 8 feet 6 inches wide, and 7 feet 6 inches high, all inside dimensions.

The use of large capacity freight cars has developed weakness in detail parts, which must now receive serious attention. The principal details thus demanding study are center plates, side bearings, wheel flanges, and draft rigging.

Considerable improvement has been made in center plates by providing means for lubrication, and the advantage of lubricated center plates in reducing flange friction has been demonstrated by careful experiments in the test room.

Designs for anti-friction side bearings are becoming numerous, and the necessity for some improvement which shall take a heavy load without excessive flange friction is so great that, as is usually the case, a successful device will be promptly forthcoming.

The cast iron wheel has been strengthened at hub and plate until its weight is nearly 700 pounds, but the weak point is still in the flange, where but very little increase in section can be made.

Broken flanges are becoming so numerous under large capacity freight cars that the use of steel-tired wheels for them has been seriously suggested. The use of the rigid pressed steel truck has doubtless increased the severity of the blows which wheel flanges have to resist, and some improvement in the truck to reduce the intensity of these blows would increase the life of the wheel. If a steel-tired wheel is used in freight service, it is urged that it should be one of that type where the tire is welded to a cast iron center, with no fastenings whatever.

The advantage of a good chilled iron tread is very great, and if this could be combined with a steel flange, so that the structure would not break under hard service it would meet present requirements. The flange, when worn, could be replaced without turning either flange or tread.

The draft gear question has not been materially advanced by the Master Car Builders' committee appointed to make tests of improved draft gear, and it is doubtful if the subject will be presented to the convention in much better shape than it was last year. The tests made by the Atchison road have shown the advantage of twin springs and malleable iron draft timbers, and a large trade in this form of draft rigging is already established. The same may be said of the Westinghouse friction draft gear. It has been applied to several thousand steel cars, and to the tenders of numerous heavy locomotives. It offers an ideal device, and is a successful solution of a very difficult problem. The cost of this device is the only objection to it, and it remains to be demonstrated whether in the end it is more economical to buy the most efficient draft gear at comparatively high cost or a less efficient one for a smaller sum.

The past year has added to American freight car equipment a greater carrying capacity in more substantial structures than any previous year, and the good effect of this magnificent betterment will be felt for years to come.

*Some Characteristics of Waste Packing**

By T. H. Symington

WITH the strict economies practiced in the use of all other materials, and careful specifications covering their quality, waste cannot be overlooked.

A large amount of money is expended annually on waste for packing journal boxes, the price of this waste ranging through the various grades of cotton and mixtures of wool and cotton from 3½ cents for cheap cotton to 12 and 15 cents for the best wool.

The present method of grading waste is by the "feel," and its general appearance and freedom from dirt. This very crude method of grading, and the desire to cheapen this item of expense, led the writer to some investigations which were interesting in their results as giving a more exact method of determining the value of various wastes for this purpose.

The qualities in the waste that are to be considered are:

1st. Its capacity for holding oil, or its absorbing qualities.

2nd. Its elasticity when saturated with oil to the normal condition of packing for journal boxes.

3rd. Its capacity for lifting oil by capillary attraction, or wick action.

4th. The height to which this capillary attraction will raise the oil.

5th. The length of fibre and the amount of twist in strands.

6th. Freedom from dirt and shoddy material that is liable to pulverize.

For this investigation, twenty-nine samples of various qualities of wool waste and seventeen samples of cotton waste were collected from manufacturers and railroad companies and tested in the following manner.

ABSORPTION TEST.

One pound of each kind of waste was soaked in ordinary Galena car oil, at a temperature of about 65 degrees Fahrenheit for 30 hours, and allowed to freely drain for 10 hours, after which the samples were weighed and the increase in weight in pounds of each

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*Paper read at the May meeting of the Western Railway Club.

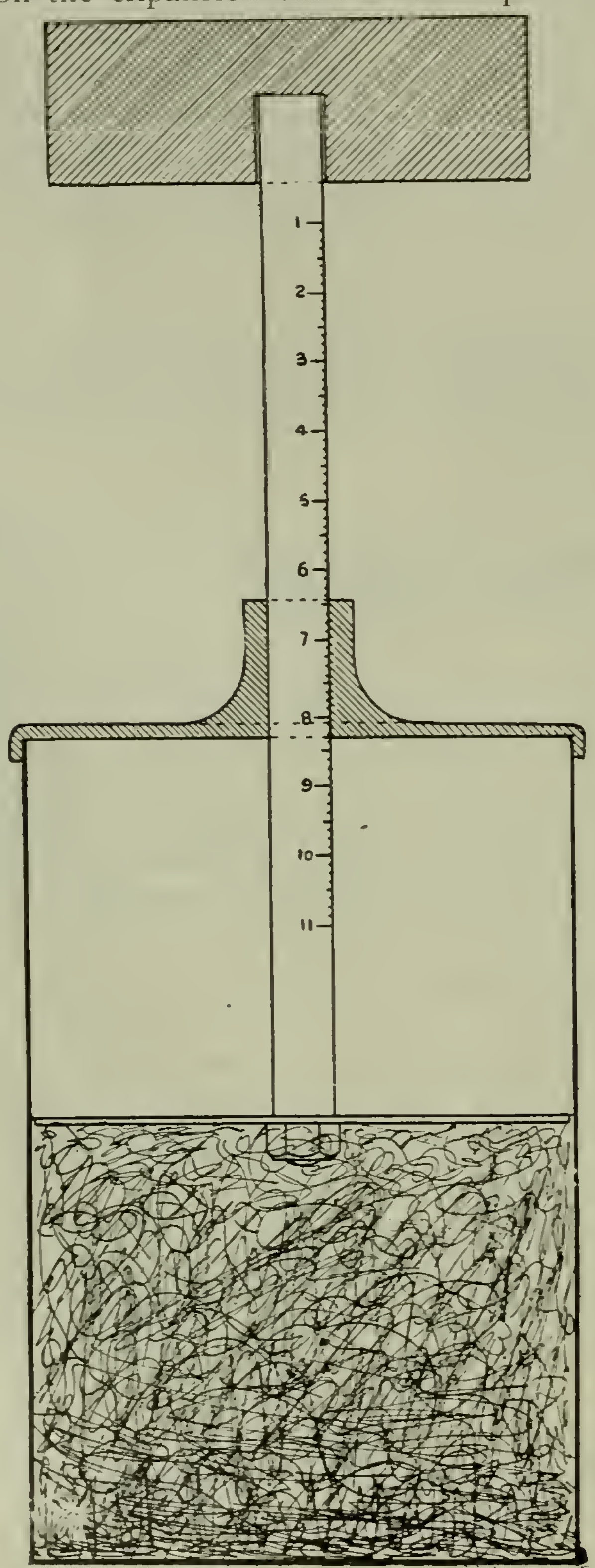
sample represented the absorption in per cent of that sample.

For the wool waste the per cent of absorption varied from 237 to 575 per cent, with an average of 325 per cent. For the cotton waste the per cent of absorption varied from 403 to 575 per cent, with an average of 491 per cent.

EXPANSION TEST.

In this test, each sample of waste, soaked and drained from the absorption test, was placed in a tin bucket (shown in figure), eight inches in diameter, and compressed by the use of a dasher and constant weight to about the tension of waste in a journal box, and allowed to stand for two hours. The height of the dasher from the bottom of the bucket was measured, and when the weight was removed from the dasher, the amount of rise of the dasher represented the expansion of the waste.

For the wool test this expansion varied from 8 per cent to 39 per cent, or an average of 22 per cent. For the cotton the expansion varied from 8 per cent to 26 per cent, or an average of 15 per cent.



WASTE TESTER.

CAPILLARITY TESTS.

Fresh samples of dry waste of each kind were compressed in a similar bucket to that used in previous test, with the bottom of the bucket perforated with a number of holes. The waste was compressed by the use of the dasher and weight, and the bottom of the bucket placed just below the surface of a large tank of oil, and allowed to stand for 10 hours. The waste was then removed and weighed, and the increase in weight in pounds for each sample represented what might be termed the capillarity of the waste in per cent.

For the wool waste this capillarity varied from 25 per cent to 137 per cent, with an average of 88 per cent. For the cotton the capillarity varied from 37 to 215 per cent, with an average of 131 per cent.

HEIGHT OF CAPILLARITY.

To determine the vertical height to which oil would rise in the various wastes, a small sample was placed in a glass tube of about two inches in diameter with an open bottom. The waste was compressed in this tube uniformly, and the bottom of the tube allowed to come in contact with oil in a large tank. After standing for 10 hours it could readily be seen through the glass how high the oil had risen by capillarity in the waste.

With the wool waste this height varied from ¾ inch to 2½ inches, with an average of 1.28 inches. For the cotton it varied from ⅞ inch to 2⅜ inches, with an average of 1.72 inches.

Summarizing these results, we have:

Waste	Absorption			Expansion			Capillarity Per cent			Height of Capillarity		
	Max	Min	Avr	Max	Min	Avr	Max	Min	Ave	Max	Min	Avr
Wool	575	237	325	39	8	22	137	25	88	2.50	.75	1.28
Cotton	575	403	491	26	8	15	215	37	131	2.37	.59	1.72

It will be noted that the absorption, per cent of capillarity, and height of capillarity of the cotton waste is considerably in excess of the wool. The expansion of the wool, however, is considerably higher than the cotton. This elasticity has been considered so essential that the expensive wool has been used almost universally instead of cotton in American railroad practice.

Practically, the principal trouble with cheap waste seems to be that it goes to pieces in the boxes on account of being of very short fibre and shoddy material, resulting after a year's service in a pulpy, inert mass. The long fibre pure wool does not go to pieces, but retains its form and elasticity, and is therefore much superior to the shoddy material.

The capillarity of the waste seems also dependent upon the length of fibre, as the oil feeds the length of separate fibres, but will not jump from one fibre to another.

One practical trouble with cotton waste has been that it would roll up in the box, leaving parts of the journal entirely.

The logical conclusion from these tests is, that if the cotton waste is held mechanically up to the journal, independent of its own elasticity, and is also held in the box so that it cannot roll up in knots, it would be as efficient packing as wool; and as the cost of the cotton is so very much less than the wool, this would seem to open a field for large saving in the operation of cars.

Several large roads have recently realized that with the ordinary boxes there is not a sufficient difference in the results obtained from wool over cotton, to make it desirable from an economical standpoint to use wool at all.

The elasticity of the various wastes depends principally upon the lightness to which the strands are twisted, and on account of the variation in the elasticity of various kinds of cotton waste it would be well in ordering such waste to specify that the expansion be not less than twenty per cent in a test similar to the one outlined above.

Repairs to Bent Steel Car Bodies and Trucks

AT the April meeting of the Central Railway Club a particularly interesting committee report was made on the subject of repairs to bent steel car bodies and trucks. The occasion of the report was an effort to get at prices for such work, to be placed in the Interchange Rules. The report was in substance as follows:

A number of companies having but few steel cars or none at all have not given the subject much attention, merely sending the truck or body which had been wrecked on their road to the pressed steel plant, from which they were originally purchased, for repairs.

One of the companies said, in response to the committee inquiries: "'We have the facilities of a first-class boiler shop in connection with our motive power department, where we do work to trucks, occasionally having to cut them apart. We have a furnace wherein we can put the whole truck inside, and when heated equally all over, it is taken out and put on face plate that will take the whole truck side, and in this way straighten and reform the sides and rivet them up again."

Another company replied: "We have formers and are prepared to make repairs to pressed steel coal cars as follows: End sills, end posts, cross transoms, spreaders, floor supports, right and left, corner posts, draft sills, side sill ends, diagonal struts, brake beams, top arch bars. I would also say that we have a portable heater for the heating of damaged parts and in addition I would recommend an air drill." One of the principal trunk lines gives the following information: "We have completed formers for the sides and transoms of the trucks to be used to straighten them up when they are badly bent and require taking apart. Our method is to thoroughly heat the truck sides and parts and place them on the formers and leave them in the formers until they are practically cool. Our intention also is to use a system of jacks to straighten and square the trucks up where they do not require taking apart; we also intend to do the riveting on the truck with a long stroke pneumatic riveter with yoke attachment, and I think after our arrangements are complete that we will have very good success in handling our pressed steel trucks requiring repairs."

Another quoted the following hours of labor required for repairing and replacing the following parts in steel hopper and steel gondola cars:

	Gondolas. hrs.	Hoppers. hrs.
1 center sill between body bolsters replaced	80	
1 center sill between body bolsters and end sill replaced	30	60
1 center sill complete replaced	100	
2 center sills complete replaced	180	
1 end sill replaced	24	30
1 end sheet including flange and punching replaced	30	40
1 end sheet and end sill including flange and punching replaced	44	
1 end top angle replaced	10	
1 end corner angle including flange and punching replaced	10	
1 end corner diaphragm replaced	8	
1 end side sheet including flange and punching replaced	100	
1 center side sheet including flange and punching replaced	130	
1 end side floor sheet including flange and punching replaced	50	100
3 end floor sheets including flange and punching replaced	90	170
1 hopper center cross sheet including flange and punching replaced		100
1 center side hop sheet including flange and punching replaced		40
1 outside hop sheet including flange and punching applied		50
1 side stake applied	6	14
1 corner stake applied	5	10
1 end stake applied		8
1 floor diaphragm	6	
1 floor diaphragm at drop doors applied	10	
1 drop door applied	4	6
1 drop door angle bar applied		20
1 drop door operating rod applied	4	4
1 drop door winding shaft applied	6	6
1 draft lug applied	6	6
1 sill step applied	4	4
1 hand hold applied	2	2
1 coupler applied	3	3
1 center plate applied	10	10
Removing and applying 1 drop door spreader		1
1 arch bar truck frame applied	16	16
1 pedestal truck frame applied	20	20
1 or 2 journal boxes on pedestal truck applied	4	4
1 bottom arch bar applied	9	9
1 top arch bar applied	10	10
1 top and bottom arch bar on same side of truck applied	14	14

The settlement prices of new eight-wheel steel gondola or hopper cars including air-brake to be as follows:

Bodies, gondolas 80,000 to 100,000 pounds capacity $660.00

Bodies, gondolas 80,000 to 100,000 pounds capacity 770.00
Trucks, 80,000 pounds capacity with 5 x 9 jour.. 380.00
Trucks, 100,000 pounds capacity with 5½ x 10 jour 460.00

Prices include brake-beams complete, truck levers, dead lever guides and bottom connection rods.

The discussion which followed this report developed the fact that some roads had had so little trouble with repairing steel car bodies and trucks that they had found little or no need for putting in special tools for such work. Others had prepared themselves to handle this work, so as to avoid sending to the makers. The ordinary shop on some roads could, it was said, handle these repairs with unskilled labor and common car repairers, although special tools were needed, such as pneumatic tools, portable forges and hydraulic jacks.

Mr. Ferguson, of the Pennsylvania Railroad, said, during the discussion, that the repairs to steel cars on that road had not amounted to as much as one would suppose from the number of cars that had been running. The steel trucks had given particularly good service and, unless damaged in bad wrecks, had not required as much repairs as one would suppose. The facilities that are at hand at Altoona, where they do most of those repairs, had been a gradual growth. That is, the road had been using steel parts in cars, gradually increasing the number for a good many years past, and had many bull-dozers and forms which were necessary for straightening different parts, and the consequence was that when the steel cars came the road was almost ready to meet the emergency. The boiler work, said Mr. Ferguson, is mostly in connection with patching; some of the cars are getting to the point where they require patching; and when not injured in wrecks, have holes worn or eaten in them, the acids from coal eating through the hopper bottoms. Repairs of this kind are strictly boiler work, and in proportion to a square foot of surface it would cost considerable more than ordinary wood repairs to cars, but the cost per mile is probably not so high. Pneumatic tools are exceedingly necessary in doing this work economically. In cutting off rivets and taking off the side stakes, renewing angle bars on the side-sills and work of that kind, which is often done, the pneumatic hammers will do the work in half the time and the drilling is correspondingly rapid.

Mr. Barhydt, of the Buffalo, Rochester & Pittsburg, said that his experience with the 100,000 pounds capacity cars had been, so far, that in a break-in-two and run-together, ordinarily, if there is a wooden car that is next to the steel car it will raise up and bend in the framework that holds the body of the steel car up; that is, the wooden car will raise up over the end-sill of the steel car and crush right into the uprights that hold the box of the car up. He had had no trouble with trucks, practically, except in wrecks. When there was trouble they took the trucks into the boiler shop, let the boiler-makers cut them apart, put them on flange-blocks and straightened them up just the same as a man would flange up a flue sheet; straighten them and rivet them up with a pneumatic hammer. Loose rivets were found only under tenders.

Some further talk was had as to hours and prices. It was explained that, with reference to the figures given in the report, the work on steel cars could really be done in less time than as shown in the report. These figures, by the way, came from Mr. Dow, of the Lake Shore. The fact developed that the club would not, as a club, indorse these figures; but it was voted to simply submit them to the arbitration committee for its consideration.

M. C. B. Arbitration Cases

Cleveland, O., May 15th, 1901.

To the Editor of the Railway Master Mechanic:

The new edition of the decisions of the Arbitration Committee, recently published, contains a list of cases each road has referred for decision and the number won or lost.

In justice to those roads, some at least, which referred a large number of cases and lost more than they won, an explanation of the reasons for referring so many cases may be necessary to prevent adverse criticism.

The object in referring a large number of the cases was educational, so that all the roads would be benefited by the clearing up of doubtful points.

It was not the policy of the L. S. & M. S. Ry. to decline to join other parties in referring cases merely because the decision might be against it. Some cases were made up amicably for the purpose of bringing out an authoritative decision in the interest of universal car interchange; therefore, under those circumstances, it is not strange that a good many cases were introduced, or that more were lost than won.

The result of placing such cases before the Arbitration Committee undoubtedly brought about changes and modifications in the Rules that make the occasions rare when there is any need of referring disputes to the committee; therefore it will be conceded, I think, that it was more commendable than otherwise to refer doubtful cases for decision when in the interest of all roads.

J. D. McAlpine.

*The Lighting of Railway Cars**

By Geo. D. Shepardson

AS early as 1856, experiments were made on the Chicago & Galena Railway with the use of compressed city gas for car lighting. Coal gas loses much of its illuminating power when compressed, and has therefore been practically abandoned for train use. In 1867, Julius Pintsch, of Berlin, began experimenting with various gases, and found that gas made by heating oil to a high temperature would stand compression with little loss of illuminating power. He succeeded in building up a business of great magnitude. During the last few years, acetylene gas made from calcium carbide, a product of the electric furnace, has been applied to car lighting with more or less success. Incandescent electric lamps were first used for train lighting in 1881, and are now used in many of the best trains in all countries.

Each of the old methods of car lighting has certain features which are objectionable to the traveling public, to railway men, or to both. The first requirement in any satisfactory method is safety. The devices for burning oil and gas have been brought to a high state of progress. Yet, with any illuminant requiring a flame, there is at least a possibility of fire risk.

The worst features of oil and gas are the products of combustion. Oil and gas lights not only cause a large amount of heat, which adds to the discomfort of summer travel, but they use up the oxygen of the air faster than do the passengers. The degree of emphasis to be placed upon this consideration may be inferred from a few figures. For illuminating various kinds of American passenger cars, the light varies from the equivalent of that given by about forty candles to that given by 1,200 or 1,500 candles. The ordinary car has an illumination equal to that of about 170 candles. The consumption of oxygen and the products of combustion in the lamps giving that amount of light may be compared directly with the presence of a number of passengers, the candles being equal to about 115 adults, oil lamps being equal to about eighty adults and gas being equal probably to about twenty-five adults. The above comparison makes no allowance for the additional discomfort of dirty lamps, which smoke and smell.

A great objection to the oil lamp is its liability to smoke; and another is its liability to leak oil on the carpets and upon the clothes or baggage of passengers. It was stated, several years ago, that it was costing the Pullman Company about $200,000 annually to replace carpets and other furnishings injured by oil lamps; no record being available, however, of the damage to the property of passengers.

When the incandescent electric lamp approached a commercial form, in 1879, its advantages were quickly recognized. Experiments looking toward its use on railway cars were begun almost before the first central station for stationary lighting was in operation. In spite of the frailties of the early lamp and the limited sources of electricity then available, the London, Brighton & South Coast Railway in England began in November, 1881, to operate electrically lighted trains, and has continued this method of illumination until the present time, making improvements from time to time as experience dictated. Soon after this trial began, other roads, in nearly every country, followed; and to-day the number of cars lighted by electricity runs up into the tens of thousands, not counting the myriads of trolley cars which are lighted and propelled from the same source of power. A history of the development of electric lighting for railway cars would make an interesting study for railway officials and others who desire to keep fully posted in this branch of electrical work.

As is generally known, the light of an incandescent electric lamp comes from a slender carbon filament in a vacuum maintained within a closed glass bulb; this filament being heated to a high temperature by an electric current. So little heat escapes to the outside that the lamp may be placed with safety in almost any location desired. There is no open flame which may set fire to combustibles near by, and the external temperature is so low that only actual contact for a considerable time will carbonize or ignite the most inflammable material. It heats the atmosphere to a very limited extent only, and does not vitiate it in the least, there being no combustion. The lamp may be lighted without a match by the simple turning of a key, and may be extinguished with equal facility and safety. With proper care on the part of those in charge, there will be no fluctuation in the light, neither streaks nor shadows. Experience has shown methods of construction and operation which make the electric light safe as a fire risk, and the voltage used is so low that it is impossible to receive a shock of any consequence.

When the electric berth lamp was introduced it met with instant success. A passenger who has enjoyed the luxury of a cool light at his shoulder, available at any time during the night, without any disturbance, always seeks a sleeping car with electric lights. The traveling public is satisfied with nothing less; and to-day no train can be called thoroughly modern and up to date unless it can advertise berth lights.

The latter are electric, of course, for no other kind has appeared. Along with the berth lamp is the possibility of having electric fans to keep the air in circulation. Another advantage which appeals to ladies is the comfort of heating a curling iron without the nuisance of an alcohol lamp, so trying and dangerous in the cramped quarters usually allowed for ladies' dressing rooms.

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*Extracts from an article in the Forum, May, 1901.

On trains equipped with storage batteries, each compartment and each dressing room may be furnished with electric heaters, always ready for use by simply inserting the tongs.

Power for operating the electric lamps and other devices may be obtained from storage batteries carried underneath the car, from dynamos, or from a combination of the two. The storage battery consists of a number of lead plates immersed in diluted sulphuric acid. When a current is sent through the battery from an outside source, certain chemical changes take place, which make the plates electrically different; so that when the circuit is provided they will cause a current to flow through. There is no storage of electricity as such, the energy of the charging current being changed into chemical energy, which is stored and later is re-transformed into electrical energy.

The dynamo, often called an electrical generator or a dynamo electric machine, is a device for changing mechanical energy into electrical energy; it is based upon the interrelations of electricity and magnetism. For train lighting, the dynamo is driven by a steam engine in the baggage car, or it is belted to the axle. For the engine-driven dynamo, steam is obtained from the locomotive, and provision must be made for supplying light when the locomotive is changed at division points. There is likely to be some vibration from the engine throughout the train, which, however, is noticeable only when the train is standing still.

With the axle system, provision must be made for lighting the train when standing and also when running at too low speed for the dynamo to operate. The storage battery furnishes the simplest means of supplying light at such times; suitable devices being arranged to transfer the lights from dynamo to battery or vice versa, as required. In connection with the axle-driven dynamos, the batteries are charged from the dynamo on the car, either while the lamps are lighted, or during the day, or at both times. Batteries used as auxiliaries to engine-driven dynamos are charged either en route or at the terminals, while the train is being cleaned and inspected for the next trip. Batteries used for lighting without any dynamo on the train must be charged at the terminals of the road.

The choice of an electric lighting system best adapted to a given train or to a given road involves a number of technical considerations which require careful investigation. It may be said in general, however, that the storage battery without any dynamo on the train is suitable for trains which are not more than one day away from a source of charging current; that the system of engine with dynamo in the baggage car is suitable for solid trains going through to their destination, without any changes in make-up; and that the axle-lighting system finds a field almost its own in the case of through trains on runs several thousand miles long, and on trains which are split up by having cars added or removed en route, while it can compete in point of economy and good service on trains for which the other systems are suitable.

Comparing the different sources of light, passengers prefer gas to oil, and electricity to gas, provided the electric lights are properly taken care of and are reliable. Since experiments with electric lights on trains have been made from the time when the electrical art was in an early stage of development, it is not surprising that some of the early attempts were not as conspicuously successful as they were expensive. The compressed gas system was brought to a reliable and commercially successful stage ten years before the electric incandescent lamp was ready, and the gas interests made good use of their opportunity to pre-empt the field. After much expensive development, and in the face of many discouragements, the advocates of electric lights for train use have overcome nearly all obstacles; and today the electric light is recognized as the only thing for the best service. The modern apparatus is developed to such a state of reliability and perfection that it is now possible for the railways to purchase electric lighting outfits, or to secure them on a rental basis at moderate cost and guaranteed by ample capital. Now that the electric light has won its standing with the railways, the public may expect a rapid adoption of this admirable source of light and ventilation.

Wrong Repairs to Timbers

Chicago, May 9th, 1901.

To the Editor of the Railway Master Mechanic:

Dear Sir: As a member of the Car Foremen's Association, I would ask the privilege of the insertion of the following, which may be of interest to many, if not all of the members:

Cases have been cited where wrong repairs, to various timbers, were made on foreign cars, owing to the parties making same being unable to determine what the actual standard was, owing to shrinkage, and to the fact that the timbers at opposite end of car were not of same dimensions as the ones removed. As a remedy I would suggest that the representative of each road secure a copy of the standard dimensions of equipment and forward to you to be printed in the Master Mechanic. Each member would be in possession of facts and figures which would enable him to determine at a glance what was correct in making repairs to foreign cars, and save the delay necessary in communications with the owners of said cars to obtain this information.

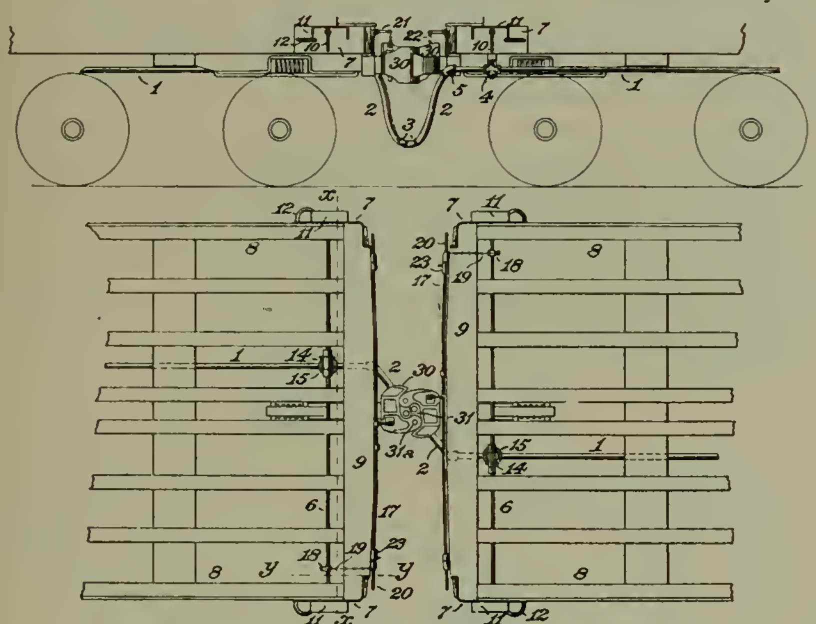
Possibly some of the members might suggest a better remedy to obtain the desired results.

J. R. Cornwall.

Interesting New Railway Patents

Westinghouse Angle Cock Operator.

As is familiar to those skilled in air-brake practice, the train or brake pipes of the several vehicles of a train are connected one to another by sections of flexible hose and couplings and the ends of the train pipes of each car are controlled by what are known as "angle-cocks," each of which is interposed between and connected to one end of the train pipe and the adjacent hose section thereof. Before cars are uncoupled, which is frequently done while the cars are in motion, it is necessary to



Westinghouse Angle Cock Operator.

close the angle-cocks at the adjoining ends of the two cars which are to be uncoupled in order to prevent the escape of air from the train pipes of the two separated sections of the train and the consequent undesired application of the brakes thereon, and when cars are coupled together the angle-cocks must be opened in order to permit the free traverse of air throughout the entire length of coupled train pipes of the vehicles of the train. The angle-cocks being located near the longitudinal central plane of the cars, it is necessary for the trainmen to go between the cars to open and close them, and this necessity involves danger to the operator and some slowness in operation by reason of the location of the angle-cocks being such that the trainmen cannot manipulate them from a convenient standing position.

The object of an invention patented by George Westinghouse is to eliminate the danger and obviate the objections of comparatively slow and inconvenient operation of the angle-cocks as heretofore practiced by the provision of means whereby they may be readily and quickly opened and closed as required by an operator when standing at either side of a car or cars.

An operating shaft is journaled transversely to the car body and which, when rocked, effects the closing or opening of the train pipe cock. The shaft is provided at its ends with handles, one of which extends from each side of the car body, and by which the cock may be operated. The train pipe cock is also operated whenever the car is uncoupled. This is accomplished by providing the operating shaft of the train pipe cock with a sheave or arm to which is attached one end of a chain, the other end being secured to an arm upon the uncoupling rods.

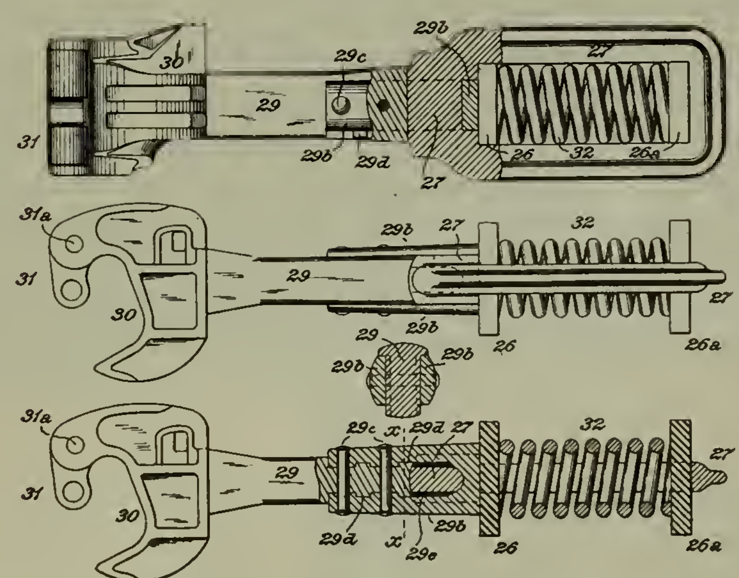
Upon the rocking of the uncoupling rod, the arm thereon is swung forwardly, which communicates a rocking movement, by means of the chain, to the operating shaft of the train pipe cock, which closes the cock.

Westinghouse Draft Appliance.

An invention relating to draft appliances which are employed in connection with automatic couplers has been patented by George Westinghouse.

The coupler-head, which does not in and of itself constitute part of the present invention, is provided with a suitable locking mechanism and may be of any suitable and preferred form of what is known as the "vertical plane" or "Master Car Builders' " type of automatic coupler. The coupler-shank is pivotally connected to a draft strap or yoke which is adapted to surround and impart strains received by the coupler-head to a draft and buffing apparatus of any known and preferred construction, which in this instance consists of a spring, interposed between front and back follower-plates, fitted in the draft-strap.

The coupler-shank is reduced in thickness at and adjacent to its inner or rear end and engages in the side



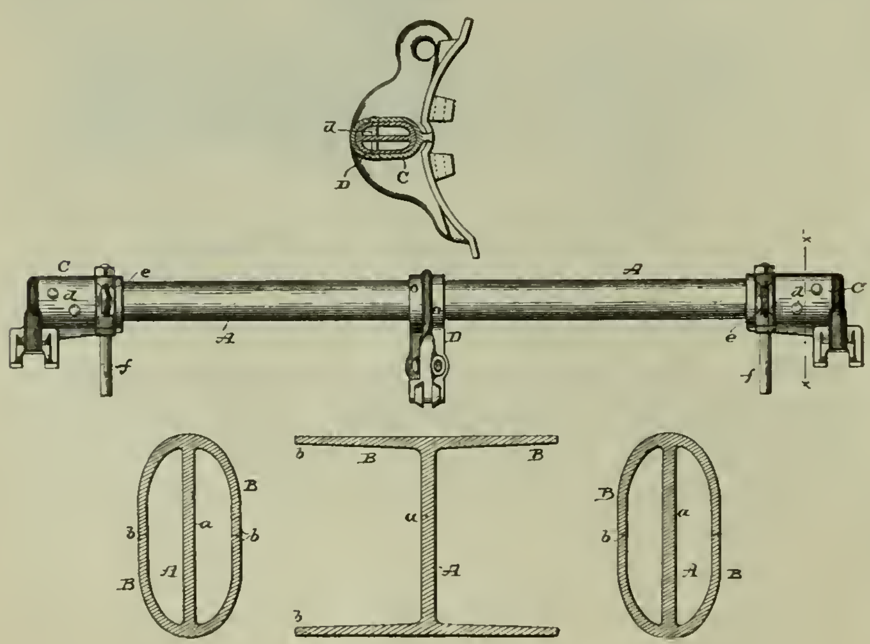
Westinghouse Draft Appliance.

members of a bifurcated pivot-jaw, to the forward or outer portion of which the coupler-shank is secured by rivets. The forward end portion of the draft-strap passes through a vertical central recess, or passage, of the pivot-jaw, which recess is open at the front and closed at the rear end of said pivot-jaw. The portion of the draft-strap which passes through the recess is provided with segmental vertical bearing-faces on its front and rear sides, said bearing-faces fitting against correspondingly-curved vertical bearing-faces on the rear end of the coupler-shank and on the body of the pivot-jaw adjacent to the rear end thereof. The inner or rear end of the pivot-jaw abuts against the front follower-plate.

In assembling the parts of the appliance the front end portion of the draft-strap is slipped into position in the recess of the pivot-jaw and the narrowed rear end portion of the coupler-shank is then inserted in the recess so as to abut against the adjoining bearing-face of the draft-strap and is secured in this position by the rivets. Under this construction it will be seen that the front end portion of the draft-strap constitutes a vertical pivot to which the coupler-shank is coupled at its rear end, thus permitting the coupler-head to traverse in a horizontal plane within a properly-limited range of movement when the car is passing around a curve, and thereby obviating or substantially reducing the tendency to uncouple on curves of short radius, which obtains where the coupler-shank and draft-strap are rigidly connected, and relieving the incidental strains on the car-frame. When the coupler-shank is swung upon its pivot on the draft-strap, the rear end of the pivot-jaw correspondingly moves the front follower-plate against which it abuts, causing it to bear more strongly against the draft and buffing spring on one side than on the other, and said spring as a resultant of such unequal lateral bearing of the follower-plate acts when the car passes from a curve to a tangent to return the coupler-head to and maintain it in normal position—that is to say, with the longitudinal central plane of the coupler-shank in line with that of the draft-strap and of the car.

Timms Brake Beam.

Mr. James Timms, of Columbus, Ohio, has recently patented an improved brake beam for cars. In constructing the beam there is employed an I-beam having comparatively wide top and bottom flanges, which latter when bent inwardly toward the center meet about midway the web. The edges of the flanges may be united by welding, or, if preferred, the flanges may be brought together without joining them, either method of forming a structure specially designed for resisting great strains. In using the device as a brake-beam, the brake-heads should be provided with an oval recess to receive the ends of the beams and are preferably secured thereon by rivets or other devices passing through the brake-head and beam. These brake-heads, or, rather, the sleeves of the brake-heads, are also provided on their upper faces with seats for the reception of the rods, which latter are designed to rest adjacent to the inner faces of the wheels and limit the swinging movement of the beam. Secured centrally to the beam is the stirrup, to which the braking mechanism is attached, the stirrup being preferably secured in place against lateral displacement by rivets passing through the same and through the beam.

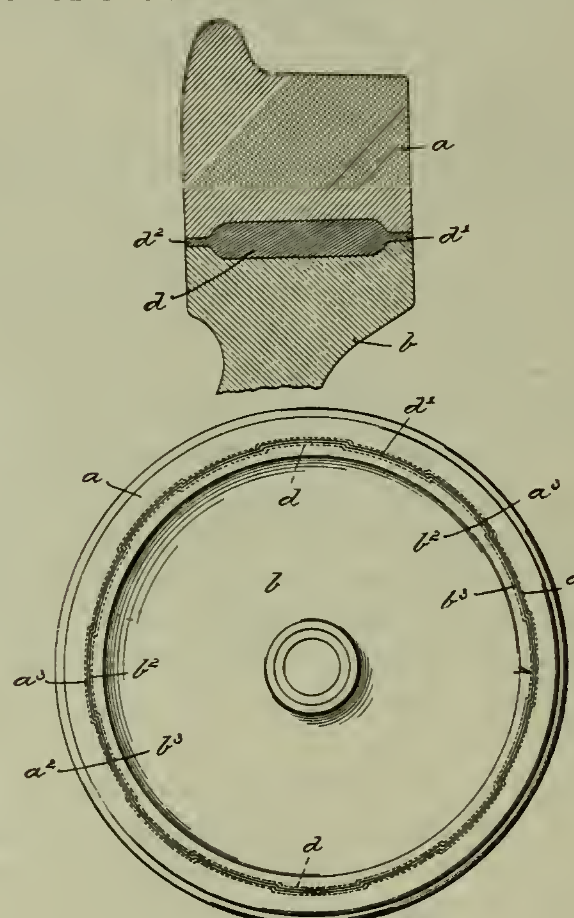


Timms Brake Beam.

With this construction the centrally-located web extends lengthwise of the beam and transversely through its long axis, and as the beam is designed to be used with its long axis in the direction of the strain it is evident that it will possess great resisting power with a minimum use of metal, thus enabling a brake-beam capable of withstanding any strain that may be put upon the same to be constructed without the use of any of the braces or trusses now universally employed for strengthening them.

Voynow Car Wheel.

An improvement in car wheels, of that class wherein the rim or tire and the body of the wheel are separately formed of two different or the same metals, and afterwards assembled together, has been patented by Constantine B. Voynow, of Philadelphia, Pa.



Voynow Car Wheel.

The rim or tire at its inner periphery is preferably of slightly greater diameter than the outer periphery of the body. The inner periphery of the tire is step-shaped—that is, it alternately projects outward and inward—while the body is correspondingly shaped, but the projections and indentations are reversely arranged, so that the outer projection of the tire or rim is arranged opposite to an inner projection or indentation of the body or core. The inner periphery of the rim or tire and the outer periphery of the body or core are also peripherally grooved, the grooves being complementally arranged to form a relatively wide, substantially annular, space between the faces of the wheel, and this wide space communicates with the smaller substantially annular-spaces at either face of the wheel, which smaller spaces result from making the inner diameter of the rim or tire greater than the diameter of the body. The wide space and the smaller spaces are adapted to be filled by a bed or filter of suitable material—such as zinc, type-metal, sulphur, or the like—so that there will be confined between the rim or tire and the body, a relatively large band of the bed or filler, narrowing down at either face into a relatively small band of said bed or filler.

The projections upon the inner periphery of the tire and the periphery of the body, and the correspondingly-shaped bands of filler serve to prevent the turning of the rim or tire on the body or core of the wheel under tractile strain. The bed or filler also serves to interlock the rim or tire and body and to prevent separation under torsional strain or side thrust.

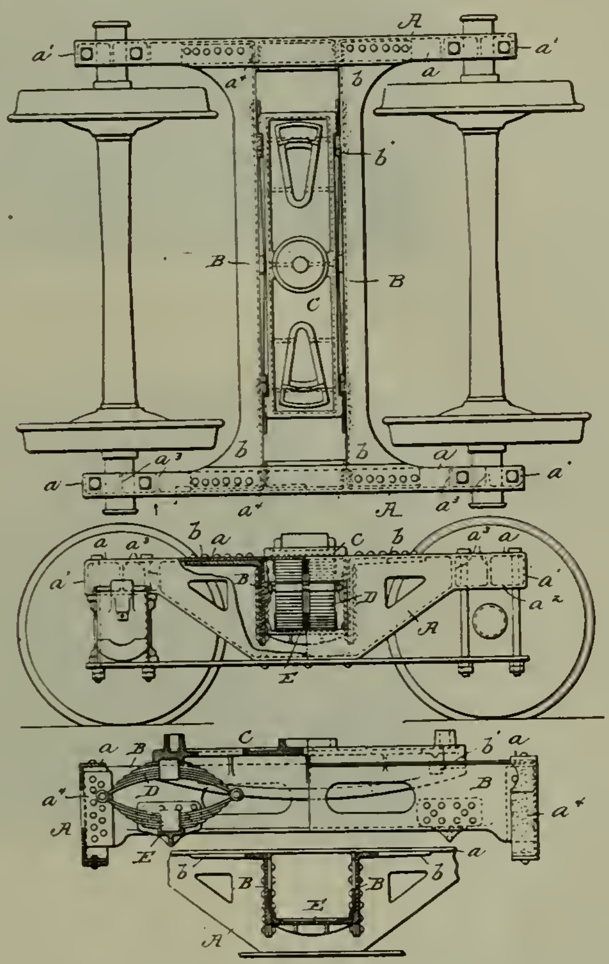
The construction may be modified by making the outer projections of the body or core of a width or thickness in cross-section slightly less than the width or thickness of the channel or space in the inwardly-projecting portions of the rim or tire, thus permitting the body or core to be first arranged so that the steps of the body or core enter the indentations of the rim or tire and then to be turned so that said projections may partially enter the channel or space of the projections of the rim or tire.

Instead of interlocking the rim or tire of the body or core by means of the step-like complemental portions, the channeled portions may be annular, and at intervals radial channels are drilled through the body and into the rim or tire, so that when the bed or filler enters the channels or spaces it will fill up these channels or spaces and form plugs or keys of metal, which prevent the separation of the rim or tire from the body or core under tractile strain or side thrust. Any material or materials may be used as a bed or filler, which is or are susceptible of wholly or partially assimilating or combining with the material or materials of the rim or tire and body or core of the wheel, so as to make, as it were, an integral wheel, but at the same time capable under treatment, such as fusion or otherwise, to cause the assimilating or combining element of the wheel to be readily separable to part the tire or rim from the body or core of the wheel.

Westlake Car Truck.

Mr. Charles T. Westlake, of Granite City, Ill., has patented a car truck which is designed particularly for use in connection with tenders for locomotives.

Each side frame is made up of a casting, its upper edge having an inwardly extending flange extending



WESTLAKE CAR TRUCK.

throughout its length, and the ends of the frame are reduced to accommodate the journal boxes.

The bolsters are Z-shaped, with their top flanges presented outwardly and widened at the ends to some extent to accommodate a row of attaching rivets passing therethrough and through the top flange of the side frames. These transoms are made shallow at their middle portions and deepest at their ends, and are so constructed as to provide guiding ribs for the bolster.

The bolster is made of one piece, and is provided with suitable spring seats for accommodation of elliptic springs, which rest upon spring seats secured to lower edges of the transoms.

In order to accommodate the increase in travel, the Lehigh Valley R. R. announces that with its spring change in time, about June 1st, a new fast train will be put in service between New York, Philadelphia and Buffalo and Chicago via Niagara Falls. This train will leave New York 10:00 a. m.; Philadelphia, 10:30 a. m., arriving Buffalo 9:00 p. m.; Chicago, 1:28 p. m. Returning, train will leave Chicago 11:45 a. m., arriving New York 4:25 p. m.; Philadelphia, 4:00 p. m. The train will be equipped with new cars just out of the shop, and will be hauled by locomotives especially designed to make fast time.

Mogul Freight.

Chautauqua Type Passenger.

Wide Firebox Consolidation Freight

The Brooks, Engines for the Pere Marquette.

The Brooks Locomotive Works turned out for the Pere Marquette R. R. a fine lot of locomotives of three different types, samples of each of which are shown above. There were four Moguls, five Chautauqua type, and six wide fire box Consolidations.

The Moguls weigh 138,500 pounds, of which 122,000 pounds are on the drivers; they have 19x26 cylinders and 56 inch drivers; 62 inch boilers carrying 200 pounds pressure; 1,886 square feet of heating surface and 30.8 square feet of grate area.

The Chautauqua type engines weigh 142,000 pounds —of which 83,000 pounds are on the drivers, 32,000 pounds on the leading trucks and 27,000 pounds on the trailers. They have 18x26 inch cylinders and 72 inch drivers; 58 inch boiler, carrying 200 pounds pressure; 2,074 square feet of heating surface and grate area of 42.3 square feet.

The Consolidations weigh 163,000 pounds, of which 148,000 pounds are on the drivers. They have 20x26 cylinders and 56 inch drivers; 66 inch boilers, carrying 200 pounds pressure; 2,470.5 square feet of heating surface and 55 square feet of grate area.

Other particulars of these interesting engines are given quite fully on the opposite page.

Three Types of Brooks' Locomotives for the Pere Marquette Ry.

Description	*Chautauqua Type Passenger*	*Mogul Type Freight*	*Consolidation Type Freight*
How many and date of delivery	Five, March, 1901	Four, February, 1901	Six, February, 1901.
Gage	4 ft. 8½ ins	4 ft. 8½ ins	4 ft. 8½ in.
Kind of fuel to be used	Bituminous coal	Bituminous coal	Bituminous Coal.
Weight on leading wheels	32,000 lbs.	16,500 lbs.	15,000 lbs.
Weight on driving wheels	83,000 lbs.	122,000 lbs.	148,000 lbs.
Weight on trailing wheels	27,000 lbs.		
Weight, total	142,000 lbs.	138,500 lbs.	163,000 lbs.
Weight tender loaded	98,000 lbs.	92,000 lbs.	92,000 lbs.
GENERAL DIMENSIONS.			
Wheel base, total of engine	26 ft. 4 ins	23 ft. 11 ins	24 ft. 4 in.
Wheel base, driving	6 ft. 8 ins	15 ft. 0 ins	15 ft. 6 in.
Wheel base, total engine and tender	51 ft. 3 ins	50 ft. 6½ ins	52 ft. 9½ in.
Length over all, engine	37 ft. 5½ ins	37 ft. 0½ in	39 ft. 3½ in.
Length over all, total engine and tender	60 ft. 3 ins	60 ft. 3 ins	62 ft. 6 in.
Height, center of boiler above rail	9 ft. 1 in	8 ft. 6½ ins	9 ft. 4 in.
Height of stack above rail	14 ft. 10½ ins	14 ft. 6 ins	14 ft. 10 in.
Heating surface, fire box	182 sq. ft	178 sq. ft	225.5 sq. ft.
Heating surface, tubes	1892 sq. ft	1708 sq. ft	2245 sq. ft.
Heating surface, total	2074 sq. ft	1886 sq. ft	2470.5 sq. ft.
Grate, area	42.3 sq. ft	30.8 sq. ft	55. sq. ft.
WHEELS AND JOURNALS.			
Wheels, leading, No	4	2	2
Wheels, leading, dia	33 ins.	30 ins.	30 in.
Wheels, driving, No	4	6	8
Wheels, driving, dia	72 ins.	56 ins.	56 in.
Wheels, trailing, No	2		
Wheels, trailing, dia	51 ins.		
Material of wheel centers	All cast steel	Drivers cast steel	Drivers Cast Steel.
Type of leading wheels	4 wheel swivelling and swing truck	2 wheel radial and swing truck	2 Wheel radial and swing truck.
Type of trailing wheels	Improved radial axle		
Journal leading axles	5½ ins. x 10 ins	5¼ ins. x 10 ins	5¼ in. x 10 in.
Journal leading axles, wheel fit	5½ ins.	5⅛ ins.	5⅛ in.
Journal driving axles	8½ ins. x 11 ins	8½ x 11 ins	8½ in. x 11 in.
Journal driving axles, wheel fit	9 ins.	8⅜ ins.	8⅜ in.
Journal trailing axles	8 ins. x 14 ins		
Journal trailing axles, wheel fit	7⅞ ins.		
Main crank pin size	5⅛ ins. x 6 ins	5½ ins. x 6 ins	6¼ in. x 6½ in.
Main coupling pin size	6⅝ ins. x 44 ins	6⅜ ins. x 4¾ ins	7 in. x 4½ in.
Main pin dia. wheel fit	6⅞ ins.	7⅛ ins.	7⅜ in.
CYLINDERS.			
Cylinder diameter	18 ins.	19 ins.	20 in.
Cylinder stroke	26 ins.	26 ins.	26 in.
Piston rod, dia	3½ ins.	3¾ ins.	3¾ in.
Main rod length, center to center	136 ins.	104½ ins.	138 in.
Steam ports, length	24 ins.	23½ ins.	24 in.
Steam ports, width	1⅞ ins.	2 ins.	2⅛ in.
Exhaust ports, least area	75 sq. ins	75 sq. ins	75 sq. in.
Bridge width	3⅛ ins.	3¼ ins.	3⅛ in.
VALVES.			
Valves, kind of	Improved piston	Improved piston	Improved piston.
Valves, greatest travel	5⅜ ins.	4⅞ ins.	4⅞ in.
Valves, steam lap (inside)	1¼ ins.	⅞ in.	1 in.
Valves, exhaust clearance (outside)	0 ins.	0 in.	0 in.
Lead in full gear	1-16 in. positive	⅛ in. positive	1-32 in positive.
Lead, constant or variable	Variable	Variable	Variable.
BOILER.			
Boiler, type of	Improved Belpaire wagon top	Improved Belpaire wagon top	Improved Bellaire Wagon Top.
Boiler, working pressure	200 lbs.	200 lbs.	200 lbs.
Boiler, material in barrel	Steel	Steel	Steel.
Boiler, thickness of material in shell	9-16 in., ⅝ in., 11-16 in. and ½ in.	9-16 in., ⅝ in. and ½ in	⅝ in., 11-16 in., 9-16 in. & ½ in.
Boiler, thickness of tube sheet	¾ in.	¾ in.	¾ in.
Boiler, dia. of barrel front	58 ins.	62 ins.	66 in.
Boiler, dia. of barrel at throat	63⅜ ins.	67¼ ins.	71⅝ in.
Seams, kind of horizontal	Quintuple and Sextuple	Quintuple and Sextuple	Quintuple & Sextuple.
Seams, kind of circumferential	Double	Double	Double & Triple.
Crown sheet stayed with	Direct stays	Direct stays	Direct stays.
Dome, dia. inside	30 ins.	30 ins.	30 in.
FIRE BOX.			
Fire box, type	Wide	Sloping	Wide.
Fire box, length	90 ins.	108 ins.	108 in.
Fire box, width	68 ins.	42 ins.	74 in.
Fire box, depth front	65¾ ins.	75 ins.	69 in.
Fire box, depth back	55¼ ins	60 ins.	52 in.
Fire box, material	Steel	Steel	Steel
Fire box, thickness of sheets	Crown ⅜ in., tube ⅝ in., sides and back ⅜ in	Crown ⅜ in., tube ⅝ in., sides and back ⅜ in	Crown ⅜ in., tube ⅝ in., sides & back.
Fire box, brick arch	On water tubes	On water tubes	On water tubes.
Fire box, mud ring width	Back and sides 3½ ins., front 4 ins.	Back and sides 3½ ins., front 4 ins.	Back & Sides 3½ in., front 4 in.
Fire box, water space at top	Back 6½ ins., sides 5 ins	Back 4½ ins. sides 5 ins	Back 7 in., sides 5 in.
Grate, kind of	Cast iron rocking	Cast iron rocking	Cast iron rocking.
Tubes, No. of	251	272	312.
Tubes, material	Charcoal iron	Charcoal iron	Charcoal iron.
Tubes, outside	2 ins.	2 ins.	2 in.
Tubes, thickness	No. 12 B. W. G.	No. 12 B. W. G.	No. 12 B. W. G.
Tubes, length over tube sheets	14 ft. 6⅛ ins	12 ft. 1¼ ins	13 ft. 10¼ in.
SMOKE BOX.			
Smoke box, dia., outside	61 ins.	65 ins.	69 in.
Smoke box, length from tube sheet	68 ins.	68 ins.	72½ in.
OTHER PARTS.			
Exhaust nozzle, single or double	Single	Single	Single.
Exhaust nozzle, variable or permanent	Permanent	Permanent	Permanent.
Exhaust nozzle, dia	4¾ ins.	5 ins.	5⅛ in.
Exhaust nozzle, distance of tip above center of boiler	5½ ins.	2 ins.	0 in. on center.
Netting, wire or plate	Netting	Netting	Netting.
Netting, size of mesh or perforations	2½ x 2½ ins.	2½ x 2½ ins	2½ in. x 2½ in.
Stack, straight or taper	Taper	Taper	Taper.
Stack, least dia	15 ins.	14 ins.	15 in.
Stack, greatest dia	16⅞ ins.	16¼ ins.	16⅞ in.
Stack, height above smoke box	39 ins.	39 ins.	31¾ in.
TENDER.			
Type	8-wheel steel frame	8-wheel steel frame	8-Wheel steel frame.
Tank, type	Sloping top	Straight top	Straight top.
Tank, capacity for water	4500 gallons	4500 gallons	4500 gallons.
Tank, capacity for coal	10 tons	10 tons	10 tons.
Tank, material	Steel	Steel	Steel.
Tank, thickness of sheets	¼ in.	3-16 in. x ¼ in	3-16 in. x ¼ in.
Type of under frame	Steel channel	Steel Z bar	Steel Z. Bar.
Type of trucks	Fox pressed steel	Fox pressed steel	Fox Pressed Steel.
Type of springs	Double elliptic and coil	Double elliptic and coil	Double Elliptic & Coil.
Dia. of wheels	33 ins.	33 ins.	33 in.
Dia. and length of journals	5 in. x 9 ins	4¼ ins. by 8	4¼ in x 8.
Distance between centers of journals	5 ft. 3 ins	5 ft. 3 ins	5 ft. 3 in.
Dia. of wheel fit on axle	6⅜ ins.	5⅜ ins.	5⅜ in.
Dia. of center of axle	5⅜ ins.	4¾ ins.	4¾ in.
Length of tender over bumper beams	21 ft. 1½ ins	21 ft. 4½ ins	21 ft. 4½ in.
Length of tank inside	19 ft. 6 ins	19 ft. 6 ins	19 ft. 6 in.
Width of tank inside	9 ft. 10 ins	9 ft. 10 ins	9 ft. 10 ins
Hight of tank not including collar	55 ins.	46 ins.	46 ins.
Type of draw gear	M. C. B. coupler	M. C. B. Coupler	M. C. B. Coupler.
SPECIAL EQUIPMENT.			
Brakes	American for drivers, Westinghouse for tender and train service	American for drivers, Westinghouse for tender and train service	American for drivers, Westinghouse for tender & train service.
Pump	9½ ins.	9½ ins.	9½ in.
Sight feed lubricator	Detroit	Detroit	Detroit.
Safety valves	Ashton	[illegible]	[illegible]

The Car Foremens' Association of Chicago

May Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Wednesday evening, May 8th. Pres. Sharp called the meeting to order at 8:00 p. m. Among those present were the following:

	Evans, W. H.	Perry, A. R.
	Flanagan, Jos.	Powell, C. B.
Ackerman, J.	Grieb, J. C.	Russell, J. W.
Bates, G. M.	Guthenberg, B.	Smith, R. D.
Bickford, W. L.	Hedrick, E.	Saum, G. N.
Bossert, Chas.	Kroff, F. C.	Stagg, C. S.
Cornwall, J. R.	Kline, Aaron.	Stimson, O. M.
Clark, I. N.	Leubke, Wm. F.	Sharp, W. E.
Cardwell, J. R.	La Rue, H.	Swift, C. E.
Cook, Roy J.	Morris, T. R.	Terry, O. N.
Cook, W. C.	Marsh, Hugh.	Tomlinson, W.
Cather, C. C.	Murphy, Thos.	Wentsel, Geo.
Depue, Jas.	Nordquist, Chas.	Wensley, W. H.
Earle, Ralph.	Parke, P.	Wolfe, Chas.

Pres. Sharp: The minutes of our last meeting have been printed in the Railway Master Mechanic and distributed among the members. If there are no amendments or corrections they will stand approved as printed.

Secretary Kline: The following have made application for membership:

H. A. Beaumont, Gen. Foreman, B. & O. R. R., Zanesville, O.; A. G. Donavan, Asst. Supt., Armour Car Lines, Kansas City, Mo.; Geo. S. Goodwin, Draughtsman, C., M. & St. P. Ry., West Milwaukee, Wis.; T. J. Mullally, Master Car Painter, A. C. L., Chicago; Wm. O'Herin, Supt. Motive Power, M., K. & T. Ry., Parsons, Kan.; W. P. Raidler, Master Mechanic, G. B. & W. Ry., Green Bay, Wis.; L. Rosenbaum, Foreman, B. & O. R. R., Zanesville, O.; Thos. J. Raftery, Foreman, B. & O. R. R., Zanesville, O.; G. B. Williamson, Car Foreman, B. & O. R. R., Newark, O.

Pres. Sharp: The names as read have been approved by the Board of Directors and they will be enrolled as members. We will now take up the regular program of the evening. Subject No. 1 is: A received from B a foreign car with one draft timber broken, old, and one American continuous cross key bent on opposite end of car (no indication of rough usage). The car was taken over A's line to a point about 36 miles distant, where it was offered to C, but was refused on account of one draft timber broken, old, and two American cross keys bent. A was obliged to make repairs. Can A make bill against the owner provided he secures joint evidence from B and C showing that the defects existed as stated above?

Mr. Evans: The latter part of the subject is what I do not understand—how the joint evidence would cut any figure. My understanding is that one party to the joint evidence must represent the owner of the car, whereas, as I understand the question, the owner of the car is not at all interested in the interchange, and I do not think that in this case it would be right for A to bill against the owner, providing he procures joint evidence card from B and C showing defects existed at opposite ends.

Pres. Sharp: Do you think he could obtain joint evidence?

Mr. Evans: I do not think he could.

Mr. Cather: This question brings up the question of the literal construction of the rules, and then again the rules as exemplified by the Arbitration Committee's decisions. Now the rules specify that a defect is an owner's, providing a combination does not exist or that the damage has not been occasioned at one and the same time and at the same end. In this case the car is received on a road's line, A, without a number of defects existing at each end of the car, which does not indicate rough usage. After a short lapse of time additional defects occur, forming a combination denoting rough usage as a whole, and according to the rules, as they stand without consideration of the Arbitration decision, it appears that the defects are owner's; but Arbitration Decision 534 makes this question one that would be considered as denoting rough usage at one end of the car and would bar a charge, in my opinion, against the owners for repairs to that end, for the reason that the road having the car in its possession would be considered as negligent in not making needed repairs at the proper time. It may be stated, and reasonably, too, that there was no opportunity to make repairs. In fact, there are cases where it is absolutely impossible to make them before a combination exists. Yet if we allow that as an argument there would be other instances of actual neglect when the owner would suffer. In my opinion there should be no charge against the owner for repairs of the car at the end where the combination existed at the time of repairs. So far as the joint evidence is concerned in this case, I do not see any reason why it cannot be procured—not in the sense of a joint evidence as outlined in the rules, but as a joint inspection record, which would be practically the same thing, showing that certain defects existed when the car arrived on A's road, that would also show that the damage did not occur simultaneously; but Arbitration Case 534 bars any charge, in my opinion.

Mr. Bates: It seems to me in this particular case if A handled the car and it was refused on the other end of the line on account of a combination existing, the proper procedure for A would be to take the matter up with the owner and state the facts to him—that the car was received from B with draft timber broken at one end and bent key at the other end, and I am sure if he had done that he could have collected the bill, but as he failed to do that I do not see why he should not stand all the expense.

Mr. Morris: If A damaged the car, or received the car in a damaged condition and failed to make the repairs at the proper time, he is responsible for any additional defects that occurred as a result of his negligence and the owner is out of it altogether, as I understand. The fact of additional defects occurring afterwards does not make the opportunity for the issuance of a joint evidence card and I do not see why a joint evidence card should come in at all. I think it is a very clear case of A being responsible for the combination that existed at one end, and the owner for the key at the opposite end.

Mr. Cather: Another idea suggests itself there as to what the owner would consider in the case of bill being presented for repairs at the other end of that car without your inspection record or the joint evidence, for the reason that the defects existing at one end of the car show rough usage, according to the rule. The natural inference to the owner would be that the car had been subjected to rough usage if bill was presented for renewal of the key at one end of the car and "no bill" stub for draft timber and key at the opposite end, and that no charge should be made for them. Now then, if the car has been damaged in rough usage, say as an actual fact, and at the same time this other damage previously existed at the opposite end of the car, would it not be natural for the owner to say that the car was damaged by rough usage and we are not entitled to bill for either end of the car. At the same time the damage is not simultaneous. Neither was the damage at one end simultaneous. That is the question that should be considered.

Mr. Cardwell (A. C. C. O. Co.): I think, following up the Arbitration Committee's decision, that if we follow the rules literally or the intention of that decision which makes the delivering road responsible on account of negligence in failing to make repairs, we can do nothing else but hold the road making the repairs, responsible, and in order to dispose of the subject I would make the motion that the road making the repairs is responsible for all the defects on the car. This motion was not seconded.

Mr. Morris: I would move that A is responsible for the repairs to the end that had the broken draft timber and the bent key and the owner is responsible for the bent key at the opposite end, and that the joint evidence card should not be considered in the case at all.

A Member: We will get into trouble there. Suppose the combination exists denoting rough usage and if rough usage occurred to the car why cannot the key at the other end of the car have been damaged at the same time, and if so, the delivering road is responsible for the whole thing.

Pres. Sharp read Decision 534, which is as follows:

"If the defects in the draft timbers which are claimed by the Lake Shore & Michigan Southern Railway Company as existing prior to the breakage which required their renewal were of such a nature as to impair the strength of the parts so as to render their final failure liable in ordinary usage, it was the duty of that road to repair the draft timbers. If the defects were not of such a nature as to render the parts liable to failure under fair usage, the failure of the same in connection with the follower and the draft spring should be considered as forming a combination for which the owner is not responsible. In the opinion of the committee there must have been some further damage done to the draft timbers requiring their renewal, and therefore the Lake Shore & Michigan Southern Railway Company is responsible and should cancel the bill."

Mr. Cardwell: That combination denotes rough usage. That is the Master Car Builders definition; and if the car received rough usage the delivering road is responsible for all the damage to the car, and I do not see how you can render any other decision.

Pres. Sharp: The case as stated claims the defects existed on one end when he received the car. The other draft timber key was bent at different times and the defects were not simultaneous.

Mr. Cardwell: This road A had the option of protecting itself when receiving the car. This rule was incorporated in order to encourage roads to make repairs to cars instead of running them in a dangerous condition, and I think, strictly following the rules, the railroad company is responsible for all damage denoting rough usage.

Mr. La Rue (C., R. I. & P.): Don't you think the last paragraph of Decision 484 would cover it—that the road handling the car had the option of making the repairs at the proper time? The question is, did the broken draft timber and bent key weaken the car so as to break the key at the other end? If so, it all should be charged to the road handling the car.

Mr. Kroff (P., F. W. & C.): Is a damaged American draft timber key and a damaged draft timber unfair usage? and would that form a combination? Supposing in this case there would be an American continuous rod broken and key O. K. What would be the results then? I do not think the key should cut any figure in the combination. I should judge it would be the rod. One American continuous rod and one draft timber would break the combination.

Mr. Morris: I do not see the use of bringing up any further cases and befogging this question. A bent key and broken draft timber is good enough for illustration, and if I remember right there is an Arbitration Committee decision which says something to the effect that if a draft timber is broken at one end and a coupler at the other it does not make a combination.

Mr. Marsh (C., N. Y. & B.): I believe we are going to get into trouble here if we bill the owner for the bent key at the end from which the combination exists. I think the road handling the car is responsible for this combination, which occurred through its neglect to make proper repairs at the proper time.

Mr. Powell (I. C.): I am not in favor of the motion that has been made, as we are establishing a precedent here which I do not believe is perfectly proper in view of Decision 534. I think that the party receiving the car in this case is liable, for the reason that the rules specifically state a combination exists denoting rough usage. If the car is received by a road, with bent key, and the draft timber is afterwards broken while the car is in its possession, or vice versa—draft timber broken and key afterwards broken—then there is a combination denoting rough usage, even if the key is removed at the opposite end. The American continuous rod runs the entire length of the car and it seems to me to be immaterial whether the draft key is at one and the draft timber at the other end, or whether the draft timber and key were broken at the same end. I think the party making repairs is responsible for both keys and the draft timber.

Mr. Bates: In regard to what Mr. Kroff has said, that the key and the draft timber did not form a combination, I wish to state that the Arbitration Committee decided that it was. They claimed that the key was a substitute for the spindle and formed a combination when broken in connection with the draft timber. I would further state that the binding of a key at one end caused so much more slack in the other end that it no doubt caused the key to bend. As the bent key was not replaced at the proper time, I think the party handling the car is responsible for all the damage.

Mr. Powell: It seems to me that this case is reviving the old receiving record, where one road receives a car and afterwards does some additional damage to it, and then goes and gets the receiving record in order that bill may be rendered. As I understand it, Decision 534 tries to avoid that receiving record, and therefore I do not see any possible way to make bill against the owners for the additional damage.

Pres. Sharp: The motion before the house is that A is responsible for the damage at one end of the car and the owner for the damage at the other.

The motion was lost by a rising vote.

Mr. Cardwell: I would again make the motion that the party handling the car is responsible for the entire damage.

The motion was carried.

Pres. Sharp: Subject No. 2 is: "A receives from B one of C's cars, carrying B's defect card for four wrong draw lugs, which are again broken. A, not having proper material, has to apply four more wrong draw lugs. Should A issue another card?"

As it developed that the actual case had not been properly cited, the president directed the interested parties to furnish a joint statement of the case, to be discussed at some future meeting.

Pres. Sharp: Subject No. 3: "A car is returned to the owners after having sustained damage to end sill, deadwood and draft timbers, requiring their renewal. The coupler, with pocket riveted to same, is missing. All of the items are properly covered by defect card. The question is, what labor charge is proper—particularly can any charge be made for the expense incurred in assembling the parts of the coupler and putting it together."

Mr. Grieb: It does not seem to me that there is much of a question at issue here. My opinion would be that the proper charge for labor in this case is that allowed by the rules for renewal of the end sill and draft timbers with no allowance for labor for assembling the items which form part of the coupler and its attachments. The deadwood, of course, is covered by the renewal of the end sill and involves no additional labor. The replacement of the coupler is also covered by the allowance made in the rules for the draft timbers.

Mr. Kroff: I think Mr. Grieb has explained the case fully. I feel about the same as he does on that.

Mr. Cather: The question as placed before the meeting by Mr. Grieb is wholly proper. In applying two draft timbers we naturally apply new or re-apply the old coupler and attachments. The rules provide nine hours labor for that job, which means the draft timbers applied with their parts, and in order to dispose of the question I would move that this is the sense of the meeting.

The motion was carried.

Pres. Sharp: We now come to question No. 4: "In cleaning and oiling triple valves and the application of triple valve gaskets and check valve case gaskets at the same time, what is the proper charge to make? Should a charge of 10c. for applying a triple valve gasket be made in addition to the charge of 25c. for cleaning and oiling? What is the common practice?"

Mr. Cather: The question was presented merely with the object of learning what was the common practice of the roads represented here. The rules provide a specific charge for the renewal of the various parts of triple valve, cylinder, release valves and other air brake appliances. We find that many roads are rendering bills for labor in applying these various parts at one time, taking advantage of the specific labor charge for parts as if applied of itself and nothing else done. We have taken the ground that where a number of these items are applied, it is not the intent of the rules that the labor charge shall be the same as for each item, but shall conform to what is actually required, both by the rules and common sense. For instance, we take the item of an angle cock. The rules provide 5c. for applying one of those. The rules also provide a charge of 5c. for renewing or applying an angle cock handle. It can hardly be considered that it is the intent of the rules to charge 10c. for applying an angle cock and an angle cock handle. For the same reason we do not believe it is the intent of the rules when you clean and oil a triple valve and apply a triple valve gasket in connection with it that there should be an extra charge for the labor involved account gasket, and so on with other items. However, it is a matter that I find on investigation many roads seem to have very little trouble with; but we have some connections where we have a vast amount of air brake charges of that nature and I will say that in most cases when the matter has been presented to them the labor charge has been cut down to the labor charge for cleaning and oiling.

Mr. Grieb: I think Mr. Cather has presented that subject in a very full and able manner. All those who attended the last meeting of the Western Railway Club are familiar with the fact that the principle established by Section 23 of Rule 5 should be made applicable to any other case of similar nature and this accumulative labor charge prohibited when no additional labor is involved. It is the same as the practice that now exists when a center plate and a center pin are applied at the same time, or an end sill and a deadwood. Previous to the last change in the rules some people even tried to double up on the drawbar and drawbar spring put in at the same end. I think it is eminently proper that the Association this evening decide against encouraging the practice of accumulative labor charges simply because the rules provide a separate labor charge for the different items, and I would make a motion that in cases of this kind where the renewal of one part involves the application of other parts and the labor for all of these items is covered by one specific charge in the rules sufficient for all, no additional charge would be proper.

Mr. Wensley: I will say that we make no labor charge for the gasket.

Mr. Stimson (S. R. L.): We do not do this work for others and there has been but one case, to my knowledge, wherein the charges have been multiplied.

Mr. Cather: Unfortunately the people really interested in this question, so far as charges go, are not represented at all in the Association. They are mostly southern roads and we have had considerable controversy over the matter. We had a case where the charges of that nature on one road's bill (the excess charge), amounted to something like $3.50 or $4.00. It contained a very large amount of air brake work. There are only a few roads who do air brake work to that extent, but it is was an item of expense we considered best to eliminate, and I will say that the bill was considerably reduced, but I believe there is room for improvement. In fact with most of the Chicago connections we hardly have that amount of charges in a year's time for that amount of work, and just why this particular hobby should occur where it does is something I do not understand.

Pres. Sharp: We have had the same experience, although our trouble has been in the west instead of the south.

Mr. Powell: I would like to ask whether, as a matter of fact, there is any additional labor involved in such cases as have been stated. If that is a fact, then the labor charges should not be reduced.

Mr. Smith (C., B. & Q.): We have gone into the cleaning and repairing of triple valves at our Chicago shops very extensively and we are increasing the number of them cleaned each month. Last month we cleaned and repaired in our triple valve shop a total of 881 valves; of this number 92 were passenger valves, and 789 were freight valves, and there were but 8 cleaned belonging to foreign cars. I have watched this cleaning and repairing of triple valves a great deal and see no good reason for multiplied charges for putting in gaskets. The rules provide a charge of 10c. for cleaning a triple valve, and while that price is low, I think that it is quite enough. If a triple valve is cleaned properly it must be taken apart, both gaskets must be exposed and if one is to be renewed, there is a charge permitted for it, but it requires no extra labor for renewing, and I am opposed to multiplied charges for renewing gaskets in a triple that requires cleaning.

Mr. Grieb's motion was put and carried.

Pres. Sharp: Subject No. 5: "Should not the practice of omitting to make bill or to apply repair card in cases of making wrong repairs of owner's defects, be discouraged?"

Mr. Morris: There seems to be but one answer to this question, and that is a very emphatic "Yes." We all know of the trouble that is caused by failure of the man who makes wrong repairs to cars, to put repair cards on, or defect cards. It is rather a difficult matter to say why this is done. It is rather hard to accuse anyone of dishonesty, but in fact it amounts to that, inasmuch as the owner is out the cost of replacing the wrong material. The question of penalty being put on the party making wrong repairs and failing to specify them on repair or defect card, has been talked of, but it is rather a hard matter to get at and I do not know how it can be covered. If such a penalty could be enforced, however, it might have a tendency to stop the practice. The only excuse then would be that card was lost off, or perhaps eaten by the goats, as Mr. Kehm described the way it was done down south. If some such thing could be devised it would be a great help to every one and save a great deal of correspondence and joint evidence cards.

Mr. Stimson: My recollection is that in the recommendations that were presented by this Association to the Master Car Builders' Association for the present year, we incorporated a recommendation of that character. I do not remember the wording of it, but it was in substance that all parties making repairs, whether right or wrong, should be compelled to attach their repair card, and I think the Association adopted that recommendation to the Master Car Builders' Association unanimously.

Mr. Evans: I agree with Mr. Morris there is only one answer to be made. While I do not know anything about the object of bringing this subject forward, I would suppose that it was for the purpose of bringing out a discussion on the subject. To my mind it is a good deal like telling a man he has got to take numbers and initials correctly. You all know what that means, but if you have several checking on that man or several taking the same numbers or initials, in the end you are pretty sure to have them correct before the bills go in. I would like to know what means are used by the different members of this association to insure the repair cards being placed on the cars, and in case of wrong repairs, to insure that a defect card accompanies the car. There is no question but what it should be done in every case. This seems to be a particular case of the old time car repairer and old time car inspectors. The younger generation growing up do not find trouble in putting on defect or repair cards, but the old time men still cling to the idea that it is sharp to beat the other fellow.

Pres. Sharp: I do not know, Mr. Evans, what the gentlemen had in mind in submitting this question, but it is undoubtedly a good thing to have such questions come before the association and be discussed from various standpoints and to go over the country in print. It will probably have the effect of stirring these old fellows up. I would like to have the gentlemen present answer the question Mr. Evans has just asked: What do you do to insure that this work is properly done?

Mr. Wensley: In the day time I will say that our repair cards are put on the cars very thoroughly. We have a man that does nothing else. We get called out in the evening, however, to make repairs, or have several trains come in about the same time, and with the force we have it is impossible to get the cards all on then.

Mr. Morris. I believe that the remedy lies in the hands of the superintendent of motive power. If, when cases of wrong repairs which have not been protected by defect cards, come to their attention they would deal very strongly with the guilty party I believe it would have a very good effect. From the number of joint evidence cards that we get showing wrong repairs that are not covered by defect card, and the fact also that a great many of the wrong repairs are made by the same parties month after month, it strikes me that the superintendents of motive power are altogether too lenient; and I think, as I said before, that the matter can be corrected very quickly and very easily by the heads of departments taking the matter up in such a way that the parties making repairs will know it will not be countenanced. I do not think they will continue to do a thing that they are called upon to explain every little while and are given to understand that the explanation does not go more than once or twice.

Mr. Grieb: I think what Mr. Morris has said is very correct; and by following this matter up systematically a good deal can be done to correct this unfortunate practice. I would like to say in behalf of the Milwaukee Railroad that for last month we were furnished by our inspectors with something like 140 joint evidence cards for wrong repairs made by other roads, (and the majority of these came from Chicago,) and to my knowledge we had but four cases presented to us by other roads for wrong repairs made for which our inspectors did not furnish defect card. There are times, of course, when repair cards cannot be applied, as in the case of repairs made by conductors. They will apply brasses—and they do not carry any repair cards with them. They also apply air hose and knuckles. We arrange for bill by having them turn in the defective parts to the inspector at the terminal in exchange for new material, and in that way get our bill through and send the repair card to the superintendent of motive power of the road owning the car. Now this matter of losing defect cards and repair cards is always with us and it seems to me it would properly be the function of this association to undertake to find some better means of securing cards to cars. The plan of tacking them on with one little tack, or sometimes two, is not a very secure means and it occurs to me it might not be a very difficult problem to devise some little card case to be attached securely to every car, in a uniform location, in which the various cards would be placed. It would facilitate matters very much and help the inspectors by knowing just where to look for cards, and what I suggest need not be an expensive device. I would like to ask if this association would not undertake to ask its various members to get up some little scheme or device that would prove more effective than our present methods.

Mr. Kroff: I think lots of times the lines are drawn too close on wrong repairs. One man says a job is all right and the other man says it is not all right. I think we ought to use good judgment before we say the repairs are wrong. A good, practical man ought to look at the job to see whether it is good or not and say whether it is wrong. Supposing, for example, that in your planing mill, the man would turn out 200 deadwoods and, by making a trifling mistake, cut them 1/4-in. too thin; would you throw away those 200 deadwoods? There are people who say repairs are wrong when they are 1/4-in. out of the way. Now timber will shrink and you will sometimes find two or three sizes on one car. Now I wonder what will suit the fellow that is going to inspect this job? He will measure one end, and measure the other end of car; then go up to the mill and rip out a piece to suit the end of car to which it is to be applied and when car gets home it is wrong repairs, the owner claiming that standard timber to car is 1/4-inch thicker and request joint evidence card to be signed for wrong repairs. Here is where we ought to be a little more liberal and consider whether the job is so bad that it should be removed and replaced; and not be looking for all technical points and quarter inches which can be found on every job that has not been made by the car owner. I have often thought if we are going to go on as things are going on, we should take a course of law and then go back to car repairing again. But I know this would not better things any. What we want to do is to be fair, on both sides, to the party who does the work and also to the party that pays for the work done.

Mr. Wensley: I will have to take Mr. Kroff up on the deadwood. We had a case where the deadwood applied was 4½x9x2 feet 4 inches, and the joint evidence said it should have been 4¾x9x2 feet 4 inches. I think that was drawing it a little fine myself. We do not make more than three or four joint evidence cards in a year.

Mr. La Rue: On our road they have what is called Form 668, which is made out by the conductor for repairs made by him, and handed to the first car inspector where the car stops and he applies a repair card for the repairs made by the conductor. Now as to dimensions, I am a little like Mr. Kroff. Last year I was called on to give a card for a bolster that was made of three pieces of wood and two pieces of iron. Some of the different thicknesses of the wood and iron were cracked, but the difference was in the center piece; I think the difference was 3-16 inch. I thought myself at the time it was drawing the line too close. We had considerable correspondence, but finally to settle the matter we gave them a card for it. The circumstances were that the car had been derailed and the center part of the truck torn out, which left us nothing only the ends to measure. Of course there was a recourse to that—we could have sent to the owners and got the correct measurement. But we measured them, and the measurements were taken by five or six men, and we made the bolster up, but unfortunately we missed it by 3-16 inch.

Mr. Stimson: I would like to ask if these instances are not the exception rather than the rule, and is it the practice to ask for defect cards, unless the parts are removed?

Mr. Wensley: I will say for the benefit of Mr. Stimson that the article is always removed, but if you sent an inspector to see it it could never be found.

Pres. Sharp: I think perhaps Mr. Stimson has in mind a committee to consider a form of card case and a place to attach it to the car. If there are no objections I would like to reserve the appointment of this committee for the present and have the secretary notify them before the next meeting.

The meeting here adjourned.

PROGRAM FOR JULY MEETING TO BE HELD JULY 12, 1901.

No. 1. One of A's cars arrived in B's yard with two draft timbers and one body transom broken and coupler stove in on same end of car, new defects. Car remained in the yard in this condition for two weeks, when it was sent to the repair track. It was then found to have two broken draft sills, new defects. Repairs were made and bill rendered against A. A objects to bill on the ground that draft timbers were broken by stoving in the coupler, and although no charge for damage to coupler, spindle, or its substitute, or drawbar stops was made, it is practically impossible to stove in a coupler without more or less damage to these parts, and therefore a combination denoting unfair usage must have existed. B declines to correct bill, claiming car received no unfair usage. Should A pay the bill?

No. 2. Repairs are made consisting of application of one draft sill and two draft timbers at one end of car. Labor charge of 39 hours is made. Objection is made, claiming that labor charge should be 37½ hours. Which is correct?

No. 3. What is the practice relative to adjusting brakes of foreign freight cars passing through Chicago? Should any charge be made therefor, and what should be considered a proper charge?

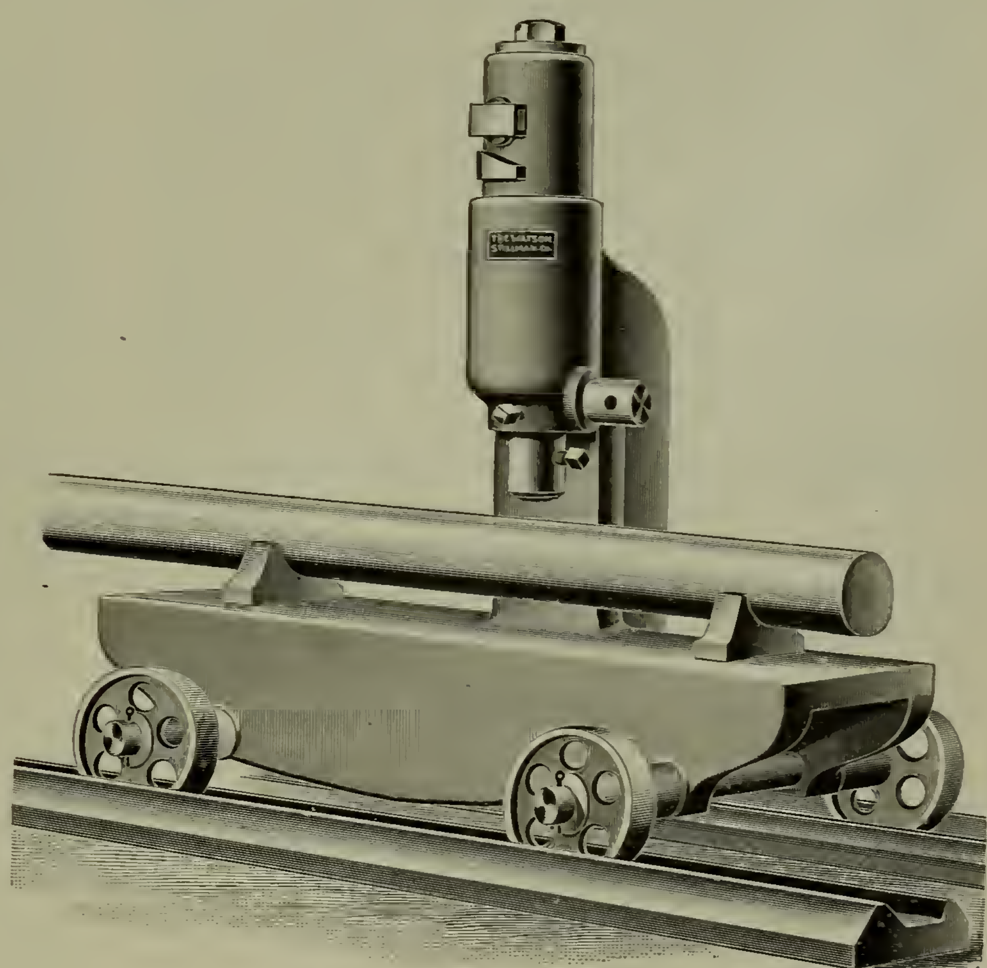
No. 4. What credit is proper for an axle removed from a 50,000-lb. capacity car, account of journal being worn below the limits specified by the M. C. B. Rules?

No. 5. When dead engines are transported in freight trains, should not damage to couplers and knuckles resulting in fair usage be charged to the owners of such engines?

No. 5. In the case of tank line cars having hand rail posts at the corners, is it necessary to apply grab handles to these posts?

Portable Shaft Straightener.

The Watson-Stillman Company, of New York, produce the useful tool shown herewith. It is an adaptation of the same company's pipe bender to the condition governing the bending of a shaft when on the center of a 24-inch lathe, or as a portable shop tool. The tool is mounted on wheels which are placed upon axles and between collars so that the gauge of the wheel can be made to suit the space between the Vs of the lathe. The working features are the same as in the Watson-Stillman Company's regular line of hydraulic punches. There is a rack movement to the ram, ready access to all working parts, bronze pump, steel pinion shaft and tool steel ram. The tool has a steel trussed girder bed, 25 inches long, 2⅛ inches from back of jaw to the center of the ram, and it will bend 3½-inch shaft easily. The total height of the tool is 33 inches, and it weighs 375 pounds.



PORTABLE SHAFT STRAIGHTENER.

*Air Pump Exhaust for Passenger Train Heating.**

THE cost of heating passenger trains in this country, with steam drawn direct from the boiler of the locomotive drawing the train, forms no small item in the expense of operating the passenger service, and anything that will reduce this expense without increasing any other must of necessity be in the line of economy.

One object of using the air pump exhaust for this purpose is a direct saving in fuel consumption on the locomotive, the other is in allowing what steam is generated in the boiler to be used in the engine cylinders, in place of there being a constant drain back in the train for heating purposes.

While many of our locomotives of the present day have large boilers and a great amount of heating surface, the cylinders are large, the trains heavy, the time fast, and in some cases the fuel furnished is not of the best, consequently trouble is encountered in getting the engine to steam well. This trouble is particularly noticeable in cold weather when trains haul hard, and when zero weather calls for quite a large amount of steam for heating the train in a satisfactory manner.

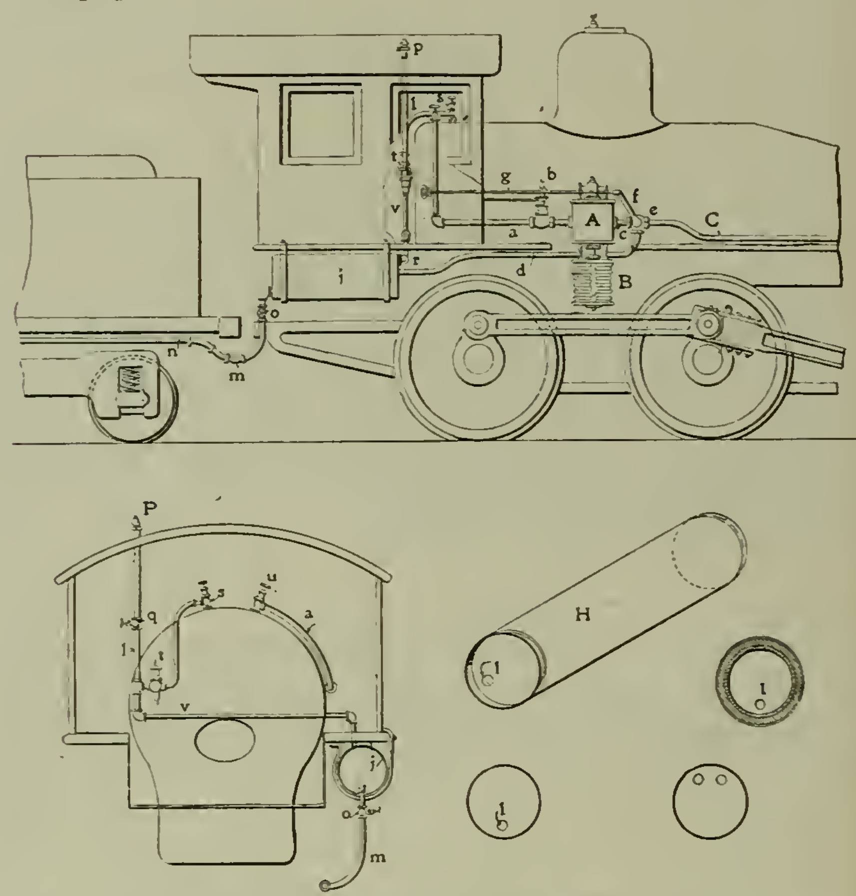
Exhaust steam for heating buildings has been for many years in use and the economy of such systems, under proper conditions, is beyond question. Many attempts have been made to use exhaust steam from the main engine cylinders of locomotives for heating purposes, but no satisfactory results have as yet been obtained.

Attempts have also been made to use the air pump exhaust for this purpose, in several instances, but the measure of success obtained was evidently not such as to warrant the adoption of the method for general use.

One of the difficulties of using exhaust steam from the air pump consists of the large amount of water which is discharged from the pump.

As is well known, the action of the pump while on the road is intermittent. As soon as the proper main reservoir pressure is reached, the governor closes the steam valve leading to the pump, or nearly so, and on the pressure being reduced from any cause, the pump is again allowed to start up, making a sufficient number of strokes to raise the main reservoir pressure to the desired point, when the pump is again stopped. This action takes place more or less frequently while the train is on the road.

While the pump is inoperative, or nearly so, much condensation takes place, both in the steam cylinder and the pipe leading to it, and on each restarting of the pump this condensation is discharged along with the steam, the first few exhausts containing much water. Now if this exhaust were to be discharged directly into the heating pipes of the train, it may readily be seen that the result would be to fill the pipes with water and the heating results would be poor; again, it would be very difficult to obtain a good circulation through the radiators of the cars, particularly with trains of any length. This difficulty seems to have been entirely overcome by the method used for the last two winters on several of the largest roads in New England, a brief description of which seems to be in line with the purposes of this paper.



AIR PUMP EXHAUST HEATING APPARATUS.

A, Air pump steam cylinder; B, Air Pump air cylinder; C, Exhaust pipe from pump; a, Steam pipe from boiler to pump; b, Pump governor; d, Exhaust pipe from pump to receiver; e, 3-way cock; ff, Handle for 3-way cock; g, Rod leading from handle of 3-way cock into cab; j, Receiver; l Pipe leading to relief valve; m, Hose pipe couplings; n, Main train steam pipe under tender; o, Globe valve in train pipe back of receiver; p, Pop valve; r, pipe connecting reducing valve to receiver; s, Globe valve boiler to reducing valve; t, reducing valve; q, Globe valve in pipe l leading to relief valve; u, Steam throttle, air pump; H, Receiver; l, Outlet to train pipe.

The device consists of a 3-way cock placed at or near the pump in the exhaust pipe, and a rod leading back into the cab and having a handle. On this handle being pushed forward, all the exhaust goes to the stack or saddle, as was the former practice. On the handle being pulled back, all exhaust steam and condensation are discharged into a trap or reservoir. This reservoir is ordinarily located under the running board of the cab and, as a rule, is about 44 inches in length and of as large a diameter as will hang up and not project beyond the cab line, and is lagged with a good non-conductor of heat and is also jacketed. The purpose of this trap or reservoir is to re-evaporate the water of condensation which comes from the pump on each restarting of the same, the operation of which is as follows:

The water discharged from the pump along with the

*From committee report made at convention of Railway Air Brake Men.

steam on the first few exhausts which, while hot, is evidently not hot enough to evaporate under the high pressure in the pump, which, working against, say, 90 pounds main reservoir and, say, 30 pounds back pressure, would make a total resistance of about 120 pounds to be overcome at the pump and would need upward of that pressure in the steam cylinder or, say, 130 pounds of steam.

Now water under a pressure of 130 pounds requires to be heated to a temperature of 355 degrees in order to evaporate and it is evident that this water is not heated up to this temperature.

On the exhaust taking place the steam and water of condensation are discharged into the trap where the pressure is suddenly dropped to 30 pounds and under this pressure water will evaporate at 274 degrees and this water flashes into steam at once, as it contains sufficient heat to evaporate at this lower pressure. Should any of the water not evaporate, it is trapped at the bottom of the receiver and held there, and each succeeding exhaust from the pump coming hotter and dryer, passing through the receiver to the train, imparts heat to what water may remain, and on the governor stopping the pump, the pressure in the receiver will fall to some extent and the result is the re-evaporation of the water which was held up at this point.

Opening out of the rear end of this reservoir a connection is made with the train line steam pipe underneath the tender. Also connected directly with this reservoir is a pipe leading up through the roof of the cab, on the upper end of which is a relief valve set at the maximum pressure required to suitably heat the train.

The direct steam pipe leading from the reducing valve and boiler is also connected to the reservoir so that, should occasion require, the former method of heating direct can be used.

The rules for operating the system are: When steam is called for from the train, the handle of the 3-way cock should be pulled back, the reducing valve set at the minimum pressure and the boiler valve opened. Should the pump exhaust raise the pressure in the heating system above what the reducing valve is set at, the surplus pressure will be vented to the atmosphere. Should the pressure fall below what the reducing valve is adjusted to, the boiler will automatically make up the deficiency until the pump starts up and raises the pressure. The result is that nothing will be drawn from the boiler while the pump maintains a pressure above what the reducing valve is set at.

From careful observation during the past two winters, it has been found that the enginemen do not open the direct steam valve at all on local trains, as the pump furnishes a sufficient quantity of steam for heating purposes, the relief valve being open a large portion of the time. With express trains the boiler is called on at times, to some extent, but merely makes up what the pump fails to furnish, where heretofore, it was obliged to furnish all the heat.

There are always present in the train pipe and its connections more or less leaks, and with the greatest care and attention it is impossible to entirely eliminate these leaks.

On many roads engnes use air for sand blowers, bell ringers and other purposes, and Pullman cars use air for elevating water. The result of these calls for air from the brake system means more work for the pump and consequently more exhaust steam for heating purposes.

Careful observation of the performance of air pumps on express trains, even where no air is used for braking purposes, shows that they work to a far greater extent than many people imagine. In order to determine this point your committee placed a counter on the air pumps of the engines drawing trains on four of the largest roads in New England; a table of the readings taken from the same being embodied in this report. (This table shows average exhausts per minute to range from 22.86 to 66.45.)

With the large air pumps now in use on locomotives exhausting steam at a very high pressure, there can be no question as to the large amount of heat which is wasted.

As to the effect of the appliance on the pump, there are many who had the impression at first that this back pressure would stop the pump and that trouble would be experienced in maintaining the proper air pressures for the air brake. Were this a fact, it would be a fatal objection, as no railroad would for a moment allow anything to impair the efficiency of the brakes, for the saving in heating might be much more than offset by losses in other directons.

Let us look at what we are requiring of the air pump. Under the previous conditions the pump had to overcome (minus the friction), ordinarily a 90-pound main reservoir pressure; to this is now added a back pressure of, say, 30 pounds, these two making a total resistance of 120 pounds to be overcome, and the boiler pressure of the locomotive to-day is ample to do this; in fact on some roads using this device for heating heavy passenger trains, we found a back pressure of 65 pounds being carried. This, added to the 90 pounds main reservoir pressure, made a total resistance of 155 pounds to be overcome. The boilers of these locomotives carry 200 pounds and the enginemen say that they never had the slightest difficulty in maintaining the proper brake pressures at all times.

To obtain some information on this point your committee made a test on the 9½-inch air pump working against 90 pounds main reservoir pressure, 60 pounds back pressure on the pump, and 185 pounds boiler pressure. The pump readily made upwards of 150 strokes per minute under these conditions.

Many prominent air-brake men in this locality who have carefully examined this device, express the opinion that it is a great benefit to the pump, in that the exhaust being cushioned prevents the pump pounding and it is a noticeable fact that the noise of the pump is reduced to the minimum.

Some might say that with this back pressure it would take more steam from the boiler to operate the pump. This your committee did not doubt, and in order to determine this point a series of careful experiments were made in the following manner:

A new 9½-inch pump was set up in the air-brake test-room of one of the New England railroads, this room containing a testing boiler on which pressures corresponding to the modern locomotive are daily carried. A counter was placed on the pump, a plentiful supply of gauges arranged to give the various pressures at these points desired, a condensing apparatus which would readily condense the exhaust from the pump, and a means for accurately weighing this water.

A large number of readings were taken under the different conditions, each consisting of 1,000 exhausts of the pump, and the averages were taken from these readings. The results of these tests are also given in this report.

The following table gives the results of three tests made with a 9½-inch air pump, and suitable apparatus for condensing the exhaust steam.

Each of the three tests was checked by taking the average of four readings, a thousand exhausts in each reading.

The first test was made with a free exhaust; the second with 30 pounds back pressure, and the third with 60 pounds back pressure.

The per cent. column was figured on the basis (in tests 1 and 2) that 1.58 gallons of water, additional, is required in order to utilize the product from which the 16.4 gallons was obtained, and which was heretofore wasted under the free exhaust. The same comparison can be made between tests Nos. 1 and 3.

Test No.	Size of Pump	Average Boiler Pressure	Highest Average Pressure in Steam Cylinder	Main Reservoir Pressure	Exhaust Free or Lbs. Back Pressure in Steam Reservoir	Strokes per Minute	Number of Exhausts	Pounds of Water from Condenser per 1,000 Strokes of Pump	Number of Gallons of Water from Condenser per 1,000 Strokes of Pump	Temperature of Water when weighed	Per Cent. of Steam Saved from Air Pump Exhaust which may be used for heating Purposes
1	9.5	195	98.5	90	Free	75	1,000	136.5	16.4	70.5	None
2	9.5	195	120.5	90	30	75	1,000	149.8	17.98	80 0	91.2
3	9.5	195	150.5	90	60	75	1,000	172.2	20.67	84.0	70.0

Note.—The pump used was a new one direct from the works.

From these figures it will be seen that we required about 16½ gallons of water to be evaporated in order to get 1,000 exhausts from the pump working against 90 pounds main reservoir pressure with an open exhaust, and that in order to carry 30 pounds back pressure at the steam receiver to utilize this steam for heating purposes, it took 1½ gallons more water per thousand strokes, and our table of the saving when using the exhaust for heating purposes is based on these figures.

In connection with the results obtained from these tests, it is proper to say that the motive power departments of the various roads using this method of heating are unanimous in the opinion that there is a marked saving in the fuel consumed and water evaporated as compared with heating trains direct from the boiler.

New Steel Passenger Car Truck.

THE Standard Car Truck Co., of Chicago, is now placing in service the perfected passenger car truck invented and patented by its president, Mr. J. C. Barber, some months ago. The design and construction of this truck embody lines that are entirely new as compared with the present style of passenger car trucks. It will be noted that the top and bottom chords are composed of rolled commercial shapes, braced, trussed and secured together to insure strong and economic construction of great capacity.

In this design the old style swing beams, link hangers, spring planks, heavy equalizing bars, trunions, pins, keys, friction plates and hundreds of other parts, that in the past required the watchful eye of the inspector day and night, have been entirely eliminated. The weak cast iron pedestal jaws, formerly employed for supporting the journal boxes, are also eliminated and replaced by a single solid section of the peculiar form shown in our engraving, one each side, which act as and form a double column to support the journal boxes, and the inner faces of which are fitted with movable shoes to receive the vertical wear between column and journal box. These columns also form an anchor at their outer ends for the truss bars and are also principal factors in supporting the top and bottom truck sides and braces, the whole forming a solid structural frame of steel and malleable.

The old form of equalizing bars, extending from one journal to the other, suporting the entire load midway, have been displayed by a truss bar, which in turn is secured at each end to the top of the journal columns, and supports the bottom chord directly under the central portion of the truck. The equalizing springs, heretofore supported midway on the equalizing bars, are now placed directly on top of the journal box, and the elliptic springs are made to perform the equalizing function, as well as carrying the load, by the introduction of a short equalizing bar composed of steel angle bars extending from one elliptic spring to the other, with the bolster resting in a rocker plate on the center thereof. the whole increasing the equalizing functions to fully double as compared with old construction. The elliptic springs are placed in a longitudinal position exactly on the center line of the journal bearings, and are therefore

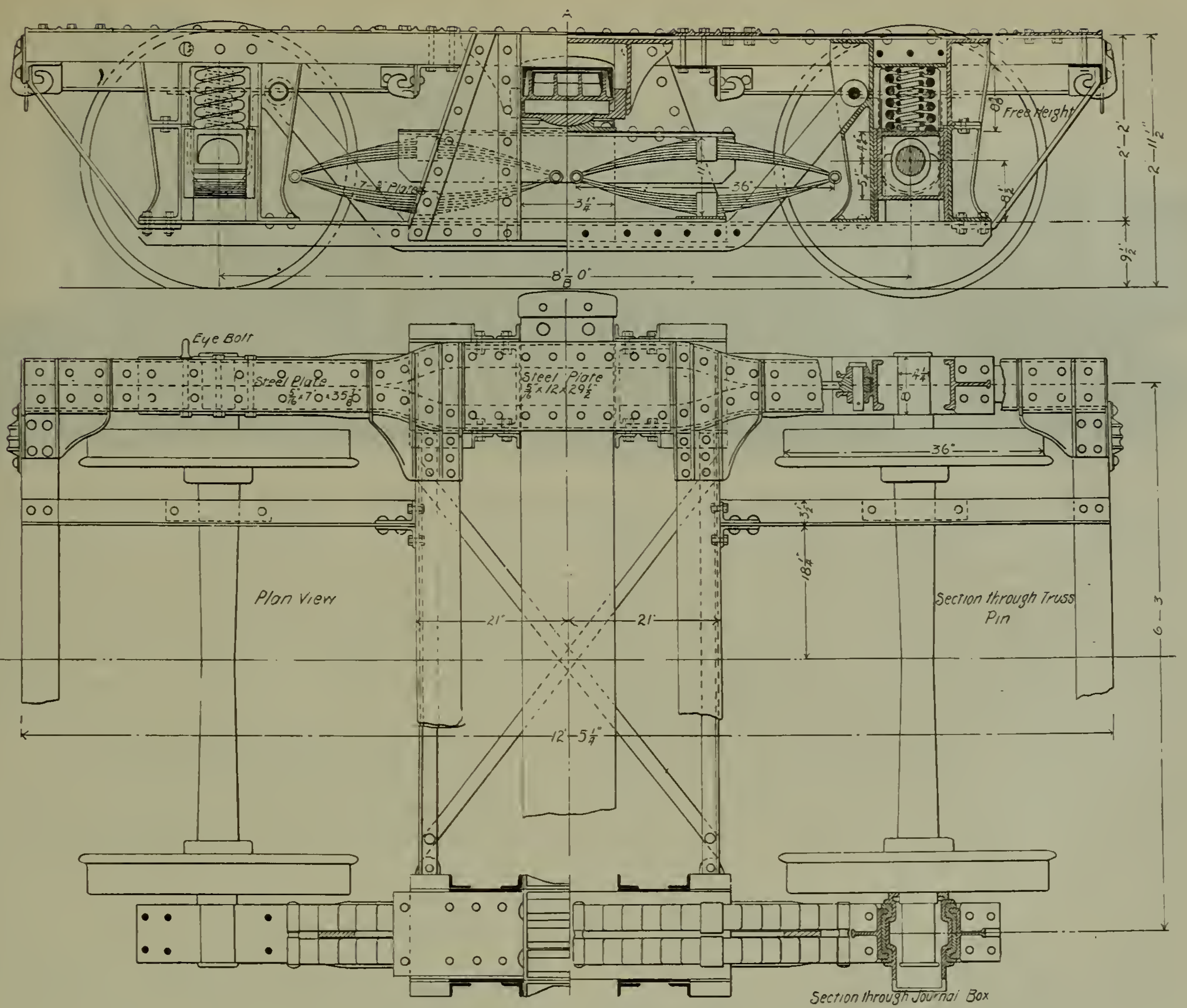


FIG. 1—NEW STEEL PASSENGER TRUCK.

convenient to inspect, and at the same time aid in insuring equal distribution of load on the journal bearings, which is necessary to prevent hot boxes.

Convenience for quickly applying and removing the springs has been provided for, as well as removing wheels. The bolster has free lateral and vertical action, the former being produced by the steel roller devices

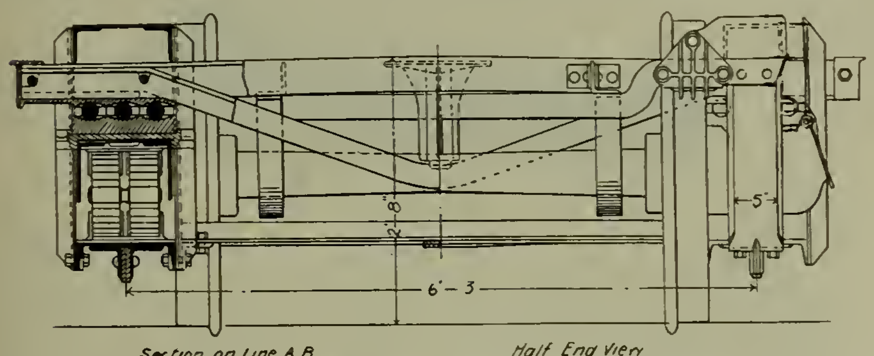


FIG 2—NEW STEEL PASSENGER TRUCK.

of the well known "Barber" type of trucks, which improve the riding qualities by the employment of means that exhaust the lateral racking forces and the blows on springs and truck frames, and lessen friction between wheel flange and rail by a large per cent.

The construction is such that it admits the application of outside or inside hung brakes, and also the quick adjustment of the bolster and side bearings to govern the height of the car.

The noticeable disappearance of all heavy forgings and a great reduction of parts in construction is a feature and improvement that should prove attractive to railway men.

A well designed side bearing is used. This is not shown on our main drawings but is given in quite full detail in figure 3.

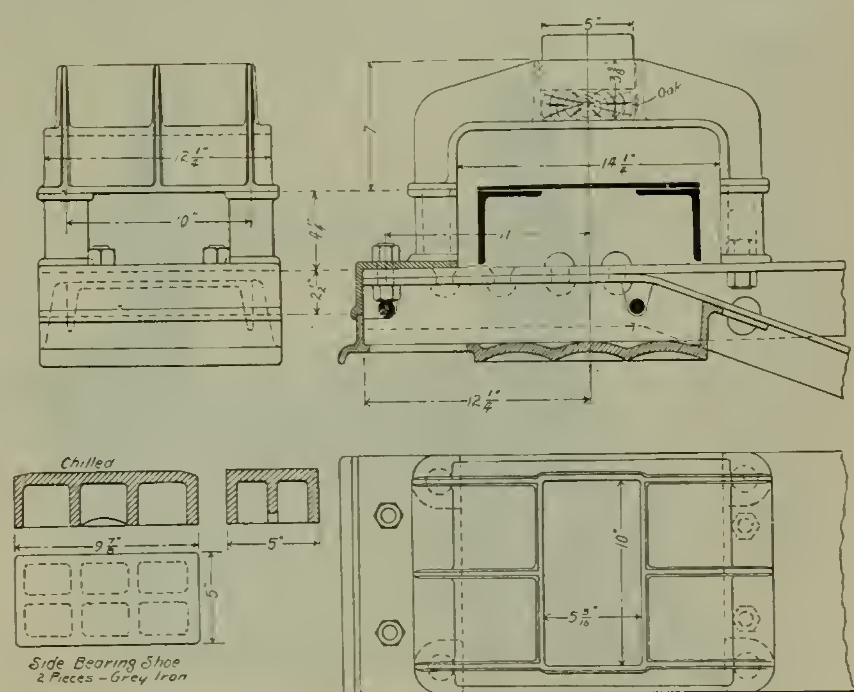


FIG. 3—SIDEBEARING FOR NEW STEEL PASSENGER TRUCK.

Schenectady Passenger Locomotive for D. L. & W. R. R.

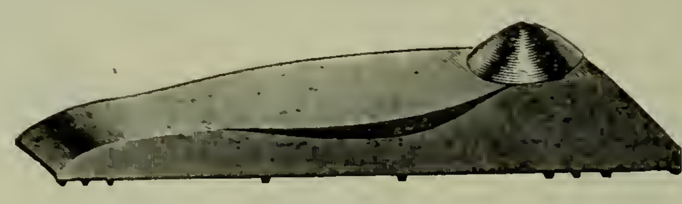
The Schenectady Locomotive Works have been recently building nine passenger locomotives for the Delaware, Lackawanna & Western, one of which we now illustrate. These engines have exceptionally wide fire boxes, affording 87.67 square feet of grate surface, and were designed by Mr. T. S. Lloyd, superintendent motive power of the Lackawanna road, to use as fuel a very inferior grade of anthracite coal, or culm. This exceptionally large grate area might appear to some to be large for even this type of engine, but was selected by Mr. Lloyd as the outgrowth of his experience and experiments in the burning of a definite kind of low grade fuel. We are informed that the results of the service tests of the engines have demonstrated that he is working along correct lines.

These engines weigh 139,000 pounds, of which 93,000 pounds are on the drivers. They have 20x26 inch cylinders; 69-inch drivers; straight, wide fire box boilers, 61 inches in diameter and designed to carry 185 pounds working pressure; fire boxes, 126 inches long and 100 inches wide; heating surface of 2,143.27 square feet, of which 1,947.87 square feet is tube and 195.40 square feet fire box surface, and grate area of 87.67 square feet. The tender has a capacity of 5,000 gallons of water and 10 tons of coal.

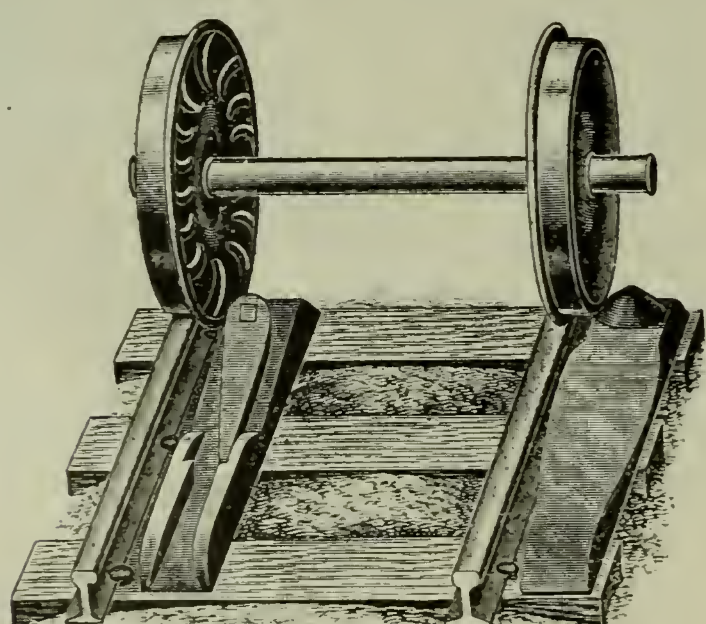
The special fittings and equipment include Jerome metallic piston rod and valve stem packing; Allen-Richardson balance valves; cast steel driver centers; Hancock inspirator; Westinghouse-American combined brakes on drivers, tenders and for train; Westinghouse 9½-inch air pump; Westinghouse air signal; Johns asbestos sectional lagging on boiler and cylinders; Gold car heating apparatus; Leach sander; Gollmar bell ringer.

The Snow Car and Locomotive Replacer.

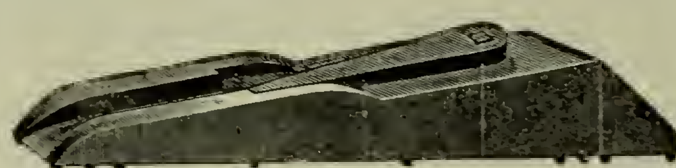
The Snow car and locomotive replacers shown in the accompanying illustrations, are the invention of a practical yardmaster of many years' experience. As will be noted, they are made up of a male and a female frog; the latter having a switch or tongue which enables it to be used either right or left. This switch or tongue is pivoted on an inch and a quarter bolt, and is also countersunk into the heavier casting, thus relieving the strain on the bolt. One of the advantages claimed for this frog is that the maximum height, instead of being in the middle, is at the end of the replacer, thus providing a very gradual grade and enabling the heaviest locomotive to pull herself up without outside assistance. This gradual incline permits the replacer to be placed under-



MALE FROG.



SNOW CAR AND LOCOMOTIVE REPLACER



FEMALE FROG.

neath the wheels at the thin end so as to clear brake hangers, sand pipes, etc.; and thus there is provided a perfect track for the wheels to run to the rails.

There is no beveled surface and no side pressure to push the frogs out of place; and they do not require to be spiked to ties or clamped to rails. The wheels in mounting bear on the tread instead of the flange, thus obviating any danger of the flanges breaking.

The replacers can be placed at any angle to the rail and can be used for mounting with leads of rails when the trucks are clear off the ties. They are made of basic steel; weigh 215 lbs. to the pair, and will bear the weight of the heavest locomotives. The female frog is placed between the rails and the tongue set to guide the wheels, which are off inside of rails, to the nearest rail. The male frog is set with the thin end close in to the tread of the wheel, allowing the flange of the wheel to project down the side of the frog.

These replacers are in extensive use on many of the leading railroads in the country and are said to be giving most excellent satisfaction. They are sold by The Handy Car Equipment Company, Old Colony Building, Chicago.

Remodeling Old Shop Tools.

[Railway Review, May 11.]

The turret lathe has not entered railway machine shops as rapidly as has been the case in industrial shops. One cause of this is on account of the constantly varying character of the work necessary to be performed on any particular machine in the ordinary railway shop. Another reason exists in the somewhat general indisposition of railway management to appreciate the benefits of improved machine tools. In this connection, however, it may be remarked that if some of the ingenuity now displayed in providing special chucks, jigs, etc., were directed to a bold remodeling of some of the worn-out, or out-of-date machine tools, some surprisingly efficient machines for certain classes of work could be produced. During a recent visit to one shop we noted several ordinary engine lathes which had been converted into turret machines, with lever operated expanding chucks or mandrels. The old spindle had been replaced with a hollow one whose hole had been made large enough to introduce a rod, by which the spring collet in the chuck is operated—the other end of this rod being connected outside somewhat similar to those of specially built turret machines. The tool carriage had been remodeled in each instance to suit some particular line of work, but with the suggestion once made to attack the construction itself of an old machine the details of its particular adaptation to some special class of work will easily be worked out. And this does not apply solely to lathes—a great many of the old and practically useless machines evident in many railway shops could, by a little thought, be worked over into a very serviceable tool in some particular. Though we do not intend, of course, to imply that such a method of procedure is as judicious as an investment in a new and modern tool.

Supply Trade Notes.

The American Locomotive Company has been organized with an authorized capital stock of $50,000,000 and initial working capital of $6,000,000. The company has bought the Cooke, Rhode Island, Brooks, Schenectady, Manchester, Pittsburgh and Richmond plants. Mr. S. R. Callaway, president of the New York Central R. R., has resigned that position to become president of the new locomotive company.

The cars of the Pressed Steel Car Company, exhibited at the Buffalo Exposition, are coated with "Protectus," which is the new material designed to prevent rust, and is not affected by sulphurous acid.

The Handy Car & Equipment Co., Old Colony building, Chicago, announces that it has taken the exclusive selling agency of the Snow car and locomotive replacers.

Mr. B. M. Gardner and Mr. Charles R. Robinson have formed the firm of Gardner & Robinson, 1522 Monadnock building, Chicago. Mr. Robinson, formerly with the sales department of Singer, Nimick & Co., has been in the iron and steel business for over 10 years. Mr. Gardner has been widely known as western representative of the Iron Trade Review. They have taken the following agencies: Seaboard Steel Casting Co. of Chester, Pa., manufacturers of open hearth castings up to 80,000 lbs. in weight; Acme Steel & Malleable Iron Works, Buffalo, N. Y., manufacturers of "Acme" and "Ductile" steel castings and malleable iron castings; Wallace Machine & Foundry Co., Lafayette, Ind., architectural iron castings; New Brighton Steel Co., New Brighton, Pa., high-grade crucible tool steel, bars and sheets, and tool steel forgings. They also handle "Motor Metal," a high-grade anti-friction metal.

There is now in the Baldwin Locomotive Works, just about completed, a locomotive for the Manitou & Pike's Peak Railway. This locomotive has Vauclain compound cylinders and plate frames and is practically a duplicate of those locomotives which Mr. Vauclain designed for this railroad several years ago.

The rebuilding of the central electric power station at the Schenectady Locomotive Works is now well advanced, and the engineering department has for some time been engaged in designing two very large buildings for a new blacksmith shop and a new hammer shop. The buildings are now being put up, and with their equipment of modern tools will add materially to the facilities of the works.

The Dickson Manufacturing Company of Scranton, Pa., have sold their general machinery and the shops in connection therewith to a consolidation of interests, which also embraces E. P. Allis & Co., Fraser & Chalmers, Gates Iron Works, etc. The Dickson Locomotive Works, formerly incorporated with the manufacturing company, remains under the old management, and considerable extensions and improvements are under way. A new forge shop is now being pushed to completion, new modern tools have been added to the shops throughout, and a new foundry and erecting shop, the latter with overhead crane capable of handling the heaviest locomotives, are also under construction. These improvements, which will be completed in September next, will give the establishment a capacity of 200 locomotives per year, and that will make the equipment complete and up to date in every respect.

The Buckeye Malleable Iron & Coupler Company, Columbus, O., have lately increased their capital stock from $500,000 to $1,000,000. Mr. S. P. Bush, superintendent of motive power of the Chicago, Milwaukee & St. Paul, will become general manager of the former company about the first of June.

Mr. J. H. Long, representing the Shickle, Harrison & Howard Iron Company, of St. Louis, has removed his office from 517 to 521 Rookery building, Chicago.

The official staff of the American Steel Foundry Co. has been changed, owing to the election of Mr. Rolla Wells to the mayoralty of St. Louis. Mr. Wells becomes chairman of the board of directors, and Mr. E. F. Goltra assumes the active duties and the position of president. Mr. O. S. Pulliam is secretary, and Mr. L. J. Hayward is treasurer. The company have only recently bought the Sligo furnace of the Ozark region in Dent county, Missouri, and will hereafter make their own charcoal pig-iron.

The Rogers Locomotive Works have been incorporated under the laws of New Jersey to take over and operate the plant of the old Rogers Locomotive Co. at Paterson, N. J. The nominal capital stock is $125,000, but when the organization of the new company is perfected this well be increased to $1,600,000, of which one-half will be preferred and one-half common stock. The incorporators are: Charles A. Stover, Frank A. Branda and Thomas R. Evans. Among those identified with the new Rogers Locomotive Works are: E. H. Norton & Co., bankers, and Elliott C. Smith, 33 Wall street, New York; Frank P. Holran, 27 William street, New York; Robert C. Pruyn, president National Commercial Bank, Albany, N. Y.; Stephen Peabody, 36 Wall street, New York, and J. B. M. Grosvenor, 66 Beaver street, New York. Mr. Grosvenor was for many years interested with Mr. Rogers, principal owner of the Rogers Locomotive Co. The company has an order for 30 large engines for the Great Northern, and bids have been submitted on engines for other roads here and in Europe. The works will be started at once.

The Richmond Locomotive Works have just received an order from the Richmond, Fredericksburg & Potomac R. R. for four ten-wheel locomotives. The main dimensions of these engines are as follows: Cylinders, 19 inches by 26 inches; driving wheels, 68 inches diameter; total wheel base, 24 feet 4 inches; driving wheel base, 13 feet 6 inches; weight in working order, total about 140,000 pounds; weight on drivers, 102,000 pounds; 62-inch straight top boiler; working pressure, 180 pounds; tubes, 267 in number, 2 inches by 14 feet 5 inches; firebox, 96⅜ inches by 42 inches; capacity of tank, 4,500 gallons.

Mr. G. E. Macklin has recently been made general manager of the Pressed Steel Car Company, Pittsburg, Pa. Mr. Macklin was formerly assistant general sales agent, with headquarters in New York City.

Mr. E. E. Forgeus, formerly with the Chicago Lumber Company, Chicago, Ill., was appointed purchasing agent of the Pressed Steel Car Company, Pittsburg, Pa., May 1st.

The Richmond Locomotive Works shipped twelve 16 in. x 24 in. ten-wheeled passenger locomotives to the Finland State Railways, Helsinfors, Finland, on Wilson Line steamer "Consuelo," which sailed May 3rd. These locomotives are duplicates of ten engines built by the Richmond Works for the Finland State Railways during last year, and form the third order received from the same source.

At the annual meeting of the Joseph Dixon Crucible Company the old board of directors was re-elected, as follows: Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Edward L. Young and Joseph T. Bedle. This board re-elected officers as folows: President, E. F. C. Young; vice-president and treasurer, John A. Walker; secretary, Geo. E. Long. Judge Joseph E. Bedle was also re-elected as counsel.

Mr. Harry A. Norton has sailed from Boston for an extensive trip abroad, where he will visit the various agencies of the Norton ball bearing lifting jacks in France, Germany, Italy, Russia and Sweden.

Mr. Jas. H. Manning, formerly master mechanic of the Union Pacific R. R. Co., at Cheyenne, Wyo., has been appointed western manager of the Standard Pneumatic Tool Co., with offices at San Francisco, Cal., where a complete line of that company's "Little Giant" pneumatic tools and appliances will be carried in stock, in order to supply the rapidly increasing demand for these machines upon the Pacific coast expeditiously.

Mr. T. J. Milner, formerly connected with the Pressed Steel Car Company, and Mr. G. N. Caleb, formerly contracting agent of the Illinois Car and Equipment Company, have entered into partnership under the firm name of Milner & Caleb. They will deal in general railway supplies and are also to be the general sales agents for the Bettendorf I beam body and truck bolsters, manufactured by the Bettendorf Axle Company, Davenport, Ia. The two members of the firm are very widely and favorably known in railway and railway supply circles, and every success undoubtedly awaits them in their new undertaking.

The Provision Dealers' Dispatch recently moved their car shops at Chicago from 43rd and Wood streets, to 42nd and Wood streets, and have re-arranged their tracks so they now run east and west instead of north and south as formerly. They are now making extensive improvements to their plant, among others being a 60 x 80 addition to their machine shop, the installation of several new machines and the erection of a 20 x 60 storeroom. We understand the P. D. D. people contemplate building several hundred new cars to meet the demands of their increasing business.

"The Overland Limited," the great California train connecting Chicago and San Francisco, running over the Chicago & Northwestern, the Union Pacific and the Southern Pacific roads, is an undeniably fine train. It is worthy of the beautiful brochure which describes the train, and which was gotten out by Mr. E. L. Lomax, general passenger and ticket agent of the Union Pacific. This booklet presents decidedly novel features of design and execution. Its leaves are in solid olive green and the text is printed in gold. Each page has white vignettes in which are printed beautiful half tones, in colors, of views of train interiors, depots, etc. An exquisite view of Golden Gate Park, at San Francisco, is given in this novel way and is perhaps the gem of the book.

The Watson-Stillman Co., 204-210 East 43d street, New York, has issued a new jack catalogue, being No. 61 in that company's list of sectional catalogues. It is a new edition of the catalogue previously known as No. 54. In this catalogue are shown several new sizes of jacks, and also several new types of jacks. It is a well arranged catalogue and contains a very complete index of the illustrated sheets which this company issues.

Established 1878.

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

Office of Publication, Room 810 Security Building, Corner Madison Street and Fifth Avenue.
TELEPHONE MAIN 3163.

A Monthly Railway Journal

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Communications on any topic suitable to our columns are solicited.

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Vol. XXV. CHICAGO, JULY, 1901. No. 7.

Snap Shots of the Convention.

WE reproduce on the following pages photographs of some of the members of the Master Mechanics' and Master Car Builders' Associations, their friends, and a few of the railway supply men and their exhibits. It would have afforded us pleasure to secure pictures of many more than are shown in this issue, but the natural desire on the part of everyone to find a cool and shady place made it impossible to obtain views of more than just a few who were caught at an opportune moment in the sunshine. We were especially disappointed in not being able to obtain a snap shot of either Mr. Morris or Mr. Chamberlain, presidents of the two associations for the past year, and very many others whom we trust will get within range of our kodak at next year's convention.

We are glad, however, to be able to reproduce so very many photographs, which, while they are not always as clear and distinct as we would wish, for the work is that of an amateur, still are possibly more natural and characteristic than the regular cabinet photograph. In very few of them will be found the pose and expression generally found in the pictures of the professional artist.

The publisher of the RAILWAY MASTER MECHANIC takes pleasure in offering this as his souvenir of the Saratoga conventions.

The illustrations follow as nearly as possible in the order of the time in which they were taken.

* * *

AMONG THE FIRST was a snap shot taken of Mr. A. M. Waitt, superintendent of motive power of the New York Central, who is the president of the Railway Master Me-

chanics' Association for the coming year. Walking at his right is Mr. Angus Sinclair, publisher of Locomotive Engineering, and for a number of years treasurer of the association.

* * *

MR. D. W. BROWN, assistant superintendent of motive power of the Lackawanna, is just leaving the convention hall at the close of the last session of the Master Me-

chanics' Association. Mr. D. Hawksworth, superintendent of motive power of the Burlington & Missouri R. R. in Nebraska, is, we think, the first figure in the above illustration; of this we are not positive, as the publisher of the RAILWAY MASTER MECHANIC has never had the pleasure of making Mr. Hawksworth's acquaintance.

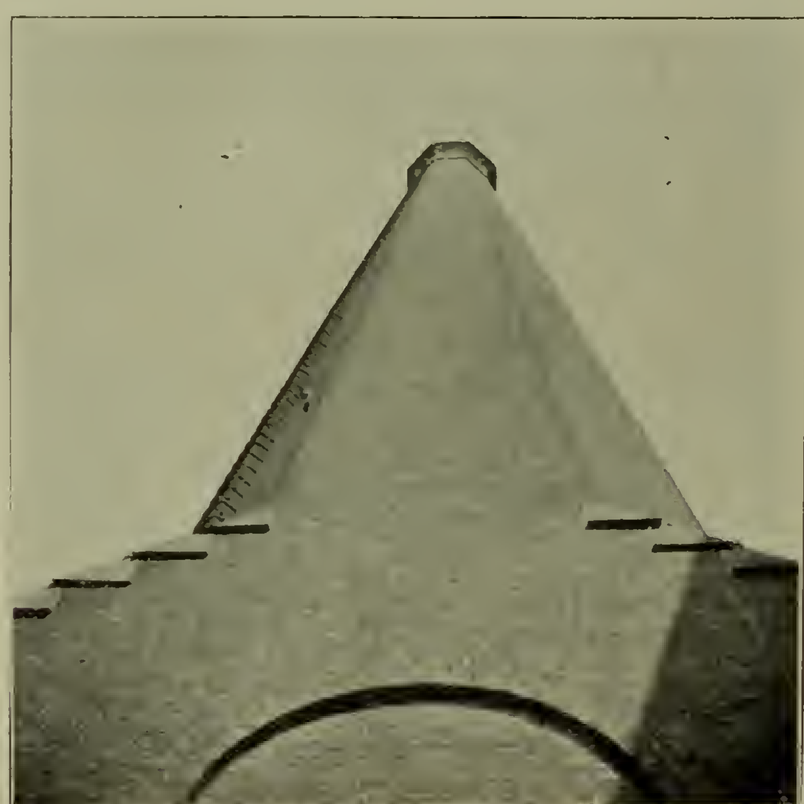
Mr. P. H. Peck, master mechanic of the Chicago & Western Indiana R. R. and the Belt Railway Company, of Chicago, was caught only after two unsuccessful attempts, and in the above illustration is only barely in the photograph.

Colonel Dickinson's car, equipped with the axle lighting system of the Consolidated Railway Electric Lighting and Equipment Company, contributed in no small way to the pleasure of the trip to those who were fortunate enough to find their way into it. The car is one belonging to the Santa Fe railroad, and is used during the winter on their famous 2¾ days train to California, and was taken to the convention as a part of the exhibit of the axle lighting company. The electric fans, driven by power derived from the axle, kept the car cool and well ventilated. An opportunity was given many railway men to examine the axle lighting system in actual service as applied to this car. The courteous attentions to the comfort of the guests on board the car was greatly appreciated by all who had the opportunity of enjoying Colonel Dickinson's hospitality.

The Trip to Schenectady, where on Friday afternoon the Schenectady Locomotive Works kept open house for the members of the Master Mechanics' Association and their friends, was enjoyed by many. A very appetizing lunch was served in the drawing-room of the company immediately upon the arrival of the train from Saratoga, and the works were visited by a large number.

A Small Portion of the crowd is shown making its way into the office where the lunch was served.

The Schenectady Locomotive Works have under construction a blacksmith shop 400x125 feet and forge 365x85 feet. These are being fitted with the latest appliances, ventilating systems, etc. There was not sufficient time to visit these shops, but they could be seen on the right in crossing the Mohawk River bridge and at the right in approaching the locomotive works. The new power station, just completed, has 1800 horse power of boilers installed and space for 1800 additional. Coal and ash conveying appliances, and automatic stokers are used.



The Chimney is ten feet inside diameter and 200 feet high, and while the view herewith produced is somewhat unusual, it had to be in order to get a 200-foot chimney into a 3½x3½ kodak film. A compound Corliss engine of 500 horse power direct connected to electric generator is installed to supply power to sixteen electric traveling cranes, besides various motors driving shafting and tools. Lighting generators, air compressors, etc., are being installed.

A Short Delay at the beginning of the Schenectady trip secured an unusually good picture of Mr. G. J. McMaster, of the Rutland railroad, and Captain E. A. Ford, of the Chicago Varnish Company. After the many years the two have attended the conventions, Captain Ford thinks the photograph should be entitled "two old regulars."

Mr. G. W. West, superintendent of motive power of the New York, Ontario and Western, is so intent upon what he is reading that he passed the kodak by unnoticed and the first that he will know of this picture will be when he receives the July issue of his Railway Master Mechanic.

The Figure in the Foreground is that of Mr. J. Taylor, master mechanic of the Chicago, Milwaukee & St. Paul Railway, and in the background Mr. E. M. Herr, general manager of the Westinghouse Air Brake Company, and Mr. C. N. Quereau, assistant superintendent of machinery of the Denver & Rio Grande.

The court of the United States Hotel presents a striking contrast to the noise and hubbub of the hotel where were located the convention headquarters. Year after year, as the conventions find their way to Saratoga, the ideal spot for such a gathering, a greater number of the members of the association and their guests go to the United States Hotel, and having once stopped there they always return. Close enough to the headquarters for convenience, yet far enough away to enjoy a few hours' quiet and a night's rest undisturbed by the more festive and convivial "conventionites," the "States" is a very attractive abiding place for the week of the convention.

Mr. Pulaski Leeds, of the Louisville & Nashville, is known by every one who attends the convention, as is also Mr. J. E. Keegan, master mechanic of the Grand Rapids and Indiana, a railroad which leads to one of the most delightful summer resorts in the world; and during the warm days at the close of the convention Mackinaw and Northern Michigan seemed very attractive to Mr. Keegan.

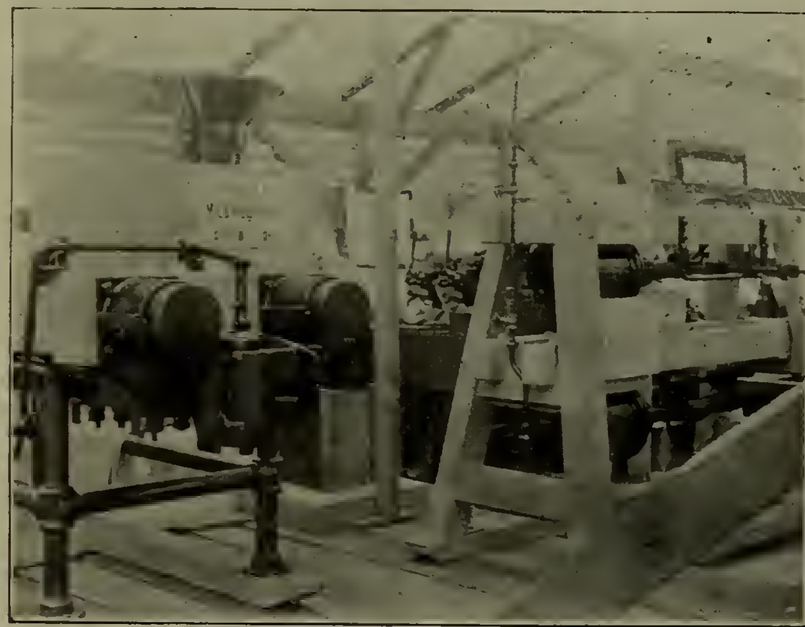
air cool and comfortable, the railway man could take pleasure in examining into the merits of the Sessions Standard friction draft gear.

The Handy Car Equipment Company, of Chicago, represented by Mr. Charles L. Sullivan, exhibited a full size Snow locomotive and car replacer, and on the tracks of the D. & H. was a Handy car equipped as follows: Kindl Car Truck, Westinghouse Air Brakes, Winslow Roof of the Chicago-Cleveland Car Roofing Co., Monarch Draft Rigging of the Buhl Ry. Supply Co., Detroit, A. French Spring Co. Springs, Bettendorf Body Bolsters, Monarch Solid Brake Beams, McCord Journal Boxes, National Adjustable Journal Bearings and Wedges of the National Ry. Specialty Co., Chicago, Corning Brake Shoes, Security Door Fixtures of the Nat'l Ry. Spe. Co., Star Grain Door of the McGuire Mfg. Co., Devoe & Raynold's Standard Paint, McCord Draft Spring Dampener.

From an artistic point of view the accompanying photograph of Mr. Post and his family was the best picture taken for the Railway Master Mechanic convention "snap shots." Every one who visited the exhibit of the Standard Coupler Company and enjoyed the hospitality of Mr. Post and Mr. Sessions, who kept "open house" where the "latch string" was always out to friend or stranger, went away only to come again the second time. The ladies voted it the best exhibit on the grounds, and here with a fountain playing close at hand, making the

ONE VERY NATURAL PICTURE is that of Mr. J. F. Dunn, superintendent of motive power of the Oregon Short Line, as he stops to shake hands while on his way to the convention hall.

Quite extensive additions are being made at the bolster shops of the Bettendorf Axle Company at Davenport, Iowa. The floor space is to be increased and quite a number of new machines installed. The bolster department has been running day and night since last fall.



THE EXHIBIT OF THE GOULD CAR COUPLER COMPANY, of New York City, showed their coupler for 100,000-lb. cars and locomotive tender for heavy equipment; also passenger and freight slack adjusters, improved M. C. B. journal boxes and their malleable draft rigging for freight equipment with spring buffer blocks. Their exhibit was not in a conspicuous place, but was well displayed and makes one of the best pictures taken of any of our advertisers' exhibits. Mr. F. P. Huntley, secretary, Dr. C. W. Gould, Geo. H. Widner and W. F. Richard represented the Gould Company.

THE BETTENDORF I BEAM BOLSTER represented by Messrs. Bettendorf, Caleb, Milner and Macpherson, was one of the largest exhibits on the convention grounds. Full size body and truck bolsters for 30 and 40 ton cars, and the Bettendorf steel underframing and center sill, were shown at the exhibit in the hotel court, and on the D. & H. tracks was a Bettendorf structural steel car.

Mr. A. L. Humphrey, superintendent of the motive power and car department of the Colorado & Southern Railway, stands at the left in the above photograph, and with him several supply men, among whom are Mr. Lamon, of McCord & Company, and Mr. Charles Riddell, of the Standard Steel Works.

The Standard Pneumatic Tool Company, of Chicago, Ill., exhibited their full line of *"Little Giant"* pneumatic tools, long stroke riveting hammer, chipping, calking, beading hammer, piston air drills, reversible flue rolling, reaming and tapping machines, reversible boring machines, hand yoke riveter, staybolt nipper, pneumatic blow-off cock, bell ringers, air hoists, steam pipe grinders, right angle attachment, pneumatic holder-on, pneumatic wood chiseling tool. Mr. J. D. Hurley represented the company, and the souvenir which he gave out was very neat indeed and much sought after.

The Simplex Railway Appliance Company, of Chicago, exhibited their bolsters for 60,000 and 80,000-lb. capacity cars; also their Susemihl frictionless roller side bearing. A very fine illustrated article in the Daily Railway Age descriptive of their plant added to the interest of their exhibit.

* * *

Mr. D. B. Carse, of Carse Brothers' Company, Chicago, represented the S. A. Woods Machine Company, whose exhibit consisted of photographs of their machinery and of samples of hollow chisels and bits, high-speed boring bits and expansion boring bar. Mr. Carse will probably be remembered for his very acceptable work on the entertainment committee, as well as on account of his exhibit. Grouped with Mr. Carse are Mr. Postlethwaite and Mr. Robt. A. Bole, and just distinguishable in the background is Mr. Crawford, of the Pennsylvania.

The Chicago Pneumatic Tool Company had its usual large exhibit, including drills, flue cutters and welders, riveting hammers, chipping and calking ham-

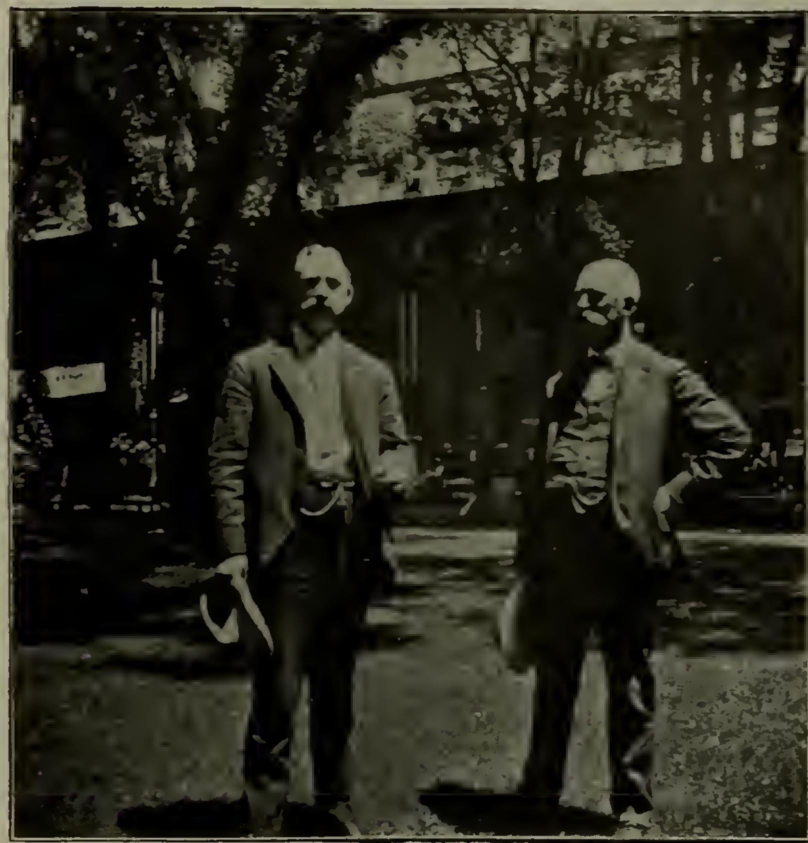
mer, yoke riveters, etc.; also their electric headlight. Their exhibit had many visitors to watch their tools in operation. Their souvenir, a gold pencil, was seen in the hands of every one before the week was half over.

* * *

The McCord & Company exhibit, as seen in the above photograph, is not a decided success, and we must lay the fault to the sign at the rear of the booth which gave the camera a bad spell. After getting Mr. Geo. H. Bryant into the picture, we had every expectation of obtaining

the very best results. McCord's gold watches, however, were a timely advertisement. The lost keys suggest the "lost chord." There ought to be a good pun worked out of this on McCord in some way if our machine was in good working order.

Mr. James H. Sewall and Mr. George H. Musgrave represented the Star Brass Manufacturing Company, of Boston, Mass., manufacturers of air and steam and re-



cording gages, chime whistles, pop valves, of which there was a full exhibit most artistically displayed.

* * *

Mr. Demarest, of the Pennsylvania railroad, and Mr. Postlethwaite, of the Pressed Steel Car Company,

were stopped on their way through the exhibits and their pictures added to our collection.

The Westinghouse Air Brake Company is always well represented at the conventions. Mr. Isbester, who is with this company, thought that a camera that is carried

in the coat pocket would hardly be large enough to take him in, but it seems from the above illustration that he is easily "taken in" by a kodak.

* * *

One of the most "catchy" advertisements which has recently appeared in the railway press is the advertisement shown in the accompanying photograph, which appeared in the two weekly papers, the Railway Review

and the Railroad Gazette, in their special issues for M. C. B. convention, from which we make the above reproduction. On one of the preceding pages will be found some pictures of the standard M. C. B. bolster men.

The accompanying photograph shows the usual very artistic and attractive exhibit of the Pintsch gas light of the Safety Car Heating and Lighting Company. As this was in the hotel proper, it was impossible to get a "snap shot" of it, but through the cour-

tesy of The Railway Age we show the above half tone which is reproduced from a photograph taken by their Mr. Dinsmore.

* * *

On a quiet side of the porch, away from the exhibits and the supply man, our camera found two well-

known officials of the New York Central, Mr. A. M. Waitt and Mr. F. W. Brazier, enjoying the pleasant weather and comfortable chairs that line the broad porches of the Grand Union.

On Monday morning, as the master car builders marched into the convention hall, the brilliant sunlight enabled us to get a number of pictures—they could hardly be called moving pictures, but rather pictures on the move. Following the band came, as shown in the

above photograph, Mr. John Kirby, treasurer, and Mr. J. J. Hennessey, vice-president, and if Mr. Martin had been back a little Mr. J. J. Chamberlain, the president of the association, could be seen.

* * *

Among a number in the accompanying picture may be recognized Mr. E. S. Marshall, of the American Steel

Foundry Company, and Mr. F. W. Brazier, of the New York Central & Hudson River Railway.

For the enjoyable and social side of the convention every one felt under great obligations to Mr. C. W. Mar-

tin, of Jenkins Bros., of New York city, chairman of the entertainment committee. Mr. Martin's picture was taken just at the convention hall door, where he was waiting to see every one in. The ladies of the convention who received the beautiful hat brushes will certainly not forget Mr. Martin.

* * *

The picture of Mr. William Garstang, superintendent of motive power of the Cleveland, Cincinnati,

Chicago & St. Louis, was taken just before the procession turned, and but for the jarring of the camera, would have been perfectly clear.

Mr. John Mackenzie, superintendent of motive power of the Nickel Plate, with Mrs. Mackenzie on his left, was caught just as they entered the convention hall.

* * *

The procession, as it winds its way in, is at too great a distance for any one to be recognized. President Chamberlain's reference to the supply men in the president's annual address on the morning that the above pic-

tures were taken is very characteristic of the master car builder of the Boston & Maine: "To our friends in the railway supply business, who are always with us, whom we cannot shake if we would, and would not if we could, I bid a hearty welcome, and hope the vacation from business cares during their stay with us will prove to be a personal benefit to them."

Mr. W. H. Miner, of Chicago, in the foreground, with Mr. Medway and others in the background, and Mr. F. H. Clark, of the Burlington, at the left of the picture is a snap shot taken just about in the center of the procession and just as it is turned to march into the entrance of the convention hall.

* * *

On account of the contrasting lights and shadows, which will be noticed in so many of the pictures taken in

the court of the Grand Union, Mr. Gardner's face is hardly distinguishable. The sign to Mr. Gardner's right, which is barely legible, refers to the exhibit on the grounds of the Consolidated Axle Light Company, which was in addition to their car on the D. & H. tracks.

An Interesting and at times very brilliant exhibit was that of the Ferguson locomotive fire kindler shown by Mr. W. M. Simpson, of Chicago. Mr. Simpson also

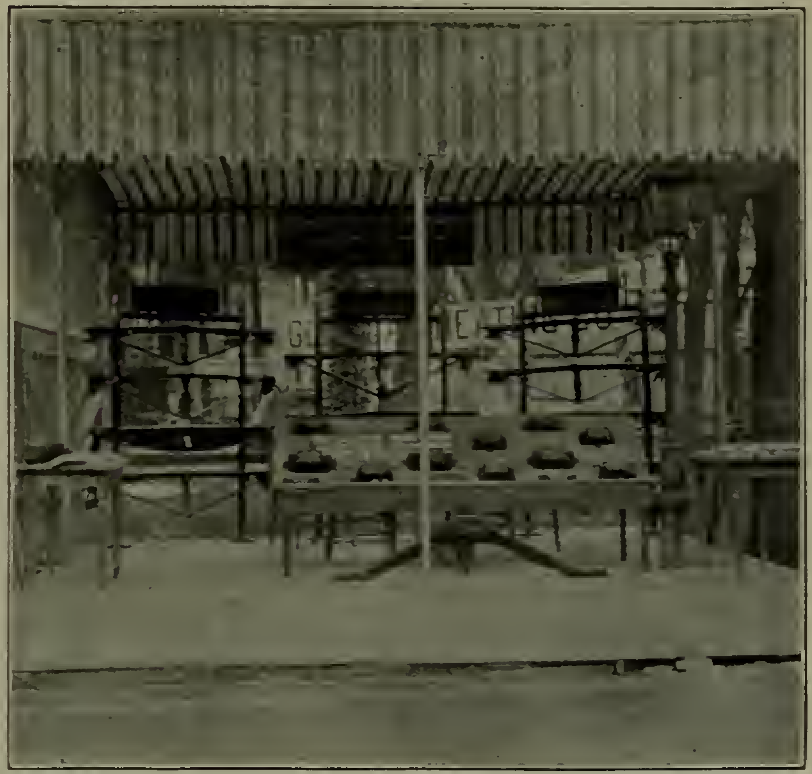
exhibited his hydro-carbon furnace for flue welding, flue annealing, heating bolts and rivets and annealing boiler and flue sheets and for case hardening.

* * *

Mr. Geo. H. Sargent was one of the very active members of the excellent entertainment committee who arranged for the most enjoyable, if not the most impor-

tant part of the convention. With him in the picture are Mr. Crawford, of the Pennsylvania, Mr. Scott, and Mr. J. V. Davidson, of the National Malleable Castings Company, manufacturers of the Tower coupler.

The Chicago Railway Equipment Company exhibited the National Hollow, Kewanee, Diamond and Cen-



tral brake beams, automatic frictionless side bearings and a specially adapted brake beam for high speed brake service. Mr. A. J. Farley represented the company.

* * *

On the table in the center is the exhibit of the Standard Car Truck Company, consisting of models of

their Barber trucks for steam and electric cars, and for freight or passenger service. To the right is a portion of the very artistic exhibit of the Star Brass Manufacturing Company.

The Keasby and Mattison Company was well represented by their display of magnesia locomotive lagging

and asbestos materials, and also by their representatives, Messrs. Wallace, Gilmore and Harwood. With them in the above picture is Mr. S. C. Smith, of New York city.

* * *

Mr. L. B. Thornburgh, of the Shelby Steel Tube Company, and Mr. R. C. Hallett, of Pittsburg, and Mr. Geo. H. Hannah were caught in the sunshine, but that was previous to the warm weather toward the close of the convention when everybody sought the shade, and it was almost impossible to find anyone where there was sunlight enough to secure any pictures.

The Rand Drill Company, of New York city, represented by W. H. Traver and John H. Castle, exhibited

their imperial types Nos. 10 and 11 Rand Air Compressors and the compressed air for the operation of the tools of the Standard Pneumatic Tool Company was furnished by them.

* * *

The above photograph hardly shows off to the best advantage the 80,000-pound capacity steel car of the Sterlingworth Railway Supply Company of Easton, Pa. But the picture is taken rather as a souvenir of the convention than with the idea of getting a photograph from which it might be possible to make working drawings.

Mr. E. D. Bronner and Mr. W. V. Kelly were taken as they were strolling along the sidewalk in front of the Grand Union. This is another one of our "on the move" pictures and would have been all that we could wish for but for the shadow of the hats on their faces.

Mr. Butler and Mr. Caleb are both bolster men, but not the same bolster. The above picture which we caught as they were shaking hands in front of the Grand Union would indicate that they are on speaking terms, although they insist on being referred to as "the rivals."

* * *

Mr. J. J. Hennessey is the president of the master car builders' associatión for the coming year and Mr. J. W. Taylor, who is seated on the porch with him is, we trust, the secretary for many coming years. The sign "Multi-Millionaires," is not intended to refer to the gentlemen in the picture and the editor is entirely innocent of any sarcastic intent.

Mr. E. S. Marshall, of St. Louis:—Really it was not necessary to introduce the representative of the American Steel Foundry Co., of St. Louis, Mo. Everyone knows him and knows him favorably. We do not know whether the cane carried by Mr. Marshall is a "Shelby" or a "Jenkins," but Mr. Thornburg and Mr. Martin are both entirely welcome to this free advertising.

Mr. F. A. Casey, vice-president of the Ashton Valve Co., of Boston, is another useless introduction. Railroad men have known Mr. Casey for years and the supply men who attended the convention were supposed to make the acquaintance of the treasurer. We are fortunate in being able to illustrate with Mr. Casey his "badge of office," the tin box which he carries in his left hand.

* * *

Mr. W. C. Armond, who has been the secretary of the Pressed Steel Car Company from the first and was identified with the Schoen Company long before, is now president of The Protectus Company, which is introducing a preservative paint especially adapted to metal structures of all kinds. His son, Mr. Frank DeArmond, has also become identified with the company. Mr. J. C. Holliday, who has recently taken charge of their Western business, was for many years in the spring business, and has an extensive acquaintance with railway men.

Mr. R. C. Blackall, known, honored and admired by all who attend the conventions, is seen in the center of a group of friends, Mr. Drake and Mr. Bates among the number.

* * *

In the second picture we have a photograph of Mr. Blackall, taken without his knowledge, and in a most characteristic and natural position. Very many of those who attended the recent convention probably noted that one of Mr. Blackall's favorite places was in this corner of the front porch near the posts. His picture is placed "last but not least" and that we are able to add Mr. Blackall's likeness to our souvenir collection is to us a great pleasure.

Established 1878

RAILWAY MASTER MECHANIC

BRUCE V. CRANDALL, Publisher.

Vol. XXV. CHICAGO, JULY, 1901. No. 7

A BRAKE shoe manufacturer who sells to a private line finds that he must make his brake-shoes "good and hard." What the car man wants is durability; and he has little regard for the friction qualities of the shoe. The result is that there are enormous quantities of brake-shoes running which, as Mr. Bush says, "stay on the beam a long time but do very little braking." It is to be feared that purchasers have been governed too much by the life of the shoe, and have not cared enough for its efficiency in stopping trains. The object of the M. C. B. tests has been to arrive at a specification which would look both ways. The manufacturers now know what the M. C. B. Association wants and can doubtless approximate it, if the buyers really want them to do so. But like other manufacturers they will make what their customers want. The committee has no doubt that the manufacturers can furnish friction and wear in just about such proportions as are demanded. Now the question is, will the buyers of brake-shoes call for goods approximating M. C. B. specifications, or will they be governed each one by his own idea of his own interests? Every car run should do its own part of the braking; but it is cheaper to let the other fellows do it if you can.

TO the question recently asked through the question box department of the St. Louis Railway Club, "Are Railway Clubs Educational Factors in the Fullest Sense of the Term?" Mr. Baulch, president of the club, gave a most unqualified and emphatic answer in the affirmative at the May meeting. Referring to the gradual but sure progress by railway clubs Mr. Baulch says: "Errors have been corrected, failures have been few and far between, and we have striven along, taking up questions of importance in the railroad world, studying them out—preparing and reading papers—discussing them; all in line with a fixed purpose, and that purpose education. Education of ourselves, of our members, and in the publication of our proceedings reaching out to educate others. . . . . Of this we are very proud, and beside all this, is the underlying principle of education. In the preparation or discussion of any paper, or of this Question Box, there is more or less reading up—more or less research and looking into—manuals, standard books, up-to-date magazines, etc., which would not otherwise have our attention, and in thus striving to enlighten those around us, we enlighten and educate ourselves. We are on the lookout for bright things. Our minds are on the *qui vive* for modern and up-to-date ideas. We want to keep abreast of the times, and in this rapidly-advancing age, with the multiple duties that are thrust on every active business man (especially those connected with the present railway service), it proves that if we take time to plan out a paper, study out the details and read it to the club. that we are, as individuals and as a club, educational factors of the first rank. The further I read and study the surer I am that railway clubs are educational factors, and as such should be fostered by every railroad official in the country."

IN the course of the interesting discussion on throttling, which our reader will have noted in these pages, some points bearing on the subject have been brought out which are not generally thought of when dwelling on the matter. In the days of the unbalanced valve, engineers followed the practice of using the throttle more than the reverse lever; giving as a reason therefor that the pressure of steam on top of the valve was thereby kept lower, thus causing less friction between the seat than if a full head of steam were used. Advent of the balance valve relieved necessity for care in this regard and a full throttle was immediately and extensively advocated. Despite this, however, most locomotive engineers continued to adjust the throttle to the work as well as the reverse lever, as the engine seemed to work better under these conditions, regardless of a condemnation of such practice from most quarters. The correspondence to which we call attention is a justification of the correction of the observation of the locomotive engineer.

Neglect of Brake Equipment on Freight Cars.

IN some respects the most important action taken by the Master Car Builders' convention was that of raising the price to be charged for cleaning the triple valves and cylinders of air-brake equipment. The condition of air brakes on freight cars has become so bad owing to negligence, that the braking service is very greatly impaired. The discussions of this subject by the Air-Brake Association, have shown that the neglect of cleaning is so general that the condition is steadily growing worse. A few roads have awakened to the importance of this matter and have made provision at certain points for doing more and better work. The mountain roads of the West have been obliged by the conditions of operation not only to keep their own equipment in good condition, but to inspect, clean and repair the brake valves and cylinders on foreign cars. The prices which the interchange rules have permitted to be charged are so low that the road doing their work for foreign cars, in the west at least, has done so at a loss. Private car lines have as a rule made no attempt to clean their own triples or cylinders because they could better afford to pay the interchange price or let the work go undone. There are thousands of private line cars on which the brakes are inoperative through this neglect. It cannot be claimed that the condition of railway companies' cars average very much better.

How to change this condition and secure for air-brakes some fair degree of the care they need is a serious problem. -The Westinghouse Co. has recently lowered the price for repairing triple valves and offered special inducements to have them sent to Wilmerding for repairs. They avoid delay by shipping at once an equal number of repaired valves to take the place of those sent them; and bill for the repairs when made, retaining the valves.

The new plan by which twenty cents each is allowed for taking off, cleaning, oiling and repairing triples and cylinders offers a premium in the shape of a small profit, in most locations. Where labor is highest it will probably pay the actual cost; and in more favored localities it will pay something. A railway company therefore has double inducement to equip for their work on an adequate scale. It saves paying to others the higher price for cleaning its own equipment, and it can make a small profit by cleaning all the foreign and private cars possible.

The question is now up to the general managers. The mechanical officers have recognized the serious nature of the situation and have agreed upon what seems to be a business like method of meeting it. There seems, now, to be no reasonable excuse for not providing the equipment necessary at the various yards for doing the work properly and on an adequate scale. If this is generally done, the freight air-brake equipment will quickly be got into a reasonably efficient condition. Many railway managers do not like to have the Inter-State Commerce Commission mentioned in such connection. But as the use of power brakes has been enforced by law, how can the commission remain idle and see the law nullified by carelessness? No reminder on this subject should be needed, as any railway manager can quickly get a report from his own men as to the neglected condition of air-brake equipment. Why not all join in taking active measures to do this work on an adequate scale by the time the new rules go into effect, September 1st?

Observations.

THE paper used for lining refrigerator cars can now be obtained in any desired width, so that each half of the car may be lined with a single piece—the width of the paper being equal to the inside height of car. This means less battening and more perfect insulation. . . . In all this contention between advocates of different draft gears, and the tests (road and otherwise) now being conducted or in view on various roads, one is apt to lose sight of the fact that the yard is where the gears than they receive in this direction in the yard. fail out on the road, of course, but the shocks received in switching is where the gear receives the damage which makes them give way out on the road. It will take very little figuring and even less call on one's experience to justify the opinion that, short of a collision, a car on the road never receives anything like the shock it gets in the rough yard handling; that is, in buffing. The air can be cut out on the front cars and a greater jerk thrown upon the gears than they receive in this direction in the yard. But this is simply done on tests; in ordinary service if any brakes are cut out it is at the rear, not in front, and the drawhead that pulls out on the road, in the majority of instances, is one that has been damaged in the yard. Of course, the efficiency of draft gears must be increased, but in the meanwhile the clear understanding by switchmen and train crews of the necessity of differentiating between a 50-ton car and a base ball will tend to somewhat modify draft gear failures.

During a recent visit to a manufacturing plant we noticed a centrifugal machine (same as used in laundries) being utilized for extracting oil from saturated waste. Oil from the machines also was cleared of turnings, chips and borings in this manner. . . . In most railway shops the milling machine is not used to nearly the extent it should be, and its capacity for economically performing work does not seem to be appreciated. That this is so, however, is not very singular when one looks around the shop for the practically imperative adjuncts of a milling machine. To be of much real use with the varying character of work incidental to railway shops, the machine needs a bountiful supply of cutters and gang tools the latter almost unknown in railway shops. Both of this class of tools require special machines for their proper maintenance; so much so that the milling machine, in the absence of such auxiliaries is about as useful as a band saw without the saw. In addition, it may be well to remark that grinding and sharpening machines have proved themselves a real necessity with all classes of tools; where one particular man is detailed to operate them, however, instead of each man being expected to fool around adjusting the grinder to each one of his particular outfit of tools. Once provided with proper grinding machines the miller is not only brought into use, but the range of the lathe is increased, for besides thus being able to provide the lathe with gang tool cutter heads, the lathe can be utilized for a very efficient miller by placing cutter arbors in the head centers, mounting a chuck on the carriage and using the cross-feed.

Throttling.

Buffalo, June 5, 1901.

To the Editor of the Railway Master Mechanic:

Mr. Waddell's criticism of the remarks upon throttling steam in your May number agrees with what was then suggested in the main feature; that it is good practice to use the throttle. But an explanation seems to be necessary as to the heat of the boiler. The heat of steam varies with its pressure, and there are tables in the text books which can be easily consulted on this point. The fact that steam has passed the throttle, and is traversing the dry pipe at a reduced pressure lowers its temperature nearly in accordance with that shown in the tables referred to; but the combined latent and sensible temperatures increase slightly with the pressure. So there is a slight excess of heat in the expanded steam, and for that reason, it is slightly superheated. But this excess of heat is absorbed by the entrained water spray which is always present under ordinary circumstances, and the result is that the steam is not usually superheated, but dried; this depending upon the amount of water present.

The oiling device used for the cylinder of the air pump sometimes shows this change in the quality of the steam. When the pump is working slowly, the steam visible through the sight feed may be seen to clear up at the beginning of each stroke, and cloud up again at its termination, when the work of compressing the air and the piston pressure is greater; this phenomenon occurring at each stroke, and depending entirely upon the varying pressure.

Now the sensible heat of steam at 200 lbs. absolute pressure is 381.7 deg. At 100 lbs., 327.9 deg.; the latter being the temperature inside the dry pipe, and there being a difference of some 50 deg., in round numbers, between the steam pressures, supposing the steam to be throttled from 200 to 100 lbs. There is, then, an excess of heat outside the dry pipe to pass through it and be absorbed by the steam of lower temperature inside.

But when it comes to there being any substantial difference in the temperature of the steam in different parts of the same boiler, the steam being "hot" over the firebox and "cold" at the front end, will Mr. Waddell explain? This is a piece of misinformation, handed down from the time when the battle was on between domes over the fireboxes, and domes on the waists, in front. The idea is absurd. The temperature of the steam must depend upon its pressure, and if there is steam of a certain pressure at the front end, that over the firebox can have no greater pressure, and can only be hotter by being superheated. How can this be, when it is coming up in bubbles through the water, and carrying up with it solid water in the form of fine spray? The real reason why the dome on the firebox has won the day is because it is made higher than it could conveniently be on the waist, it puts more weight on the drivers, and it gives a longer dry pipe. So far as the temperature of the steam is concerned, it is the same anywhere in the boiler.

As for the saddles acting as refrigerators, it is a point well taken. When it comes to passing the working steam at nearly 400 deg. temperature through a cored passage in the saddle, and sending the exhaust at say 210 deg. through another cored passage immediately contiguous, with only a half-inch wall of cast iron between—and the whole lower part of the saddle exposed to cold air, why should we not have condensation? The designer who manages to line the steam passage with a pipe, with an enclosed air space around it, will save the price of the pipe many times in a year in economy of fuel.

Geo. B. Snow.

A Remarkable Run.

THE fire on May 3, which nearly destroyed Jacksonville, Fla., was the occasion of a remarkable run made by a locomotive on the Plant System. Assistance in the way of fire engines was telegraphed for to Savannah, Ga., and a special train, carrying the Chief of the Savannah fire department, two companies and two fire engines, left Savannah at 5:15 p. m. for the run of 172 miles to Jacksonville. From Savannah to Waycross, 97 miles, was made in 95 minutes, where there was a delay of 7 minutes. The run from Waycross to Callahan, 55 miles, was made in 52 minutes. Here a delay of 12 minutes was caused by a hot box on train. From Callahan to Jacksonville, 20 miles, was made in 17 minutes, or a total of 183 minutes from leaving Savannah to arriving at Jacksonville, deducting 19 minutes for delays, leaving a net total of 164 minutes of actual running time in covering the 172 miles.

Through the courtesy of W. E. Symons, superintendent of motive power for the Plant System, these particulars have been verified, and he states that the engine crew and conductor report the speed at 80 miles an hour at times during the run. Mr. Symons has also furnished us with the accompanying illustrations of the locomotive with which the run was made and in the following particulars it will be noted the driving wheels are only 65 ins. in diameter—a feature which makes the run a record one for speed and distance. The locomotive was built in August, 1900, by the Rhode Island Locomotive Works, from designs furnished by Mr. Symons. It has 20x28 ins. cylinders, 65 ins. driving wheels and carries 200 lbs. boiler pressure in an extended wagon top boiler which is 64 ins. in diameter at the front section. The weight on drivers is 110,000 lbs. and on truck 40,000 lbs., or 150,000 lbs. in all. The tender carries 9 tons of coal and 5,000 gallons of water.

A Plant System Freight Engine with a Speed Record.

The Sargent Coupling.

THE cuts shown herewith are of the improved form of the Sargent coupling, which is adapted both for pushing and pulling cars on curves too sharp for the operation of the M. C. B. coupler.

On almost every railroad, and in the thousands of industrial establishments that line their tracks, there are to be found many curves upon which the automatic coupler will not couple, and around some of which it is impossible to pass coupled cars without cornering.

At the present such sidings are operated with link and pin between the couplers, or by means of coupling bars. This state of affairs is bad enough as it is, but with the approaching abandonment of the link slot and pin holes, it will be necessary to push cars around such curves with a push pole, and haul them out with a chain or rope. This plan is practically prohibited by the fact that the pushing is very liable to damage the release rigging, and increase repairs at a point at which the greatest number of defects are now developed, also by the danger of throwing cars off centers, as well as the increase of time necessary to set cars.

SARGENT COUPLING.

All these difficulties, as well as present ones, are satisfactorily met by the Sargent coupling device, which will be seen, by reference to the cuts, to consist of two dogs constructed to engage the knuckle arm of each of the two coupler heads. A strong yet flexible connection is made between these dogs by means of two castings which are cured to follow the contour lines of the M. C. B. knuckle, and are joined in the center by a pin. All parts are made from open hearth cast steel, carefully fitted.

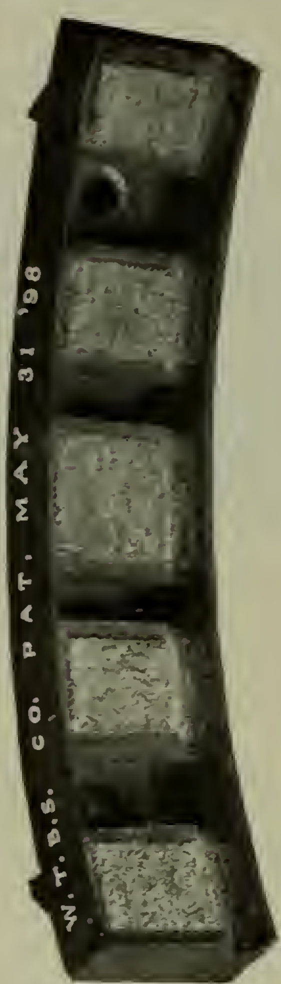
ACTION ON SHARP CURVES.

In operation the dogs are placed on each drawbar, just back of the knuckle pin, and the curved arms brought together around the face of each knuckle and connected. This accomplishes a connection which permits the cars to be pushed or pulled around any curve without injury to draft gear, etc., and is so spaced that even on the sharpest curves from six to eight inches is allowed between end sills.

A well known S. M. P. in discussing the matter has said: "A satisfactory device would be one by means of which the car could be either pulled or pushed, which would engage with the knuckle of the opposing coupler, without the necessity of the pin hole or link slot, and which would not be so heavy that one man could not conveniently handle it." The Sargent coupling answers these requirements and will no doubt be found to be a very necessary and convenient appliance.

A Wheel-Truing Brake Shoe.

The use of a brake shoe for truing the tread of a wheel is not a novel idea. Various methods of construction have been tried for this purpose. The shoe which we illustrate herewith depends for its grinding action upon a composition with which alternate pockets are filled as shown in the cut. The shoe is made to fit any brake head, any size of wheel, any width of tread; and the flange also if desired. When a wheel becomes flattened, the regular brake shoe is removed and this shoe substituted. The tread is then ground down and trued in the course of the regular service of the wheel. The special shoe is then removed and the ordinary shoe put back in place. Of course the grinding shoes should be placed on both wheels of the axle in order to keep the diameter the same.



WHEEL-TRUING BRAKE SHOE.

These shoes are in extensive use on electric roads and judging from the endorsements received they do the work well. Over 200 electric roads have it in use and its sale is extending not only in this country but abroad. The saving in time of removing wheels for grinding is of course great; and the economy is undeniable if the work is well done. The composition used is patented and its action on cast iron wheels seems to be a well-settled fact. Mr. J. M. Griffin, the president of the company, has invented a composition for use on steel tired wheels; and recent experiments on the driving wheel tires of locomotives indicate that it is a success. The subject is worthy of investigation; and the company offers to send a miniature sample shoe to any railway official desirous of looking into it, which shows the construction of the shoe and the composition used. The manufacturers are the Wheel Truing Brake Shoe Co., 106 Miami Ave., Detroit, Mich.

The Master Mechanics' Convention

THE American Railway Master Mechanics' Association met in its thirty-fourth annual convention at Saratoga June 19, 1901, President W. S. Morris in the chair and Secretary Taylor at his desk. The sessions lasted three days, and the work done was, in sequence as follows:

GENERAL OPENING BUSINESS.

After the opening prayer and an address from the president of the village, President Morris read his address, in which he referred to the desirability of Saratoga as a meeting place for the convention, and to the advantages of having a Sunday intervene between the two conventions. He called attention to the development of transportation in the last three quarters of the past century, and particularly to the industry of building steel cars, which, although established but three years, uses more steel plate than the requirements of the shipbuilding industry for the entire country.

He thought it important that the association should reorganize and encourage the work of the associations of those under them, and keep in touch with them, and on this subject spoke in part as follows:

"As local and special organizations increase in number and capacity it seems advisable to inaugurate systematic co-operation, with a view of recording in our official annals the whole of motive power progress. May we not now rely with confidence upon other associations for that which is closer to them, and devote our energies to broader matters and those which affect us as a whole?" Under the head of "official duty" he he said "More of us need to give more attention to organization, with a view of getting our work into such shape that we can rise above the details occasionally to a level with the larger problems with which we have to deal, and to take, as it were, a bird's-eye view of the department and its responsibilities. Furthermore, it ought rarely to be necessary for us to go outside to fill vacancies. To secure an organization rendering this unnecessary requires time and thought, but it will unquestionably pay. We owe it to our subordinates to encourage them by every possible promotion. The organization should begin with apprenticeship and provide for the appointment of the position of head of the department.

W. S. Morris, President American Railway Master Mechanics' Association.

"The simple 8-wheel passenger locomotive of practically recent construction has reached the limit of size under existing conditions. It may be indicated at this time that the limit has been reasonably reached for the 10-wheelers for almost the identical conditions that were met with in the increase in size of the 8-wheel passenger engine; yet the obstacles in both machines have only served to hasten other productions from the creative mind of the American engineer for the demand for additional capacity to meet service requirements. Accordingly we have now in successful operation passenger machines with six drivers connected and a trailer, as well as the trailer in the type of the 8-wheelers, both of which admit of having additional grate area and boiler capacity, avoiding the prominent objections entertained in the machines of the next earlier production. In freight service a graduation from the machine of five or six years ago of 160,000 pounds to some of over 250,000 pounds further demonstrates the unusual hauling capacity that has been successfully attempted and accomplished. The compound locomotive has been with us for several years, and as lately as 1897 it was pronounced by a former president of the association as 'still in the balance.' We cannot be proud of the fact that its status has not changed since then and that its place has not been defined and established. Many profess belief in compounding, but continue to order simple engines with an occasional few compounds. The compound is either good or bad; if bad, let us have none of it; but if good, we ought to study its good points systematically, and understand where it should be used and how it should be built."

The advantages of wider fire boxes for bituminous coal were

University, in which, as an organization, the master mechanics are interested. Prof. Goss, realizing the passing opportunity, has started a museum of interesting landmarks of locomotive progress, and it is to be hoped that it is not too late to secure examples of early practice, when boiler tubes were welded by hand and locomotives resembled small insects. An historical series of early American locomotives will be most valuable and interesting.

In closing he spoke of the remarkable changes in the ownership and control of roads as follows:

"I would like to remind you that the remarkable changes in the ownership and control of some of our largest roads must be taken to indicate most important alterations in the situation in which we are a part, and it behooves us to watch lest we fail in some degree to appreciate what it means to the departments which we represent, and with renewed efforts meet the new problems in a way that will inspire confidence and absolute progress."

The report of Secretary Taylor showed a total membership of 680, of which 637 were active, 19 associate and 24 honorary, being an increase of 15 members. The report of the treasurer showed a balance on hand of $3,712.90.

The first order of business was the proposed changes in the constitution and by-laws. All changes were adopted excepting that referring to the nominations of officers, which remains as heretofore.

The first report taken up was that of the committee on the "Relative merits of cast iron and steel tired wheels." Secretary Taylor read the report of the committee.

RELATIVE MERITS OF CAST IRON AND STEEL TIRED WHEELS.

J. N. Barr, A. M. Waitt, A. L. Humphrey, H. S. Hayward, John Hickey.

The committee appointed to examine into the relative merits of cast iron and steel tired wheels begs leave to report as follows:

"Since the date of the last report of this committee there has been practically no new developments or new information obtained bearing on this subject. The committee has nothing, therefore, of value to present.

Since the last report of the committee the question has been raised as to the expediency of the use of steel tired wheels under 100,000-pound cars, but the data in this matter is so deficient that it can not be properly made a subject of report.

The committee has nothing further to say, and feels that it should make a recommendation that the committee be discharged."

Although the committee reported no new developments and recommended that they be discharged, the report was made interesting by the discussion started by Mr. Sanderson, who took up the matter of the cost side of the question. On a motion of Mr. Leeds the report was received and the committee discharged.

The committee on ton-mile statistics, consisting of J. H. Small, C. H. Quereau and W. H. Marshall, presented no report. Mr. Quereau, however, discussed most ably some phases of the subject, taking the ground that fair comparisons could not be made between different roads having varying conditions to meet, and that not even divisions on the same road could be fairly compared with each other. The only satisfactory results to be obtained would be in comparing one year with the preceding on the same division.

Mr. Quereau also maintained that the proper basis on which to charge the motive power department is on the same basis as is used in charging the performance of a stationary engine, that is, the cost per unit of work. So far as the motive power department is concerned, it makes no difference whether it is revenue producing or not, whether it is power absorbed by the locomotive in going over the road light when the conditions require it. He offered two resolutions:

Resolved, That it is the sense of this association that a strict not secure the best results, but such comparison should be made between different records of the same division; and

Resolved, That it is the sense of this association that the ton mileage of the locomotive is a just credit to the motive power department for statistical purposes.

Both resolutions were opposed by Mr. Delano and Mr. Humphrey, but were adopted by the association.

In discussing the above subject, Mr. Humphrey maintained that any fairminded manager can see the difference existing in the physical features of neighboring lines and when it is put to them the explanation is generally accepted. Mr. Leeds claimed that it was sometimes impossible to explain and that the statistics were published where the motive power official cannot meet them.

Topical questions were then taken up according to the rule calling for them at the noon hour. The first subject, "Proper Method of Lubricating Locomotive Driving and Truck Axles," was opened for discussion by a letter from Mr. G. R. Henderson, who pointed out the present objectionable methods in use but said that he was unable to present a satisfactory solution of the difficulty.

The second topic, "What Materials Should be Used for Hub Liners on Cast Steel Driving Wheels and on the Faces of Cast Steel Driving Boxes," was not discussed owing to the absence of Mr. D. F. Crawford, who was to have opened the question.

The third topical talk was opened by Mr. Garstang, "Should Side Parallel Rods be in Position on Locomotives While in Transit." This discussion is deemed of enough importance to publish in full. After the discussion a motion was made and carried that side rods be applied to locomotives in transit. Mr. Garstang's paper was as follows:

"In opening the discussion, 'Should Side or Parallel Rods Be in Position While in Transit,' the temptation is very great to put the burden of the argument on the opponent's side and ask the question, 'Why Shouldn't Parallel Rods Be in Position While in Transit?'

Being an advocate of the practice and knowing there are no serious mechanical difficulties to be overcome, I have had new engines shipped in as nearly complete condition as possible. The result has been entirely satisfactory and resulted in considerable saving to the railroad company.

Like many other roads, we receive our new power at a point where there is only a roundhouse and but few men employed. This force cannot be taken from their regular duties, which necessitates sending men from some other shop to put the engines together. It is always necessary to send a higher class of mechanics, and the result is the first day or two these men are doing laborer's work, unloading heavy parts that are ordinarily packed in the tender coal space.

On the other hand, engines that are delivered with their side or parallel rods in position can be much sooner gotten into service, and at much less expense.

Another feature of no little importance is the certainty that the rods have been properly fitted at the works, and there is less liability to give trouble when the engine goes into service.

I cannot say that from a mechanical standpoint there are any benefits to be had, other than those mentioned, which include the saving of time, money and trouble, but our engineering and maintenance departments are taking a serious view of the matter, and in many cases advocate a strict rule requiring engines to be coupled up before they are accepted on the road. This seems a perfectly proper step to take.

The day has passed when it is considered necessary to ship new engines in slow freight trains, but on the contrary, they are hauled in the fast through trains often at a speed of 40 miles an hour, and the effect on the track of a heavy engine at this speed with a single pair of wheels as much as 1,000 pounds out of balance is not to be desired. Imagine what the result would be of an engine going into regular service with the counterbalance in this condition.

If there are any benefits to be derived from this practice to either mechanical or engineering department, and there are no hardships imposed on the builder, I will yield to the first temptation and ask, 'Why Shouldn't Parallel Rods Be in Position While in Transit.' "

The hour for topical discussion having expired, the convention took up the paper, "A Classification of Locomotives," by Mr. R. P. C. Sanderson. In the discussion that followed there was a wide difference of opinion and the matter was referred to the committee on subjects, no action being taken by the convention. Mr. Leeds and Mr. Fowler advocated Mr. Whyte's system in preference to any other as being based on such simple principles. Mr. Fowler's argument was "that any one looking at the system knows what it means if he knows what the system is based on. In the case of an Atlantic type of engine, the 4-4-2 covers the case thoroughly. If the man understands the principle on which the system is based he knows what kind of an engine is referred to. Such a classification, however, will not cover all the details which an individual road requires to have in order to carry out its business; but for general communication between officers of the various roads, this classificatoin of Mr. Whyte's seems superior to anything that has yet been devised. In European classification a fractional system is used whereby one part of the fraction indicates the number of driving and the other the total number of axles. Thus a 2-4 engine would be an engine with four axles under it, of which two were driving axles. This might apply to an engine with a pony truck at each end, but for general use between roads it seems that the classification suggested by Mr. Whyte is superior to any other."

COST OF RUNNING TRAINS AT HIGH SPEED.

(William McIntosh, G. F. Wilson, F. A. Delano, Committee.)

The following list of questions was embraced in a letter and sent out:

1. Can you furnish any data on the comparative cost for fuel consumption alone of running trains, at say fifty to sixty miles per hour, including stops, for 150 miles or more, as compared with the same train making the same stops, etc., and running at a scheduled speed of one-half this?

2. If you have not any complete data on this subject, can you furnish any data bearing upon it?

3. What would you give as a fair valuation of an engine competent to handle a train of four to six cars at a substantial scheduled speed of 50 miles per hour for distances of 150 miles or more, as compared with the valuation of an engine competent to handle the same train, making the same stops, but at one-half the scheduled speed?

4. What data, if any, can you furnish on the matter of the number of breakdowns, or failures of one kind and another, in locomotive performance with engines handling trains at the high speed above mentioned, as compared with the lower speed mentiond?

5. Has it been your experience that the increasing of speed on a few trains has had a tendency of increasing the speed of all trains?

6. Looking at this matter purely from the standpoint of a motive-power man, to what extent, if any, has the general increase in speed and reduction in time added to the first cost of motive power, or the cost of maintenance thereafter?

Seventeen replies were received, of which ten had no information whatever to offer, advising that no data on this subjecct was available in their records, and thirteen failed to reply at all.

Inasmuch as the committee considered the reply from Mr. Delano of the most interest and of greater value, we reprint in full the account of the tests on the Burlington road only, not having the space to give to the entire report.

The data furnished by Mr. Delano, of the Chicago, Burlington & Quincy R. R., was obtained from some tests made by him wherein the conditions of the fast and slow trains were maintained as nearly alike as possible, except in the point of speed. He reports as follows:

"I submit as evidence on this matter of cost of running trains at high speed, a report made in July, 1900, on the C. B. & Q. R. R., under my jurisdiction on fast mail train No. 15, between Chicago and Burlington, a distance of 206 miles, the schedule of the train, including stops, being 51 miles per hour. Three trips were made with this train and two trips were made with a dummy train of practically the same weight, but making only half the speed. The data of the tests is given fully in the report made by Mr. M. H. Wickhorst, engineer of tests, who had direct charge of the work, with a staff of assistants, but I would call attention to several particular features.

"First. Test was made at a time of the year most favorable to low cost of train operation.

"Second. The train was exactly on schedule time and there was, therefore, no time to be made up and no accident or hot boxes causing a delay which had to be made up.

"Third. In spite of the above fact, it is interesting to note the speed at which most of the miles had to be made in order to keep the train on schedule time. It will be noted, for example, that the greater part of the distance had to be covered at a speed of 60 to 65 miles per hour.

"Fourth. It is estimated that the value of the high-speed engine on the fast mail train (weighing 74 tons in working order), was $14,000, as against the value of say $7000 for the engine (weighing 41 tons in working order), which handled the test train operating at only one-half the speed.

"The above, together with Mr. Wickhorst's report, answers the first three questions so far as I am able to do so.

"I would submit as an answer to your other queries, the following:

"Answer to Question 4. In regard to breakdowns, it is pretty apparent that there are a great many more cases of delayed trains due to hot bearings on engines and cars where the speed is excessive than where it is moderate. On some divisions of the road where speed is moderate we never have a case of hot crank pins, whereas hot crank pins and hot driving boxes are not uncommon in high-speed service.

"We use our very best power in high-speed service, and in spite of this we have more failures in high-speed service than in moderate service, but just how much more I am unable to say.

"Answer to Question 5. I feel quite certain that the increase in speed of a few trains has a tendency to quicken the speed of all trains, first, because the men get educated or keyed up to a high speed, and secondly, because it is necessary to make high speed in order to keep out of the way of trains, even on a double-track road.

"Answer to Question 6. The greater speed of trains, both freight and passenger, which has come with recent years has greatly increased the requirements for larger boiler capacity of freight as well as passenger engines. High speed has developed a good many weak points in the machinery of engines which under more moderate speeds gave good service. There is very little question that this enhances the first cost of the motive power, but just how much it would be difficult, if not impossible, to say. To combine speed with great tractive power is a difficult thing to accomplish because, in the nature of things, the requirements are contradictory, and in attempting to satisfy opposing conditions is of course more or less of a compromise."

Mr. Wickhorst's report is as follows:

"I submit herewith dynamometer car tests made with fast mail train 15, compared with special train of the same make-up, but run at one-half the speed, the test to be made primarily to show relative drawbar pulls and speeds and also to show relative coal and water consumption. We made three tests with train 15 and two tests with the special train. The dates and make-ups of the different trains are shown on the following table:

FAST MAIL TRAIN NO. 15.

Car.	7, 20, 00.		7, 22, 00.		7, 23, 00.	
	No	Weight in lbs.	No.	Weight in lbs.	No.	Weight in lbs.
Dynamometer	Z	34,000	Z	34,000	Z	34,000
Baggage	707	69,400	707	69,400	707	69,400
Baggage	766	69,600	766	69,600	766	69,600
Mail	930	73,800	930	73,800	931	74,000
Mail	914	79,600	914	79,600	915	79,300
Contents	...	50,000	...	25,000	....	25,000
		376,400		351,400		351,100
Total weight behind engine tender	....	188.2 tons	......	175 7 tons	.....	175.5 tons

SPECIAL TRAIN.

Car.	7 26, 00 and 7, 27, 00.	
	No.	Weight in lbs.
Dynamometer	Z	34,000
Baggage	706	65,200
Baggage	763	70,900
Mail	932	75,200
Mail	913	74,400
		319,700
Total weight	....	159.85 tons

The weights of the cars are the actual weights. The weights of the contents or mail on train No. 15 are estimated weights. Train No. 15 was run on a special schedule made by doubling the time between stations and stops of train No. 15. A condensed time schedule of the two trains is given below:

		No. 15.	Special.
Union depot, Chicago	Lv.	9:30 p.m.	8.25 a.m.
Mendota	Ar.	10:55 p.m.	11:15 a.m.
Mendota	Lv.	10:59 p.m.	11:23 a.m.
Galesburg	Ar.	12:24 a.m.	2:13 p.m.
Galesburg	Lv.	12:27 a.m.	2:19 p.m.
Burlington	Ar.	1:22 a.m.	4:09 p.m.

"The train No. 15 made its regular schedule stops, which are as follows:

Canal and Sixteenth streets	1 mile.
Western avenue	4 miles.
Mendota	83 miles.
Galesburg	163 miles.
Burlington	206 miles.

"The special train on 7—26 was started 13 minutes behind its schedule time, leaving Chicago 8:38 as second No. 13, and besides the regular scheduled stops as per above, we were also compelled to stop on account of being blocked by No. 13 at the following points: Montgomery, Wyanet.

"The special train on 7—27 was started from Chicago at 8:10. 15 minutes ahead of its schedule as an extra train. On this run also we had to make stops outside of the schedule, which were as follows: Princeton, Wyanet (three times), Buda, Monmouth.

"We made no attempt to correct our calculations for these extra stops. On trains No. 15 we used 'Columbia' type engine 1590. This engine has 18x26 in. cylinders, 200 pounds steam pressure, 84¼-in. drivers (nominally), and weight on drivers 84,450 pounds; cylinder tractive power, 17,000 pounds. On the special train we used engine 1121. This is an American type 8-wheel engine, 17x24 in. cylinders, 160 pounds steam pressure, 69-in. drivers and weight on drivers 53,600 pounds; cylinder tractive power, 13,500 pounds. The idea of using different engines in the two different kind of runs was to have the class of engine best adapted to the service in each case.

"The tests consisted of determining with the dynamometer car the drawbar pulls, or, in other words, the resistances of the different trains, and also the running speeds. We also accept records of the coal used, water consumption and steam pressure. Coal used was the best grade of screened lump Illinois coal. The drawbar pulls and the running speeds were recorded automatically in the dynamometer car. After making the trips, we went over the record paper and determined with a planimeter the average drawbar pull, or, in other words, the average train resistance for each half mile of each trip. The average running speed of the special trains was just about one-half of the speeds of trains No. 15, while the average train resistance per ton was little less than half. The water per ton mile was about two-thirds and the coal per ton mile was a little over half. The following tables show these results, taking the results of No. 15 as 100:

	Train No. 15.	Special train.
Speed, miles per hour	100 per cent.	50.7 per cent
Drawbar pull, per ton	100 per cent.	46.5 per cent.
Water, per ton mile	100 per cent.	68 per cent.
Coal, per ton mile	100 per cent.	54.5 per cent

"In general, therefore, we may say that these tests indicate the cost for power as represented by the consumption of coal and water, of running trains, increases directly as the speed, that is, if we double the speed, the coal, water and drawbar pull are likewise doubled.

"I give below a table giving the coal burned per square foot of grate area per hour:

ENGINE 1,590, TRAIN NO. 15.

Trip No.	Grate surface, square feet.	Actual running time, hours, min.	Coal, pounds.	Pounds of coal per square foot of grate area, per hour.	Average.
1	37.5	3.32	13,205	99.5	....
2	37.5	3.25	12,400	96.7	....
3	37.5	3.27	12,464	99.0	98.4
ENGINE 1,121, SPECIAL TRAIN.					
4	17.25	6.39	6,228	54.4	....
5	17.25	7.00	6,070	50 3	52.33

SUMMARY OF SPEEDS MADE BY TRAIN NO. 15 AS DETERMINED BY DYNAMOMETER TESTS, TAKEN FROM LAB. PRINT NO. 556,221, T.-17, AUGUST 16, 1900.

Number of miles made.	Trip No. 1.	Trip No. 2.	Trip No. 3.	Average.
At 25 to 30 miles per hour	5	2	5	4
" 30 " 35 "	2	5	1	4
" 35 " 40 "	7	5	3	6
" 40 " 45 "	10	9	8	5
" 45 " 50 "	13	9	5	8
" 50 " 55 "	16	19	17	22
" 55 " 60 "	48	24	40	30
" 60 " 65 "	62	49	63	71
" 65 " 70 "	33	58	31	40
" 70 " 75 "	7	20	11	13
" 75 " 80 "	.....	3	5	2
Total number of miles taken	203	203	189	205

The data furnished from the other roads, which the committee gratefully ackuowledged, did not go as far into the subject as they would like. In most cases the record of cost of running particular trains, cost of inspection and maintenance, and many other items are so combined and confused with other figures as to make separation impossible, and it is apparent that no accurate information can be obtained except by careful tests, such as those made on the Chicago, Burlington & Quincy Road. The cost of operating high-speed trains where they make few stops between terminals, as compared with the cost of operating heavy trains making frequent stops, is usually a matter of guesswork. In the case of a heavy train making frequent stops, the speed between stations is nearly, if not quite, as high as the speed of the fast train, but the boiler is of course not taxed so severely as when it is required to furnish power continuously.

The tests made by the Burlington Road are of great value so far as they go, and clearly indicate that, so far as coal consumption is concerned, it is fair to assume that the cost increases directly as the speed increases, but your committee realizes that this is only one of the items of the enhanced cost of running trains at high speed.

The greater capital invested in locomotives capable of handling trains at high speed, the greater cost of maintenance, represented in the greater care and more perfect inspection, is spoken of by all who have replied to our queries. Furthermore, it is a pretty generally acknowledged fact that any given class of power will show far more engine failures operated at high speed than at lower speed; that the "keying up" of the service on a few trains tends to key up the service of all trains, and that while there is an undeniable benefit resulting from the greater alertness on the part of employes, there is an expense resulting from these greater demands on engines, requiring more expensive motive power, from machinery failures in both engines and cars, resulting from this greater speed, more serious results from derailments or accidents when they occur, or which involve an expenditure of money to prevent.

As already stated, your committee has only considered the question of cost of running trains at high speed as affected by mechanical considerations. None of the other features of the problem, such as cost of track maintenance, cost of keeping the track clear, keeping trains out of the way of high-speed trains, and many other incidentals, have been considered at all.

The attention of the committee has been called to various magazine articles and articles in technical journals on this question, all of which seem to fog the issue by not making a clear distinction between the question of "What it cost to run trains at high speed," and the question of "Whether it pays to run trains at high speed." Obviously the two questions are entirely separate and distinct. What it costs to run trains at high speed is a question susceptible of more or less scientific and complete analysis; while the question as to whether it pays to run trains at high speed is purely a commercial question, even more difficult to solve, because the question of earning power, advertising value and many other considerations enter in, as well as the question of expense of operation.

The discussion of this question was participated in by Messrs. Rhodes, Whyte, Deems, Delano, Symington, Leeds and Prof. Hibbard. Inasmuch as Mr. Delano's paper before the Western Railway Club some months ago was the cause of the committee being appointed by the Master Mechanics' Association, we give Mr. Delano's remarks, somewhat in full. He spoke as follows:

"In regard to the Burlington tests, I want to point out this, that the high speed of trains of which there were three tests, were run under the best weather conditions, that is, they were run at night and in the summer time. The train was operated strictly on time, no time to make up or any occurrence on the roads such as hot boxes or delay that had to be made up. The engine on the train was suited to high speed service, and was a Columbia type engine with 7-foot driving wheels, and the train tested against it was a train specially made up, run on a special schedule, of the same weight as nearly as could be, and it also had an engine that was supposed to be suited to that speed, with driving wheels, as I recollect them, 69 ins. in diameter. Mr. Wickhorst's conclusions, cited by Mr. Rhodes, seemed to check—that is, not only the coal consumption but the drawbar pull both checked, and show that it required that the drawbar pull and the coal consumption increased directly as the speed; that is, double with the high speed trains compared with the low speed train. You will find on page 20 also an interesting table showing the grate area of the two engines and the consumption of coal per square foot of grate area. Two of the three trips of the high speed train were just under 100 pounds, and the third was slightly less than the other two; whereas, with the low speed train, an engine with a small grate, the coal consumption was slightly over 50 pounds. I also want to call your attention to the speed that was necessary to make in order to keep up a schedule of between 50 and 51 miles for the entire distance of 205 miles. It is well known, but it is often overlooked, that in order to keep a train making necessary stops, on time, that you have got to exceed your schedule a good deal of the time. You will find that the average of the three trips, 22 miles, had to be made at the speed of 50 to 55 miles per hour; 30 at a speed of 55 to 60; 71 miles at a speed of 60 to 65 miles per hour; 40 miles at a speed of 65 to 75 miles an hour, and 13 miles had to be made at a speed of 70 to 75 miles, and 2 miles at a speed of 75 to 80. I thought it would be interesting to analyze the speeds in that way. A very small amount of distance was made at the low speeds."

Although the committee accomplished a great deal in collecting the amount of data which it did on this subject, still the real question, as brought out by President Morris, the determining of the cost of high speed trains, still remains an indefinite quantity. It was decided best to continue the committee for another year.

THE MOST SATISFACTORY METHOD OF HANDLING, CLEANING AND SETTING BOILER TUBES.

(W. H. V. Rosing, A. E. Miller, C. H. Doebler, Committee.)

A circular letter of inquiry was sent to members of the association, requesting information with a view of eliciting the latest practice on this subject, to which 27 members replied.

In general it was learned that the methods are practically alike and the operations deduced from replies in connection with the recommendations of the committee are as stated below:

Tubes should be cut out of both tube sheets with a power cutter and removed through dry pipe holes providing the pipe has been taken out, otherwise through a tube hole that has been reamed sufficiently large to admit of removal of tubes, according to the probable amount of hard scale they may carry. The ends remaining in the front sheet should be driven out with a pneumatic hammer and chisel. The ends remaining in back tube sheet should be removed in a similar manner. A heavier hammer, however, is needed for this, with an ordinary flat chisel about one-half in. wide, or split caulking tool. The labor of chipping off beads can be then dispensed with. They should then be taken to the rattler for the purpose of removing the scale. Safe ends should be cut off and scarfed and piled near furnace with horning anvil where the tubes should be opened and safe end applied. After this operation they should be piled convenient to welding furnace.

The safe end should be same thickness as original tube and should be applied to the end of tube having previously received a safe end in order that the thicker end of tube be used for welding. After weld has been made and scale scraped off, the tubes should be swaged about 5-32 in. and stood up in quicklime for annealing. They are then cut to length, and front end opened on horning anvil and are then ready to be replaced.

The committee is of opinion that, with the average workman, it is not necessary to test the welds in tubes until they have been reset, for, with the small percentage of failures, it is more economical to remove a defective tube occasionally after having been set in boiler than to test each tube separately.

Before setting tubes, copper ferrules should be rolled into the holes of the back tube sheet and tubes driven into them. The back end of tubes should be set with a Prosser expander and after peening over, rolled with a roller expander and beaded with a pneumatic hammer and beading tool. The front ends should be rolled with a roller expander.

The heating of tubes is accomplished with either coke, anthracite coal or oil. Either of these will produce a satisfactory welding heat and the furnace should be arranged for heating as many tubes simultaneously as the man at the welding machine can handle without waiting for a heat.

The fuel used is rather a matter of cost, according to local conditions, than of specific kind.

The rattler should be hexagonal, or if of large diameter, octagonal in shape. One section should be secured by key bolts, that it may readily be removed by means of a pneumatic lift. By giving the rattler a half turn, all flues will be discharged at one operation upon an inclined plane in order that they will roll clear of the machine.

Where coal or coke is used it should be fed to the furnace by means of a hopper. In case of burning oil, it should be applied with a burner at both ends, especially where tubes are being heated from both sides of the furnace.

The committee recommends the scrapping weight of tubes for boilers carrying 200 pounds boiler pressure as follows: 2-in. tubes, 1.65 pounds per foot; 2¼-in. tubes, 1.85 pounds per foot. From this it is obvious that a heavier tube will have a greater percentage of service metal.

No definite information was received regarding the merits of steel tubes as compared with charcoal-iron tubes. The experience with steel tubes seems to have been very limited. The opinion of the majority favored charcoal-iron tubes from the fact that they pitted less and would hold a better bead. The principal trouble, however, was in the welding of steel tubes to steel safe ends. The committee is not prepared to say how much of this is due to the inexperience of the operator or to the metal itself.

This report was discussed to some considerable extent, being participated in by a large number. Mr. Brown referred to the suggestion by the committee that the same thickness be used in the safety ends as in the body of the flue, and said that he found good results by using a No. 12 flue for a No. 11 safe end, giving as a reason that it expands under rolling and lasts longer. Regarding putting all the safety ends on one end of the flues he thought that there are times when a safety end does better to put it on the other end. Prof. Hibbard suggested that the difficulty of welding steel tubes to steel safe ends might be overcome by a method used for many years in Europe, stretching the tubes, heating them up in the central portion and clamping clamps on the cooling ends and stretching them. This somewhat diminishes the thickness of the tube, but would mean that there would be no trouble in welding steel tubes to steel safety ends, as it makes the steel tube satisfactory in this regard. Reference was made to experiments which were made on the C. B. & Q. several years ago and Mr. Forsyth said that at one time they had difficulty in welding steel tubes. In order to get the flux they tried water-glass and borax, and it answered well, but they still had difficulty in welding tubes to the steel safe ends. Out West the flues are removed after ten months or a year to clean them, and that is the only reason for thinking an iron tube is better than a steel one, that they are much more easily welded. Mr. Mitchell found that with the Shelby tube there was no difficulty in using an iron safe end and getting perfect results.

Mr. Garstang said that he did not think that there was any question about welding an iron safe end to a steel tube, or welding a safe end made of similar material as the steel tube.

Mr. Rhodes spoke interestingly on the subject as follows:

"There are two points in the committee's report I want to speak on. The first one is where the committee says, 'The committee recommends the scrapping weight of tubes for boilers carrying 200 pounds boiler pressure as follows: 2-in. tubes, 1.65 pounds per foot; 2¼-in. tubes, 1.85 pounds per foot.' It seems to me it is a very good recommendation and it will give some information to some of our shops which do not follow that practice of knowing when tubes get too thin. In the West we are bothered a great deal with the pitting of tubes, and that matter has brought up the question as to what causes tubes to pit. We can take a tube and we will find a hole through it at a certain point, and alongside of it on either side the iron will not be affected. What is there in the water that produces a hole in the tube every 6 ins. and the intermediate points not be affected? At the start when we were investigating the matter I endeavored to argue with some of the tubemakers that what we wanted was a tube made of the metal between the pit holes, that we did not want a tube made of the metal where the pit holes were. Some of the manufacturers contended that it was the scale which is rolled into the tube which does not get thoroughly out which causes the pitting, and therefore they argued that if you will use a tube that is not welded, such as the seamless drawn tube, a steel tube that has no scale rolled into it, which is necessary as you weld the flue, you will avoid the pitting.

"We have tried some steel tubes. They have not been in service long enough to know what the results are going to be, but not long ago we had a case of an engine failing badly on account of the tubes pitting. The engine had not been very long out of the shop. The failure of the engine occurred a long distance away from our shops, and caused much inconvenience. The master mechanic said if the tubes had been carefully inspected and the old tubes thrown out, this failure would not have happened. We sent some tubes back to the shop and they indicated the tubes should have been condemned when the engine was overhauled. The foreman of the boiler shop called my attention to the fact that the engine had been re-safe-ended when it was in the shop, and directed my attention to the safe ends, showing they were as badly pitted as the body of the tubes, and therefore had he put in new iron tubes it would not have resulted in any better service. In the further investigation we made on this matter, we got hold of a report that was presented to the National Railway Congress in Europe last year on the subject of the pitting of boiler tubes, and it was very clearly shown in that report that with certain classes of water there is an acid that assembles on the tube, and that this acid formulates a little globule that attaches itself to the flue and produces a corrosive acid which eats into the tube, rather disproving the argument that a cinder rolled into the tube has anything to do with the pitting, and it would look to me as if this acid in the water would have the same effect on the iron as on the steel, and we will not get rid of the pitting of tubes where we have water subjected to this acid formation, even if we adopt different style tubes. Some claim that steel is less liable to corrosion than iron, and other authorities claim just the reverse."

The trouble in setting tubes was discussed at length by a number after Mr. Rhodes had explained his position in regard to the matter. Mr. Symington remarked that he thought a great deal of energy was sometimes spent in the wrong direction on these boiler tubes. On roads with good water tubes can be set in almost any way and they do not give trouble. On roads with bad water, no matter how you set them, no matter how much money and thought you put on the matter of the setting of tubes, you have trouble. By purifying the water the trouble could be largely elminated.

WHAT IS THE MOST PROMISING DIRECTION IN WHICH TO EFFECT A REDUCTION IN LOCOMOTIVE FUEL CONSUMPTION.

(A. E. Manchester, A. Forsyth. A. F. Stewart. Committee.)

The committee to whom this subject was assigned sent to the members of the association a circular of inquiry, in which the following questions were propounded:

1. What in your opinion is the most promising direction in which to effect a reduction in locomotive fuel consumption?

2. Have you demonstrated the practicability of the method you recommend? If so, with what results?

3. If a special device, kindly furnish the committee with blue prints and an explanation of its application and use, together with an estimate of the cost for application and of the economy to be effected.

4. Is it a patented device?

5. Is it applicable to existing engines, or only to new construction?

Twenty-six replies were received.

In answer to a question as to the increase in the proportion of compound engines built at their works last year, as compared with four or five years previous, a prominent locomotive builder said: "After eliminating from the total number of locomotives built in our shops last year, foreign locomotives, switch engines, electric and compressed air locomotives, and various other specialties which we build, of the road engines turned out for this country 70 per cent were compound."

Since having this subject under consideration, in conversation with another of the principal locomotive builders, he said in answer to the same question, that 50 per cent of the road engines for this country turned out of their shops within the last year were compound.

It seems to your committee that compounding has passed the questionable or experimental stage and is now so generally recognized as one of the known methods for effecting a reduction in locomotive fuel consumption, as to warrant making it a special feature of this report.

The committee is further of the opinion that the American Railway Master Mechanics' Association has so often had this matter under consideration and investigation, and such a large portion of the members have had actual experience in the operation of compound locomotives, that the association should be prepared, and ought to, in justice to itself, give its approval or condemnation of the compound locomotive, and place itself squarely before the world as to why it does so.

Feed-Water Heaters.

Using the exhaust steam from air pump and cylinders for heating feed water, your committee looks upon as being one of the most promising directions in which to effect a reduction in locomotive fuel consumption. This feature can be applied to existing engines, as well as new, with a moderate expense and but slight changes in existing arrangements, and is adapted to work in connection with several other fuel economizing devices, such as wide fire boxes, compounding, etc.

The average yearly temperature of water as delivered to locomotive tenders is from 50 to 60 degrees Fahr. For every 12 degrees that the temperature of the feed water be raised by exhaust steam or waste gases before the water enters the boiler, there will be a saving of one per cent in fuel. If by the means recommended an average temperature of 200 degrees for the feed water can be maintained, a saving of 12 per cent in fuel would result.

The method we recommend for accomplishing this is illustrated in Figs. 1 and 2, and consists of a steam pump adapted to handle hot water. The exhaust from the air pump, water pump, and a branch from the exhaust in front end, to be discharged into a partition of portion of tank, which we will designate as the hot-water tank.

The hot-water tank will have a capacity of 300 to 400 gallons of water. The partition will be water-tight, with the exception of a ½ inch space at the bottom, through which the water will maintain a constant level on both sides of the partition.

The exhaust from the cylinder saddles is conducted to the rear of the engine through a pipe, as shown in Fig. 1 at A; and the exhaust from the water and air pumps, as shown at B and C, joins this piping, which enters the bottom of the hot-water tank at D, and is then conducted up through the tank to the top and through a return bend back to within two inches of the bottom of tank, where it terminates in a bell-shaped open end through which the exhaust escapes into the water.

In the exhaust pipe and between the pumps and cylinders is placed a shut-off gate at E, to close the exhaust from the cylin-

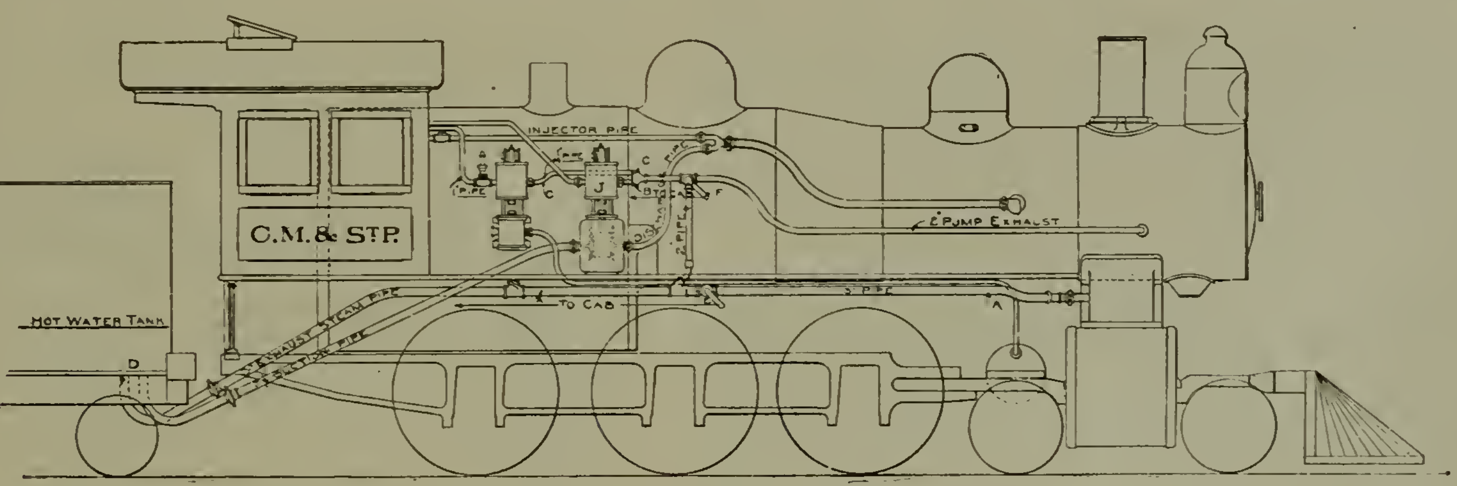


Fig 1
General Arrangement Of Feed Water Heater

ders to tank if desired; also a gate at F where pump exhausts may be cut off from the tank and delivered to the front end.

The suction pipe for water pump is arranged to draw water from 4 inches below the surface of the water in hot-water tank, the suction end being supported by a float or buoy, as shown in Fig. 2 at G, which rises and falls with the level of water in the tank. The other end of adjustable pipe connects with a flexible joint at H, and forms a connection through tank valve case in bottom of tank to hose and pump.

In the top of the hot-water tank is a perforated pipe, I, which connects to the pipe running down through the coal space to the under side of tender frame. When the tank is full of water, this pipe acts as a skimmer to get rid of the oil coming in with the exhaust. It also acts as a safety valve for the escape of steam, should the water in the hot-water tank get to a higher temperature than 212 degrees, and thus prevent the hot water being forced out under the partition and into the cold water portion of tank.

The pump, hot-water tank and other appliances connected with same are on the right-hand side of engine and tender. The engine should be equipped with an injector large enough to supply the boiler when worked to its full capacity. The injector should be located on the right-hand side, but should take its water from the left-hand leg of tank. This arrangement should prevent the danger of trouble or delay on the road caused by the failure of the hot-water pump or any of the heating appliances, leaving the injector practically cold water to draw, should it be necessary to use same.

We had hoped to present to the convention results of a test made in regular service with the device just described, but on account of failure to get a satisfactory pump, are unable to make a service report, but hope at no distant date to be able to advise any inquiring member as to the practical results obtained by same.

Wide Fire Boxes and Increased Grate Area.

When the state of the art is considered, they stand in much the same light as already explained for compounding—that is, it is not a new or untried feature and its first application to the locomotive dates back a quarter of a century, but its use for a long time was confined principally to that section of the country using anthracite coal as fuel. Of late years the field of operation has extended, until today a majority of engines for road service now building have this feature.

Increased grate area is so closely allied to wide fire boxes as to properly be considered in the same connection. As a grate of more than thirty-five square feet can hardly be obtained except with a wide fire box, and even this in a box forty-two inches wide or less puts the front portion of the grate so far from the fire door as to require a special effort and considerable skill on the part of the fireman to keep the front grate covered, and as the fireman is one of the important factors in fuel economy, in increasing the size of the grate it should be done with a view of keeping all portions within the reach of the average fireman, and at the same time make the work of putting in the coal as easy as possible.

One member who has made fuel combustion and gas analysis in the locomotive a special study, says:

"There are three sources of preventable loss coming under this head, which, in my opinion, may be reduced—

"1. Incomplete combustion.

"2. Heating unnecessary excess of air in the gases.

"3. Reduction of the quantity of solid fuel thrown out of tbe stack.

"Tbe first and second may be effected by improved methods of manipulation, which can be determined by chemical analysis of the escaping gases. The incomplete combuustion loss is the larger one in locomotives, which is contrary to that in stationary furnaces and boilers, where unused air carries away more heat than is lost by incomplete combustion.

"Tbe most effective way to reduce the third loss would be by the use of larger grate areas, which would afford a freer air supply and from the reduction of the resistance of the fuel bed there would be a lower suction over the fire, consequently less small fuel would be carried out witb the gases. Careful manipulation of the fire with small grates will have an influence in the same direction, because the resistance through the fire would be reduced.

"I cannot recommend any special device except larger grates, which, of course, would apply to new engines only; although there is an opportuuity of improvement with very large engines with small grates where the necessary resistance through the fire is abnormal, or where it is impossible to get sufficieut air into the fire with prevailiug practice. The remedy would be to introduce air over the fire. This is not recommended, however, uuless shown necessary by tests of the combustion, and its application and operation determined likewise.

"Complete combustiou with 12 or 13 Co_2 may be secured in locomotives, and under these conditions, the loss in the hot gases, based on their escaping at 800 degrees Fahr., would be about twenty-four per cent. Under sucuh conditions, iu stationary practice, an economizer would afford means for recovery of about ten or eleven per cent, but for seveml reasons such means are not applicable to locomotievs. The usual locomotive as compared with the average stationary boiler aud furnace furnishes an opportunity for a more efficient conditiou of combustion, but it has the disadvantages of a somewhat higher temperature of escaping gases, a very mucb greater loss in the form of solid fuel, and a very much greater radiation loss from the boiler.

"The above remarks concerning excess of air do not apply to engiues with extremely large grates, because with them the loss on this accouut may be considerable.

"Improvement based on tests of the combustiou products are always of importance, and there is no difficulty in demonstrating the value of such tests."

We are not prepared to recommend a definite proportion of grate to cylinder or heating surface, or the relative width to length; neither do we believe that such proportions can be correctly giveu and have them apply to all grades of fuel and classes of service. However, from informatiou received from those who have bad the most experience with wide fire boxes and increased grate area, and from reports of combustion tests showing the gas analyses of different sized grates and fire boxes, we feel warranted in placing this feature among the methods by which some improvemeut in fuel economy may be effected, but all the conditions should be carefululy considered before a radical departure is made from tbe deep and narrow box.

An uueconomical feature of the large fire box and increased grate area is the heating of unnecessary excess of air iu the gases. This cau be kept down to a minimum by careful firing and well fitting ash pans aud damper, if the latter be carefully manipulated. Adjustable grates, wbereby the air space could be enlarged or decreased at will, might, if such a device could be made entirely reliable, better perform this part, but we kuow of no grate that has withstood the test of service that will fill the requirements.

Another feature is the greater amount of coal that must be burned on a large grate while the engine is standing still and the greater care required to hold the steam below the popping-off point. The safety valve, if allowed to frequently perform its fuuction, will be very wasteful of coal. This loss has been figured out as equal to ¼ pound of coal per second, or a small scoopful per minute.

Wide fire boxes when operatiug under favorable conditions and burning fuel suitable to their construction, will develop economies worthy of consideration; but in a service where much of the time is spent standing still and the fire being kept in a condition to go whenever the signal is given, enough fuel will be wasted while standing still to overcome the economies obtained while running.

Instructing Enginemen.

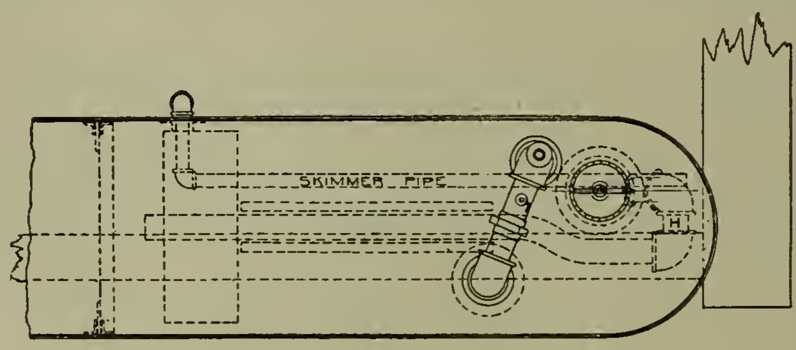
Traveling engineers and firemen; light and intermitten firing; keeping a level fire; prevent excess of air in gases; perfect combustion; checking coal consumption each trip, aud constant attention to details, are some of the recommendations of members as the most promising directions in which to effect a reduction in locomotive fuel consumption.

Engines Adapted to Service.

This will prove economical, not only so far as fuel cousumption is concerned, but in every other way. The operating of high-speed trains with small wheel engines, runuing them at an excessive piston speed, or runniug large engines where smaller oues will do the work, will always prove expensive from a fuel standpoint.

"Engines in constant service" is recommeuded by one member as a promising direction in which to effect a reduction in locomotive fuel consumption. If considered from the standpoint of keeping constantly in motion after starting out on a run, the results will be ecouomical. Bad meeting and passing points leave their mark on the performance sheet. Short divisions with frequent lay overs, or excessively long runs on which the fire becomes clinkered, are not conducive to fuel economy.

On most roads, at the present time, the results sbown on the performance sheet are based on the gross tons hauled one hundred or a thousand miles, and in order to make a favorable show-



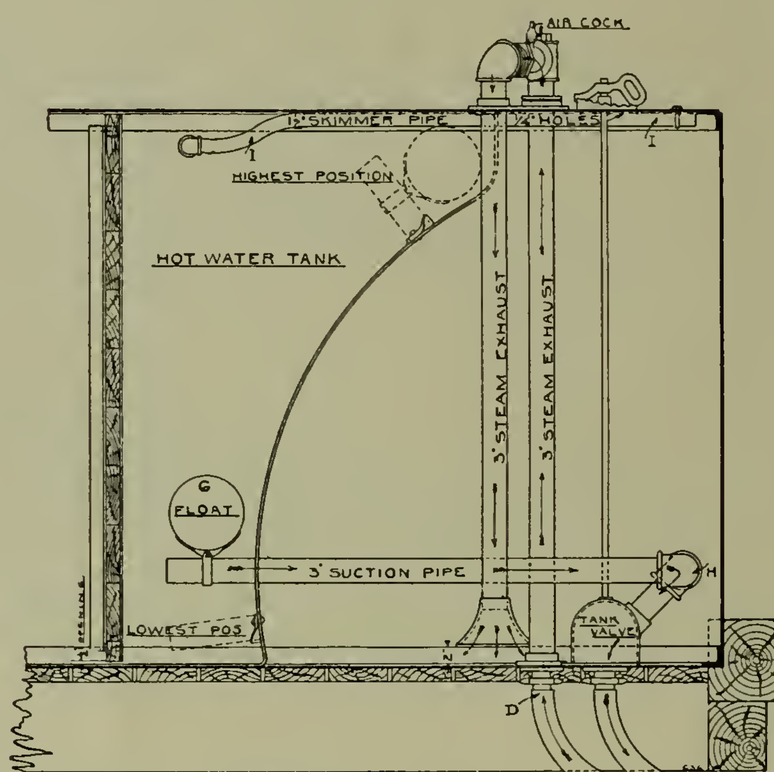


FIG 2

ARRG. FOR EXHAUST STEAM IN TANK

ing full tonnage must be hauled. (By this we do not mean a train that requires full stroke, or if a compound engine that the live steam should be worked in the low pressure cylinder with the engine making but from three to four miles an hour; but all the engine can haul over the ordinary grades at ten, or on the level at from eighteen to twenty-five miles per bour.)

The run should, iu order to prevent loss at terminals, be as long as both the fireman and fire can be kept in good condition. An exhausted fireman or a dirty fire will not save fuel; aud when the engine arrives at a termiual the lay over should be sufficiently long to allow of the flues, arches and grates being well cleaned before starting out on a trip.

Uniform Grades of Coal.

This is another important factor in fuel economy, especially when the grade of coal varies and requires different treatment in both draft and firing. Coal of the same general grade should be furnished to a section or division and the engines kept where they will get but oue grade.

There are those bere who can remember when ten or eleven feet was the maximum length for a locomotive flue. Today from sixteen to eighteen feet is quite common practice in new engines, and nineteen feet has lately beeu tried; yet, so far as we know, the Association, or the members of same, are not satisfied as to whether the economical leugth for a 2-inch flue has been reached.

Superheating.

Superheating of steam is much in favor in stationary practice in Europe, and is beginning to receive considerable attention in this country. We understand that to some extent efforts have been made to apply the principle to locomotives with economical results, and that tests are now under way in this country along the same lines. If its application to locomotives can be made entirely practicable, it may be one of the means of determining the economical length of the flue; but both these points are worthy of consideration and might furnish a fit subject for the special investigation of one of your committees.

Bates Fire Doors, Etc.

Bates fire doors, Master Mechanics' front ends, outside lap and no lead on valves, coarser netting and large nozzles, and piston valves have also been suggested to your committee as means by which saving in fuel might be effected.

Automatic Stokers.

Automatic stokers are being used for a double purpose. It is expected by those personally interested that economical results in the use of fuel will be obtained, and at the same time the labor of the fireman will be considerably lightened, requiring less effort and skill on his part to feed and operate them when doing the work by hand. After considering the several recommendations, the conclusions arrived at are that the most promising directions in which to effect a reduction in locomotive fuel consumption must be largely determined by each particular railroad for itself, the methods varying to suit the local conditions, such as class of power, fuel, service, and to what extent fuel economizing features are now successfully employed.

Many of the recommended methods are applicable only to new construction, but engines building today should be serviceable for twenty to twenty-five years to come, and care should be taken to incorporate in them all well developed features of economy.

As far as we have been able to learn, a reduction in fuel consumption has resulted from compounding whenever the engines were intelligently handled. This feature seems to us to be one of the most promising directions and the one that would yield the largest per cent of saving.

Wire fire box and increased grate area under certain conditions, with the size of the fire box and grate area modified to suit the conditions, when intelligently handled, should be one of the means of effecting a reduction in locomotive fuel consumption and should be carefully considered for new road locomotives.

As to economical length for locomotive flues, we have no definite recommendation to offer; but would call attention to some of the latest designs and constructions in which one of the new features is flues of an heretofore untried length. So far as we have been able to learn, the uneconomical length for flues has not yet been reached.

Using of the air pump and a portion of the other exhausts for heating feed water, appears to your committee to be one of the most promising directions by which to effect a reduction in locomotive fuel consumption. It is applicable to old and new construction and to all classes of service. Your committee had hoped to present to this convention something more tangible than a picture with which to back up their recommendation, but failed in the market to locate what seemed to be a satisfactory pump for the place. In our judgment, there are no requirements which cannot be met, and assume that it is only a question of showing up what is wanted, together with the volume of business this feature would open up, to have the pump manufacturers bring out what is required.

All the methods referred to are worthy of consideration. Many of them are adapted to work together, each one exerting an individual influence toward fuel economy, and when aided by earnest and intelligent effort on the part of the engineer and fireman, in connection with close attention to details on the part of the motive department officials, a reduction in locomotive fuel consumption will follow.

In discussing the above report, Mr. Rhodes spoke at length, emphasizing the matter of coal economy, in which he was endorsed by Mr. Sanderson. Mr. Sanderson also referred to the compound locomotive as follows: I have some hesitancy in opening that question, but I want to be distinctly understood as fully indorsing the compound principle when properly applied, but there are times and conditions of service when the compound is, I believe, not as economical as a simple engine. There are conditions of service where the compound and triple expansion engines have given the highest satisfaction, as in marine work, puumping duty and in stationary service where the loads and speeds are fairly constant. In these particular lines the principle of divided expansion has reached its highest development and efficiency. In cases on a railroad where the grade is practically uniform, nearly level or extremely heavy, and the engine can work for a great proportion of its time, or at least during a large proportion of its fuel consumption, at a definite rating of power for which it was originally designed, there is no qustieon in my mind but the compound engine is the proper thing. But where you have a varying roadbed and where you want to change your engines from one division to another, continually, so as to make the best use of your power, and one division may be suitable for the compound, and one division may not, I am rather in doubt whether it is fair to say that the compound engine will be as successful and as a well designed simple engine under these conditions. There are certain conditions to which the compound engine are applicable, and I believe the early failures of the compound were due to its misapplication.

Mr. Barnum took issue with Mr. Sanderson's statement in regard to the compound engine not being of uniform economy. He stated that the Union Pacific has in service, or about to go into service, one hundred and twenty-two 24-inch cylinder compounds, and that they expected great economy in the matter of fuel. The question, in Mr. Humphry's opinion, resolved itself down to one of eternal vigilance. Mr. Humphrey recently inaugurated a system of making ten-day records for the purpose of improving fuel records. The loss due to incomplete combustion was referred to, and Mr. Miller stated that the education of the firemen was the important matter in this regard. To do this he thought every pound of coal should be weighed, so that each fireman should know to the pound how much fuel he used as compared with other firemen.

MAXIMUM MONTHLY MILEAGE IT IS PRACTICABLE AND ADVISABLE TO MAKE; HOW BEST TO MAKE IT, BOTH IN PASSENGER AND FREIGHT SERVICE.

(T. H. Symington, Mord Roberts, Geo. F. Wilson, Committee.)

In this report we give only the summary of the conclusions which they recommend for a maximum monthly mileage, as follows:

That short divisions be lengthened so that the average service will consume from eight to ten hours over the division one way.

That there be as low a maximum grade and degree of curve as practicable, and that helping engines be placed at one or two points on a division where the grade is considerably in excess of the rest of the division.

That unnecessary stops be eliminated as far as practicable by the better location of water columns.

That as far as practicable schedules be arranged to give reduced lay over away from the home terminal.

That crews be required as far as practicable to live at the point most conducive to economy of operation, and to keeping engines in service.

That transportation officers avoid the demand for more power when during a short heavy season some other requirements of the service can be adjusted temporarily, thus avoiding the laying up of engines in normal season.

That transportation officers do not make the demand for all engines to be in good order, resulting sometimes in the purchase of new power for heavy seasons, when it might be avoided, and thus provide for increased mileage in normal seasons.

That engines be double-crewed with extra men for relief when there is enough work on one engine for two men. When this is not the case, that they be single-crewed with extra men for relief.

That special attention be given to the roundhouse force and equipment, and that it be the last place to suffer from reduction of force.

That the very best talent in the machinery department be placed in charge of the roundhouse work, and that system alone be not depended on for results.

That the inspection of engines be reported separately by the enginemen and inspectors, as a check on their attention to detail.

That the roundhouse work be specialized as far as possible, so as to avoid a division or uncertainty of responsibility.

That the existing methods be overhauled so that necessary routine work will not cause engines to lose their turn.

That with the change to the pooling system, adequate preparation be made for more careful inspection, and heavier charges to maintenance.

That interchangeability of parts be adhered to as far as practicable in various types of engines.

That we strive after simplicity of design, and adhere to what we know is all right, unless there are excellent reasons for change.

The discussion of this report was opened by Mr. Rhodes, who seemed to think the committee to be a little afraid of criticising the other departments. Mr. Deems, Mr. Quereau and Mr. Rosing spoke along the same line, in that all referred to the fact that delays due to engine failures formed a very small percentage to the total. Mr. Quereau stated that the percentage of total delays due to the motive power department on most roads west of Chicago, including hot boxes on cars and all failures of cars as well as locomotives, will not exceed 12 per cent of the total delays.

Mr. Joughins' remarks we quote in full, as follows: "About three years ago we thought that with 210 engines we had a fair number of engines to run our traffic with. At that time we increased our mileage about 13 per cent, and also increased the engine stock about 10 per cent, and since that time we have gradually increased the amount of traffic handled, that is, the number of cars hauled and the engine mileage, so that it increased every month until the engine mileage got to be 90 per cent greater than what it had been at the beginning of the period; we almost doubled the engine mileage. Instead of doing our work with 200 engines as before, we did with 230 engines the work of about 380 or 400 engines. We did that by increasing the number of crews on the passenger engines and pooling the freight engines and keeping them running twenty-four hours out of the twenty-four, if possible. We are well satisfied with the result. What are the factors which produce a large monthly mileage? Is it a question of water, coal, trains, men or what? A great deal depends on the weight of the trains, the grades and speeds; but, above all, I think is the question of the quality of coal. If the coal is not good, the enginemen cannot make big mileage."

ADVISABILITY OF THIS ASSOCIATION JOINING THE INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS.

(S. M. Vauclain, H. S. Hayward, T. W. Gentry, Committee.)

The committee recommended:

First. That this Association should not join the International Association until a more definite organization is effected.

Second. That a committee of material experts, members of this Association, be appointed to consult with the International Council (American Section) if it desires our assistance.

Third. That it would be far better for this Association to adopt the specifications agreed upon by the International Council, if a majority of our members would endorse the same, instead of becoming members of the International Council, thus leaving our Association free to depart from them at any time a majority vote would favor doing so.

The report of the committee was adopted.

THE ESTABLISHMENT OF A JOINT LIBRARY IN CONNECTION WITH THE MASTER CAR BUILDERS' ASSOCIATION.

(A. M. Waitt. Committee.)

The undersigned was appointed a committee to confer with a similar committee of the Master Car Builders' Association to consider the establishment of a joint library for the two Associations.

The matter has been carefully canvassed from the standpoint of both Associations. and as a result of the joint deliberations, would report that it is deemed inexpedient at the present time to establish a joint library.

First. Owing to the expense involved.

Second. In all large cities excellent reference libraries are maintained. whose facilities are available to all.

Third. There are comparatively few of our members who would be likely to avail themselves of such library if established.

The report was accepted and the committee discharged.

Index of Proceedings.

The committee on indexing the proceedings reported the following. which was accepted by the Association and the committee discharged: Your committee thought that the best report they could make would be to bring in the index itself. The index is printed and a dozen copies which were bound and sent from Chicago have not reached here as yet. They will be sent to all the members by the secretary. I will say that the work was done for the committee by Mr. Fowler. and very thoroughly done. the index of course being a complete index for our entire proceedings: there are some 33 years if I remember. making a volume of about 200 pages. The entire cost for doing the indexing. the printing and binding will amount to about $1,100, but it seems to me the money is well spent and the index will make the proceedings of great value to all members who care to refer to them.

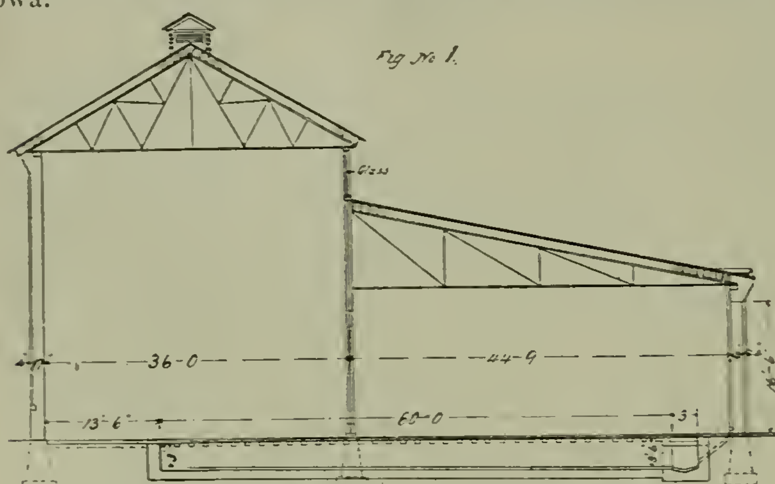
AN UP-TO-DATE ROUNDHOUSE.

(Robert Quayle. D. Van Alstine. V. B. Lang. Committee.)

Your committee has concluded that the length of the roundhouse should not be less than 80 feet in the clear. Doors should have a minimum height and minimum width of 16 feet and 12 feet in the clear. respectively.

The upper portion of the doors should have as much light in as can be obtained without interfering with the strength of same. The window space should be as ample as considered consistent with the strength of the walls in the outer circle of roundhouse.

In building roundhouses of the minimum length of 80 feet, it will at once be seen that the light from the outer and inner circle of roundhouse will be insufficient. particularly in the short days of the autumn and winter. and as more light is desirable about the center of the house. it will at once be apparent that we must arrange for additional light. This can be done as shown in Figs. 1 and 2. without necessitating skylights. which continually give trouble from leaking. Roundhouses having roofs like Figs. 1 and 2 can be seen in actual use at Norfolk, Virginia, and Mason City, Iowa.



NORFOLK & WESTERN ROUNDHOUSE.

Engines should head into roundhouses of modern type. first. because of the more room afforded at the outer circle of the house, where most of the work on the engines is done when headed in in this manner; second, because of the increased light that can be obtained.

The location of smoke-jacks will be determined by taking the dimension of your longest engine and dividing the space up equally at either end. In the north. on account of the cold weather. it is necessary to use smoke-jacks. In the south. continuous ventilators (as shown in Fig. 1) give good results.

Your committee would recommend that ventilators be used at least in every other stall. with a minimum dimension of 3 by 4. and not less than 2 feet in height. and these to have the usual slats in the sides. In the northern country we recommend that a damper or drop-door be placed in the bottom of each ventilator. so that they can be closed up in winter time when necessary. In the southern districts of our country. it is not considered necessary to have these additional openings where they have the continuous ventilator at the highest point of the roof. which is used instead of smoke-jacks. as shown in Fig. 1.

The length of pit should be 60 feet: the depth of same to be governed by the type of power used on the line for which the roundhouse is being built. For example: If engines have large fire boxes, and the wheels are from 63 inches and upwards over all. we recommend that the pits be 2 feet 6 inches minimum depth. and 3 feet maximum depth. If the wheels of the locomotive are low, and most of them deep fire boxes, we would recommend that the pits be 3 feet minimum and 3 feet 6 inches maximum depth.

Two methods of supporting the rail on top of the pit walls are in vogue: one consisting of placing short ties extending to the edge of the pit wall and about two feet long. the space in between them being filled with concrete. which helps to support the rail in case the tie should soften under the action of wash water, etc. The other method consists in surmounting the pit wall with a timber about twelve inches square, upon which the rail is spiked. This construction, however, is much more expensive than the former, and apt to deteriorate more rapidly. In either case, provision should be made for raising the engines by jacks. In the first arrangement of pit this is provided by placing a 4 by 12 timber on top of the ties just outside of the rail, whereas in the latter construction a timber sometimes 12 by 16 is placed on edge immediately next to the rail sill, which gives ample strength for the base of the jacks, this timber being supported by piers or pilasters from the main pit wall. In either case pit wall should be designed to form proper support for the jacking timbers. It is quite important that the sills which support the rail be kept as dry as possible, and as water will accumulate between the floor and outside of rail, it is preferable to have this filled in either with wooden strip or cement, or if this is not done, to provide proper drainage under the base of the rail so that water running into the groove can continue down into the pit. This can be done by means of cross-notches underneath the base of rail about every three feet.

The floor of the pits under the engines should be formed to a convex surface. the center being about three inches higher than the sides. which allows workmen to work on dry floor even if there should be some water trickling through the side of the pit.

The drainage of the pit is a very important feature. The old-time method of having pipes and gates was a continual source of annoyance, as these pipes would continually choke up with waste and other refuse. Many modern houses have the engine pits extend to an annular pit. which is just inside of the main doors. this pit being made lower than the engine pits. This annular pit should be drained at some suitable point into the turntable pit or system of drainage. This pit should be deeper in the center than at the sides, and besides offers an opportunity, where this is desired, for stringing water and steam pipes. This pit should have loose covers which can be removed when necessary to clean out the pit. but ordinarily form a close floor. The turntable pit should have a tile drainage to the main sewer. It should also be either paved with vitrified brick or cemented. An up-to-date roundhouse floor should be of vitrified brick laid on edge in a bed of sand. The consensus of opinion is that the brick floor is the best. and your committee would recommend a concrete bottom and then a layer of sand in which to bed the vitrified brick. When brick is laid, the floor should be covered with a layer of sand or tar (tar preferable) to fill in the joints. We also recommend that the water and blow-off pipes be placed in the annular pit, all other pipes to be placed overhead. with drop-pipes between every other pit, with suitable hose connections to connect with the locomotives. The blow-off pipe from the top of the dome to be connected with short pipes through the roof over each pit. connection with the engine to be made with flexible metallic joints.

We would recommend that the stationary boilers which are used for steam heat, pumping. machinery, etc., carry 125 pounds steam pressure. and that the steam be conducted through the house in pipes not under 1½ inches.

It is recommended that compressed air be supplied at 100 pounds pressure, as this is the most suitable for general uses, such as pneumatic hammers, air jacks. rolling flues, etc. One arc light should be located over the center of the turntable. and not less than three 16-candle-power incandescent lamps should be placed between the pits: one about opposite the cylinders, another about opposite the cab, and the third about the center of the tank. There should also be located in convenient places in every other stall two connections for portable lamps for pit work and fire box work; all lamps to be covered with wire guards for protection.

Your committee is unable to satisfy itself on a roundhouse smoke-jack that would meet with general approval. but we are agreed that the smoke-jack should be made telescopic to fit the stack. It should also have a certain amount of swing parallel with the track. so as to provide against the same being pulled down should the engine move with the jack resting upon the engine stack.

The smoke-jack should be provided with a damper. so that when the engine is put into the house and no fire on the grates. it will prevent the cold air from passing up through the flues. We also are of the opinion that a lever ought to be used to raise and lower the jack instead of the cable and sheaves as are commonly used.

Every modern roundhouse should be provided with a drop-pin for removing driving wheels. extending across two tracks: also one closer to the outer wall of the house for removing truck wheels. These pits should be so arranged that the wheels can be removed from an engine on one track. and run over to the adjacent track. and then lifted up to the floor.

Jacks are preferably worked by power. air and water being the chief sources. The hydraulic power, however, has the advantage in that there is not the same elasticity and vibration that is noticeable when air is used.

Turntable.

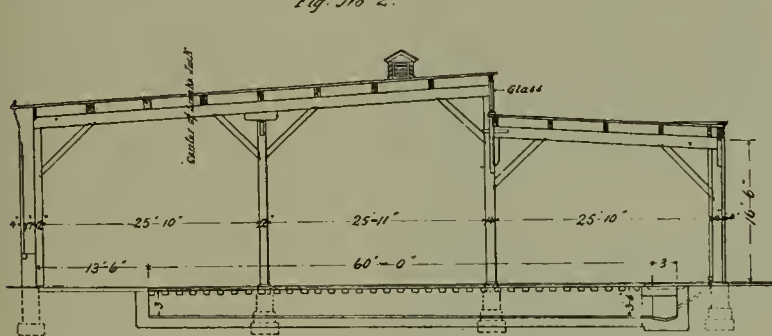
In the answers received, a large majority favor structural steel turntables, designed so that all parts can be easily accessible. and should be frequently painted. When new tables are being put in. your committee would recommend that they be made at least seventy feet long and well braced. Experience shows that the long table with a load on it is more easily handled than the shorter table with the same load. This is no doubt due to the fact that you are better able to balance the engine. by having longer leverage. It also avoids the crossing frogs on radial tracks. The center should be supported on conical steel bearings, and latches at both ends of the table. There should be a decking forming a footbridge on each side of the rails. This decking should be no less than 15 feet wide over all. Your committee recommends electric power for operating turntables in preference to any other in use. If, however, there is no electrical power available, the gasoline engine can be used for this purpose very successfully.

Your committee recommends as many wall benches supported by brackets as there are stalls, and in addition to these, several portable benches. It is the opinion of your committee that every well-managed roundhouse should be provided with a tool-room for the care and maintenance of hand tools and supplies. An annex should be provided to contain the necessary boiler, pumps and machine tools for making ordinary running repairs, as well as a room for supplies. We would recommend the following machinery, namely: One 30-inch engine lathe, one 12-inch engine lathe, one 30 by 30 inch planer, one 24-inch drill-press, one 20-inch shaper, one grindstone, one bolt-cutter, one screw or pneumatic press for rod bushings, one blacksmith forge and anvil, etc. Where size of the cylinder demands it, the large lathe should be increased to 36 inches.

We further recommend that the following portable tools be provided, namely: Portable crane, valve-facing machine, air motors, air drills and hammers, cylinder boring machine, valve setting apparatus, chain block and fall, hydraulic jacks, small air press, pinch bars, chains, tongs, wrenches, etc. It is recommended that light tools, wrenches, etc., be kept in the tool-room, while the heavier tools, like jacks, levers, pinch bars, etc., be kept in suitable places in the roundhouse. In regard to coal-chutes, the large majority of the replies are that the inclined track chute is preferred where there is sufficient space. Inasmuch as there is a committee to report on this subject, we have decided not to make any definite recommendation. Your committee considers that the proper location for a water-tank or standpipe is where it will serve both inbound and outbound tracks, and that standpipes and tanks should have proper drainage to carry off overflow and waste water from the tank. For handling ashes and cinders, we conclude that the cheapest arrangement, and one which is least liable to cause trouble by breaking down, is a depressed track between two tracks, the depressed track to be deep enough so that the ashes can be hoed from the cleaning floor directly into the ash cars, and the double ash tracks being merely for the purpose of having engines desiring quick treatment pass around those which may be a longer time on the pit. If, however, there is not sufficient track room for this arrangement, some mechanical device for taking care of the ashes will have to be resorted to, provided the traffic warrants the expense.

It is thought desirable by your committee that each engine should carry its own record as to wash-out, stay-bolt inspection, etc., and this can be most conveniently done by means of a card which is always visible in the cab of the locomotive, and can be turned in at the end of each month for file at the Master Mechanic's office. This should not, however, be construed as displacing the usual roundhouse records, as these should be available when the engine is on the line.

Fig. No 2.



CHICAGO & NORTHWESTERN ROUNDHOUSE.

It is the opinion of your committee that stay-bolts should be tested once a month. The hammer test is satisfactory when bolts are completely broken through. When only partially broken it does not tell the story. Where tell-tale holes are drilled, or hollow stay-bolts used, a careful inspection of the tell-tale hole for the presence of lime is considered most satisfactory. It is also desirable that a record should be kept of all such tests. In making the hammer test, about 40 or 50 pounds of steam or air pressure should be used in boiler to separate the ends of the broken bolts.

Roundhouse foremen.

The opinion was held almost unanimously in favor of machinists filling the position of roundhouse foremen. A few believe that engineers who are also machinists would make good men. Your committee is of the opinion that it is very necessary that a roundhouse foreman should have had practical experience as a machinist, and that if he could have some experience as either a locomotive fireman or an engineer, it would make him a better roundhouse foreman than he could be without such experience, as he would then know the conditions that exist on the road, and could therefore do more intelligent work.

In the discussion which followed the reading of the report on "An Up-to-date Roundhouse," Mr. Rhodes pointed the objections to a flat-roofed roundhouse on account of its being impossible to properly ventilate and light it. Mr. Sanderson thought the depth of the pits excessive and that the plan suggested by the committee, of heating by using a heated air blast, was all right for the northern roads, but for the southern roads such an outlay would not be warranted. Mr. Rosing's remarks we quote in full as follows:

With regard to the water and blow-off piping, I notice the committee states that the blow-off pipe from the top of the dome should be connected with short pipes from the roof, but over the pit. We have pipes from each pit, but they connect with a pipe running around the house, but on account of the slight success of washing boilers with hot water through the ordinary pipes we have connected with each of our large roundhouses a sump of about 25 by 30 feet and about 30 feet deep, and blow the steam from the engines directly into the water in the sump. In washing out the engine we blow off the steam first and the water is then let out into the engine-house pit, but the blow-off of steam goes into the sump and will heat a large body of water to 110 degrees, which is as hot as any man can bear in handling it. A suction pipe is connected with this sump and we, therefore, have plenty of water for washing out as well as filling boilers.

With regard to the light I notice the committee recommends that three lights be placed between the pits. In our last roundhouse we put in but one light of 100-candle power, placed in relation to the smokestack so that the light will shine under and into the engine. That gives a 100-candle power light on each side of each engine, and in cold weather the engineers can conveniently oil their engines without the use of the torch. There is not much saved in dispensing with the torch, but I mention that to show that the engine is well lighted underneath.

Mr. Quereau said that he had seen a roundhouse lighted by electricity employing a method not mentioned by the committee, in which by the use of drop lights can be put between the engines and an extension light by which the man going to work can put the electric globe as close to the work as he wishes. If it is a light hung from the roof he may get into such a position that a shadow will interfere with his work. If the light is in the form of a bulb on an extension, protected by a hood, he can put it where he wants it. This is a simple method and might reduce the cost of electric light in a roundhouse, enabling the work to be done with a less number of lights.

Mr. Bentley's remarks closed the discussion and we give them in full, as follows: During the twelve months we have been in our house at Clinton, Ia., as Mr. Rhodes suggested, we have discovered a lot of mistakes we have made, and if we were going to build another roundhouse we would make some changes. The hipped roof has been adopted in place of the flat roof. I do not think we would put our water pipes, steam pipes and other pipes overhead, but would, as the committee suggested, place them in an annular pit going around the house. After the water pipes had been set up a short time we found that the water from condensation was dripping from the pipes on the engines, and the foremen were complaining that the engines were in a dirty condition, and we had to put some galvanized iron drips underneath the pipe to carry the drippings to the post. When that house was built provision was made for a large amount of what might be called additional lights. Lights in the doors and through the doors and windows, everywhere except the roof. Even with the additional light we find we are in the dark at certain times of the year, and we would recommend any change that would increase the lighting of the house either from the roof or in any other practical way. The ventilation of a roundhouse is very important. In our old house we had a peaked roof, but there was no ventilation in it. The same thing happned in the new roundhouse at Clinton. We did not have sufficient ventilation to take care of the gases arising from the engine; we cannot have too much ventilation in a roundhouse. Another mistake is putting the blow-off pipes in the roof for blowing the water and steam out of the engine. With our system of piping we cannot lead the water upward. If we had blow-off pipes in the annular pit the water would flow by gravity.

One of the gentlemen spoke about piping for gasoline or gas. We have a movable gasoline tank by which we heat our tires and take them off and put them on. Our electric turntable motor has been in operation six months, and during that time it has given very excellent service. It is a 10-H. P. motor and by its use we simply have one man to operate the turntable. He signals the engines on the table, turns them and then signals them off. Another man opens the doors and puts the engines under the jack. By the use of the electric motor we have been able to reduce the service to the extent of two men at night and one man during the day. I am in favor of eliminating the use of wood wherever possible in a roundhouse. The drop pit in the Clinton roundhouse is something dissimilar to anything I have seen, in so far that the driving-wheel pit and the engine-truck pit are both operated by the one jack, which is of the hydraulic pattern. Whenever it is necessary to drop a pair of drivers and the jack is under another engine we transfer it on wheels from one pit to the other. I think the hydraulic jack is better than the pneumatic, on account of its rigidity, the pneumatic jacks being springy and uncertain. I wish the committee had been in existence and made this report before we had built our roundhouse, as we would probably have adopted some of their recommendations. They say an electric light should be located over the center of the turntable. I think it is necessary for some illumination to be located there. W have extension lights kept in the storeroom all the time for use under the engines, and there is no doubt they are much better and safer than the torch.

A member stated that the staybolts should be tested oftener than once a month. As long as you have staybolts which will test themselves, I do not think it necessary to take the time to test them. We have staybolts with tell-tale holes. We make an examination every three months, and if any of the staybolts break between the examinations it tells its own tale and we replace them. I cannot agree with the use of cast-iron jacks, as those in use are very unsatisfactory; since it is very unusual to find them in order. Mr. Quereau's suggestion for handling the work of the men, by issuing work slips, was practiced by me as a roundhouse foreman years ago. The suggestion is all right and results in great economy in the work of the men.

The last topical question, "The Maintenance and Lubrication of Metallic Piston Rod Packing," was to have been opened by Mr. D. Van Alstine, who sent a communication on the subject, owing to his inability to be present. This we give in full, as follows:

My reason for suggesting this topic for discussion was to ascertain to what extent roads are having trouble with metallic piston rod packing, and what has been done to remedy the trouble. A limited inquiry leads me to think that packing in heavy high pressure engines is a considerable item of expense, and the result is not very satisfactory. Some of the principal causes of packing blowing are probably as follows, viz.:

1. Poor lubrication, due to pooling engines, by which engineers are less careful, or inefficient cups or swabs.
2. Piston valves with insufficient relief valves for getting rid of water in cylinders.
3. Large piston rods, which through unequal lubrication on opposite sides of the rod, furnish greater leverage to spring the packing open.
4. Insufficient play of the vibrating cups in the stuffing box to allow for wear of crossheads in guides and piston in cylinders.
5. The angle of the packing in the cups too acute.

The most important of all these is, in my opinion, poor lubrication, and it seems also the most difficult to control. Feed cups are unsatisfactory, especially where a pipe has to be used to carry the oil to the swab, and swabs become glazed or are blown away from the rods by leaking steam.

Something of a more adhesive nature than ordinary lubricating oil seems desirable and we are experimenting with hard grease with some prospect of success, but cannot say positively as yet what the result will be.

From observation and inquiry the following points appear to me to deserve especial attention:

1. Lubrication.
2. Sufficient clearance of packing cup is stuffing box, say ¾-inch.
3. Correct angle between packing and cup.
4. Packing cup a close fit to the rod.
5. Proper alloy and packing rings finished.

After the following officers were elected the meeting adjourned: For president for the coming year, Mr. A. M. Waitt; vice-president, Mr. J. N. Barr; second vice-president, Mr. G. W. West; third vice-president, Mr. F. A. Delano; for treasurer, Mr. Angus Sinclair.

The Master Car Builders' Convention

THE Master Car Builders' Association met in its thirty-fifth annual convention at Saratoga, N. Y., June 24, 1901. President Chamberlain in the chair. The sessions lasted three days and the work done was in sequence as follows:

GENERAL OPENING BUSINESS.

After the opening prayer an address of welcome from the Mayor, Mr. Chamberlain read his address, from which we extract the following:

It gives me a personal pleasure to deliver my initial address as president of this association, as well as to have the honor to open the first convention of this organization brought together in the present century. Since our last convention the business of the country, in a general way, has been prosperous and our export trade has far exceeded that of any former year. To my mind the railroads of this country have to a larger degree than any other branch of business made this condition possible. In relation to matters that brought us together, the arbitration committee have investigated and passed on thirty-one cases brought before them, which is the least number during any previous year, and beats the record of 1899—35 cases; 1900—33 cases. This committee also reports recommendations from various railway clubs relating to our code of rules, and before I read the report on this subjeect, I desire to express my personal opinion that it would be unwise to make any changes unless the latter are, all things considered, of valuable moment; I would sooner see a smaller than a larger code of rules.

I desire to call attention to the last two paragraphs on page 3 of report of committee on standards, which, if followed up by home practice, will result in securing a more perfect condition as regards M. C. B. standards than now exist.

Your committee on "Draft Gear" shows that considerable work has been spent on this subject and gives valuable information of tests made, but they do not feel they are yet in a condition to make any recommendation as to details. As this subject is one of the utmost importance I would recommend that the committee be continued another year.

Your committee's report on "Revision of Recommended Practice for Springs," including design for springs for 100,000-pound cars, is worthy of your attention and their report and drawings accompanying the same should be carefully considered.

Your special attention is called to the report of committee on "Laboratory Tests of Brake Shoes," made at Purdue University. The information gained by the committee is certainly interesting and instructive, and the details as shown by the chart and data should prove to be valuable to the members of this association.

The standing committee on "Triple Valve Tests," presents a report showing the performance of a valve called the "Hibbard," which in the summary of the tests shows the latter to be instructive and valuable, inasmuch, as while it failed to meet under "a strict accounting" all of the requirements, it goes to show that mechanical inventors can overcome difficulties which will admit triples of various makes to work in perfect unison with those in present use.

Your attention is next directed to the report of committee on "Cast-Iron Wheels," and the various patterns of wheels attached to the same, and I think it but proper that this convention should take a stand in the matter of weights of wheels for 60,000, 80,000 and 100,000 pounds capacity cars. You will see your committee recommended a minimum weight of wheels for repairs to foreign cars of the above capacities, and further recommend a stated weight, 575, 600 and 625 pounds for cars of 60,000, 80,000 and 100,000 pounds capacity, respectively, that are cast after September 1, 1901.

Your committee on "Air Brake Hose Specifications" is to be commended in making direct recommendations as regards specifications, as to material and dimensions, as well as three tests which each lot received should be required to stand in order to be accepted for use. This matter has been before us since 1897 (see Mr. A. M. Waitt's able report to 1898 convention), and it would seem that the time has arrived when some decided action should be taken by this association.

I next invite your attention to the interesting report of your committee on the "Chemical Composition of All Steel Car Axles," together with the suggestions they offer on the subject.

The committee on "Uniform Section of Siding and Flooring" makes recommendations regarding the same, to which, on the ground of economy, your attention is directed.

The report of committee on "Prices in the M. C. B. Rules" presents changes and additions in prices of material and labor, and without attempting in any degree to bias the minds of the members of this association, I would ask that each one of you thoroughly look into this matter so as to be prepared to act without unnecessary delay when the all-important subject of the interchange of rules comes before the convention.

Your particular attention is called to the report of the standing committee on "Tests of M. C. B. Couplers," and the recommendations they make as regards specifications for same. This report should be carefully read and digested by the members of this association, so that they will be prepared to act understandingly when the subject comes up for consideration. The report is quite an elaborate one and shows that the committee has devoted a deal of thought and study to the question assigned it.

Since our meeting last year, when our total membership was 463, it has increased 20, the number of members being at present 438, while the number of cars represented is at present 1,505,622, as against 1,356,861 last year; this being an increase of 148,761 cars.

I cannot but call your attention to the reports of the inspectors employed by the Interstate Commerce Commission, setting forth the fact that a considerable number of cars equipped with M. C. B. couplers have defects which render the uncoupling inoperative, yet this is not surprising when the fact is taken into consideration that the entire car equipment is so equipped that the percentage of defects does not appear to be so large when figured up; but that a better state of things can be accomplished there is no doubt, if the railroad companies would make a special effort in looking after and promptly repairing all defects that come under the notice of the car inspector, not only as regards the coupler and all its parts, but also as regards all other safety appliances to the car, including the air brakes.

Most of the defects mentioned are slight, and the delay to freight would be comparatively small were the repairs made promptly. This would reduce to a great degree the number of defective cars reported, and I earnestly recommend that this matter receive your prompt individual attention.

The secretary's and the treasurer's report showed the present membership of the association to be 483, of which 274 are active 186 representative, 7 associate, 16 life members. There are now 1,356,861 cars represented in the association and a balance on hand of $9,590.48, with all bills paid.

The following letter from Mr. Schroyer was read:

"A number of reports from inspectors of the Interstate Commerce Commission have reached me recently, and that which has been most frequently reported as a defect in the M. C. B. coupler is the absence of the cotter key from the knuckle pin of bars which are on the cars of line. We, as a company, have never done anything except to encourage, and all our literature implies, that the cotter key should be used in knuckle pins. As a result, however, of knuckles being broken on the road and their removal and replacement in outside yards, where changes are frequently made while trains are being held for same, the practice has resulted among the trainmen and repairers of neglecting to put the cotter key in the pin. We have never made an organized effort to correct this, for the reason that we do not consider that the presence or absence of a cotter key affects in any manner the safe handling of a car, as we have never known of a single instance where a knuckle pin has worked out of the bar while in service on the road or in switching in the yard.

"This matter was brought up incidentally at the last meeting of the Master Car Builders' Association, but was not satisfactorily disposed of. What I would like to have you to do in this matter is to bring the question up before the executive board with reference to having the association take some action in the matter. This is especially urgent for the reason that the Interstate Commerce Commission now have a number of inspectors out over the lines and have asked Congress for an increased appropriation for hiring additional inspectors to go over the road inspecting cars on all lines as to their safety as covered by the Interstate Commerce Commission's laws and other defects which may make the car unsafe for hauling. What I would recommend would be the appointment of a committee to take up and determine and recommend to the American Railway Association such items as might be classed as defects to the safety appliances of the car, and such items as might be classed as non-defective, that there may be a uniform understanding as regards this matter between the railroads and the inspectors of the Interstate Commerce Commission."

The convention then entered upon the annual revision of the rules of interchange. The report of the Arbitration Committee was read rule by rule. This committee had considered all recommendations for changes made by the various railway clubs and reported in favor of or against the proposals. It is interesting to note that the confidence of the association in the committee was so great that its recommendations were in every case adopted.

PRICES IN MASTER CAR BUILDERS' RULES.

(J. N. Barr, C. A. Schroyer, J. H. McComma, W. E. Symons, T. B. Purves, Jr., Committee).

We give only the conclusions arrived at in this report and that is that while a careful review of the situation shows some discrepancies in prices, and at varous times during the year some discrepancies in prices, it believes that it is almost impossible to make any suggestions or changes which would make an improvement over the present established prices. The discrepancies have arisen and disappeared with varying cost of material in the past year, and such will always be the case, and the present trifling discrepancies, if corrected at present, may prove to be discrepancies again within three months. After taking the whole matter into careful consideration, it has nothing further than the above to recommend.

Attention might be called to the fact that there are no fixed prices for steel cars. It is the opinion of the committee that at the present time no good would be accomplished by undertaking to do this, and that very few are prepared at present to fix figures for repairs to such cars, and it will require several years' experience before sufficient information will be obtainable to come to any reasonable conclusion in the matter. The committee therefore recommends that the consideration of prices for steel cars be deferred.

J. T. Chamberlain, President, Master Car Builders' Association.

TRIPLE VALVE TESTS.

(G. W. Rhodes, A. W. Gibbs, W. S. Morris, J. O. Pattie, W. McIntosh, Committee.)

Not having space to publish the entire report we give simply the conclusions arrived at by the committee:

It will be observed that while, under a strict accounting, the Hibbard valve failed in four of the twelve tests it was subjected to, there was but one class of failure, excluding the minor test of time charging reservoir to 70 pounds, namely, the time record, and that in the No. 2 test this failure only amounted to a small fraction of a second, so small indeed that it had to be measured by electrical recording apparatus, the combination of stop watch gage and observer's eye not being quick enough to determine the differences. The adavntages of the disk test for measuring the range of service application and the range of emergency application was well illustrated. No. 6 test was a surprise and disappointment to all those who had witnessed the fine performance of the valve in all other respects. The inventors of the valve feel confident they can reproportion the parts so that emergency action will follow service action within the 3-64 limit called for in test No. 6. When this is accomplished it is believed that the Hibbard valve will easily meet all the requirements of the association's code. The committee feels that it cannot commend too highly the action of the owners of the Hibbard valve in submitting their device for criticism and test before putting them on the freight cars of the country.

The wisdom of installing the association plant at Purdue University was well demonstrated in preparing, arranging and conducting the tests. The committee is under many obligations to Professors Goss and Smart, to Mr. L. V. Ludy, instructor in the Engineering Laboratory, who had the immediate supervision of and who compiled the chronograph and recording apparatus records; also to students Hays, Grimm, Buenting and Meddis for valuable assistance rendered, and to A. J. Cota, Master Mechanic, Beardstown, C., B. & Q. R. R. Co., who handled the engineer's valve throughout the tests.

This report was discussed only by Mr. Rhodes who went into the matter very thoroughly.

LABORATORY TESTS OF BRAKE SHOES.

(S. P. Bush, R. P. C. Sanderson, Geo. Gibbs, Committee.)

We give only the specifications recommended by the committee which for a brake shoe having the standard M. C. B. dimensions are as follows:

Shoes when tested on the Master Car Builders' testing machine in effecting stops from an initial speed of forty miles an hour shall develop upon a cast-iron chilled wheel, or upon a steel-tired wheel, a mean coefficient of friction of not less than:

25 per cent when the brake shoe pressure is 2,808 pounds.
22½ per cent when the brake shoe pressure is 4,152 pounds.
20 per cent when the brake shoe pressure is 6,840 pounds.

The rise in the value of the coefficient of friction at the end of the stop shall be within such limits that the value of the coefficient of friction for a point of 15 feet from the end of the stop shall not exceed the mean coefficient of friction by more than 7 per cent.

This specification is based upon the results obtained in the case of ordinary or reasonably hard cast iron, such as the "B" shoe of the original tests, and a good quality of composite shoe. It will be noticed that this specification does not place a maximum limit on the coefficient of friction. The committee has omitted this for the reason that it believes it is the desire of the Association to encourage high frictional qualities as well as satisfactory wear. It is found that high and uniform frictional qualities are desirable in that it makes it possible to perform the operation of braking with an expenditure of less work and with lighter and less expensive brake gear. The committee believes that it is undesirable to use a brake shoe that gives a high coefficient of friction at or near the end of the stop, as this results in sliding the wheels, and in recommending that the coefficient of friction for a point 15 feet from the end of the stop should not exceed the mean coefficient of friction by more than seven per cent, it was intended to exclude only the worst of those that have been presented for test.

Finally, it may be stated that as development in the matter of brake shoes continues, it may be found desirable to make some modification in the specification proposed, but for the conditions existing today, the committee believes that it is fair and reasonable, and urges all members to pay some heed to the frictional qualities of brake shoes that they may use.

The discussion was participated in by Mr. Bush, Mr. Sanderson and Mr. Rhodes. The remarks of Mr. Bush we give in full as follows: Without reading the report I wish to make a few remarks on the general subject of brake shoes. The committee was instructed to make a test of brake shoes that might be presented by the railroad companies, and that was the only work presented to it. We have taken most of the brake-shoes out of the stock of the railroad companies. The committee does not know where the brake-shoes came from, they know what railroads they came from but that is all. In the case of two of the shoes the committee presented them as coming from the committee. The shoes known as the Lappin and the Cardwell were presented direct to the chairman of the committee and he presented them as coming from the St. Paul road. These two shoes, while presented to the committee as coming out of the regular stock, the Chicago, Milwaukee & St. Paul road are not using them. I will say further, that the manufacturers of the shoe designated as the Lappin shoe, do not desire this shoe to be considered as their regular shoe, as it is a softer shoe and made according to a different plan. The shoe which was tested is at the Grand Union Hotel, where it can be seen, and it will be recognized as different from the regular Lappin shoe.

The report shows the result of the tests on each shoe.

In the matter of specifications, the committee recommends that some influence be used on the part of the association to counteract the tendency that has existed for some time past to use brake shoes that give very low wear and very small friction, and in preparing the specifications the committee had this point in view. Since coming to the convention the committee has had a good deal of conversation on the subject, and it is inclined to believe that the specifications, as shown in the report, offer a little bit too much influence in the direction of high friction, in that it might eliminate, if everybody followed the specifications, some shoes that really must be used at the present time. For instance, it would eliminate the use of the hard cast-iron shoe under certain conditions. At the time the committee prepared these specifications it found that there was more than one shoe that would come under the specification in other respects; but, for instance, the hard cast-iron shoe would be barred at 48 miles an hour under a pressure of 6,800 pounds, and as this shoe has been used for many years, and will be used for many years to come, the committee hardly felt justified in taking the position to bar that shoe under any circumstances, so it recommends a change in the specifications, as follows: At 40 miles an hour, 22 per cent at a pressure of 2,808 pounds; at 40 miles an hour, 20 per cent at a pressure of 4,152 pounds; at 40 miles an hour, 16 per cent at a pressure of 6,850 pounds. The above are the specifications for chilled wheels. The specification will bar out all shoes that have an excessive amount of chill in them. It will bar out shoes that stay on the brake beams a very loug time and do not do very much braking.

In the case of a steel-tired wheel, the committee feels that it might be better to make a change and make the basis of the specification a speed of 65 miles an hour instead of 40 miles an hour, for the reason that most of the work with cars which have steel-tired wheels is done under conditions of higher speeds, and in fact it is a usual occurrence, with high speed work in passenger service to-day, to commence the operation of the brake at a speed of 65 miles an hour. We therefore recommend that the specifications for steel-tired wheels be as follows: 40 miles an hour 16 per cent, 2,808 pounds pressure; 40 miles an hour, 14 per cent, 4,152 pounds pressure; 40 miles an hour, 12 per cent, 6,850 pounds pressure.

In regard to the action of the various shoes under the test there are some things the committee feels it can speak of with safety. One is that increasing the quantity of chilled iron decreases the coefficient of friction. That seems to be demonstrated all the way through. There is a difference, however, in the manner of applying the chilled iron in the shoe. In some cases it is done by simply chilling the face of the shoe itself. In other cases it is done by applying a chilled insert. If you will examine the diagrams you will find that there is a difference, particularly in the case of steel-tired wheels, in the coefficient of friction, although there may be approximately the same amount of chilled iron. In the case of the chilled iron inserts, where the edge of the chill of the insert runs either directly across or diagonally across, or in the form of an irregular curve, it changes the action and it has been thought possible that there was a slight cutting action. It is known that certain kinds of shoes are considered as tire-dressing shoes. The Ross-Meehan shoe has been considered as a tire-dressing shoe, and the cast-iron shoe, with the chilled insert, would unquestionably have the same effect. It will be observed that such a shoe operates differently on a chilled wheel, the coefficient of friction is not nearly so high on a chilled wheel, but on a steel wheel it seems to be able to perform a certain amount of work of cutting. Whether that cutting action would be objectionable the committee is not prepared to say. It is a fact that such shoes are used on steel-tired wheels to a greater or less extent at the present time.

TESTS OF M. C. B. COUPLERS.

(W. W. Atterbury, W. S. Morris, W. P. Appleyard, H. Monkhouse, F. A. Delano, Committee.)

We reprint this report in full and in a later issue we will give a portion of the discussion, especially the remarks made by Mr. Sanderson:

As during the previous year, the work of your committee has been largely that of perfecting, by actual service, the details of the work submitted at the two previous meetings of your association. As a result of the experience that we have had during the past year, changes of considerable importance have been found necessary in the Specifications of M. C. B. couplers, and minor changes have been thought advisable in the Drop Testing Machine and the Coupler Contour Gage. No changes have been found necessary in either the Worn Coupler Gage or the Twist Gage, except to make the latter adaptable to the new design of coupler with increased shank.

Specifications.

The specifications in their present form have not proved as commercially practicable as is considered advisable, due partially to their lack of definiteness and to their severity, and also because there are certain portions of the specifications which, in the judgment of your committee, are unnecessary. The modifications to which your committee particuularly calls your attention are: First, the requirements of the specifications have been made uniform for couplers, whether cast steel or malleable iron; second, the abandonment of the separate knuckle test.

An extended experience with the M. C. B. testing machine has forcibly impressed on your committee the advantages of good, well-annealed cast steel as a material from which to make the body of the coupler; so much so that in its judgment it is inadvisable to longer retain in the specifications any preferential test for any other material.

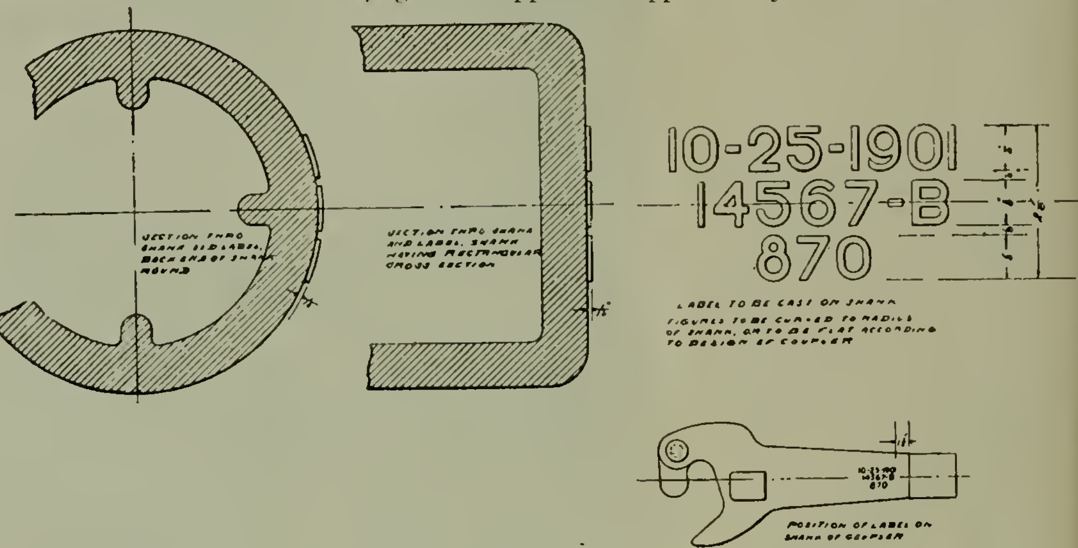
The separate knuckle test, in connection with the test of couplers, is an unnecessary expense, as the knuckles are already thoroughly tested in tests 1, 3 and 4.

The specifications as revised and as recommended by the committee are as follows:

Specifications for M. C. B. Automatic Couplers.

After January 1, 1902, all M. C. B. automatic car couplers purchased by or used in the construction of cars for the above-named company must meet the requirements of the following specifications:

Couplers will be subject to the inspection and tests of the representative of the above-named company, preferably at the works where they are made, as to their mechanical workings, general condition, and strength. The inspection and tests to be made with the aid of gages and apparatus approved by the association. Test



M. C. B. Recommended Method of Measuring Distortion of Couplers Under Test.

couplers to be furnished free by manufacturers. Testing apparatus and assistance necessary to make satisfactory tests and inspection to be furnished free by the manufacturers when such tests are carried on at their works.

The bars, knuckles and locking pins, or blocks, must be accurately made to fitting gages prepared by the manufacturers, governing those dimensions which will insure that, when afterwards assembled, parts taken at random will go together without adjustment or machining. When so assembled, knuckles and locking pins, or blocks, must work freely, but without so much lost motion between knuckle and bar as will permit more than 1-16-inch vertical play in the former, or between knuckle and lock as will permit knuckle to drop forward beyond the proper contour line; but ¼ inch to ⅜ inch lost motion in the opposite direction is not undesirable.

Couplers must conform to M. C. B. contour lines, dimensions and gages. They must couple and uncouple with each other (with either or both knuckles open) and with the master or sample coupler. They should unlock easily and lock with freedom when knuckle is pushed in by hand. They must have complete locking fixtures, with lock set preferably within the head of the coupler. They must have steel pivot pins 1⅝ inches in diameter, and of a uniform length of 13¾ inches from under side of head to center of pin hole for 3-8 inch cotter. Pivot pins, after being heated and having ends struck up, must be carefully and properly annealed.

Bars will not be accepted if distorted by improperly matched flasks or other defects due to molding or casting, and must be free from shrinkage cracks, cold sheets and blow holes. The coupling faces and bearing surfaces must be free from sand and scale. The coupling face must be square with axis of bar. The dimensions of the bearing surfaces of butt and its depth must not vary more than 1-16-inch from the standard. The back end of shank and the front faces of butt must be flat and square with the axis of bar. The front faces of butt must be free from sand wash in the corners. The dimensions shown on standard drawing of that part of shank lying between butt and head of coupler are maximum and must not be exceeded. The holes for pivot pin in lugs of bar must be drilled, or, if cored, must be broached out so as to be not more than 1 21-32 inches diameter. They must not only be in line with each other, but their common center line must be parallel to face of bar and at right angles to its axis.

Knuckles must conform to manufacturers' fitting gages and to

M. C. B. knuckle gage, so as to fit properly in coupler head, and insure strict adherence to the M. C. B. contour. They will not be accepted if distorted by improperly matched flasks, or other defects caused by molding, and must be free from shrinkage cracks, cold shot and sand, scale or blow holes. The pivot pin hole must be drilled, or, if cored, must be broached out so as to be not more than 1 21-32 inches diameter. It must be parallel to face of knuckle and at right angles to its axis.

The name of the coupler and class of bar must be cast upon the top side of head of bar, in letters and figures ¾-inch long and raised 1-16-inch. Each coupler must also have plainly cast upon it the Master Car Builders' standard label of dimensions and size and in the location as shown in detail on drawing which forms a part of these specifications. Each knuckle must have the serial number of class or style and maker's mark cast upon it at some point where it will not be worn off. For form of label, see M. C. B. sheet K.

The weight of each complete coupler having 5 by 5 inch shank to be not less than —— pounds; of each coupler having 5 by 7 inch shank to be not less than —— pounds. Each knuckle to weigh not less than —— pounds. As many couplers and knuckle as possible must be cast from each heat of steel or melt of iron used. All parts to be well annealed throughout.

The representative of the railroad company having inspected the couplers offered, shall proceed to test from such as he expects selecting for test as follows: One complete coupler shall be taken at random by him from each lot of one hundred couplers accepted or from each accepted heat of steel cast (for malleable iron, from each annealing heat, it being optional with the manufacturers which method is pursued.

The coupler shall be subjected to test No. 1 hereafter specified If the coupler fails to stand the prescribed test, but before failing stands a sufficient number of blows to make a retest admissible a second coupler shall be taken from the same lot from which the first coupler was taken. If it stands the test, that lot of couplers will be accepted as far as test 1 is concerned. Otherwise that lot will be rejected and another lot substituted and tested in the same way.

From each 1,000 couplers accepted by test 1, five complete couplers shall be selected by the inspector, one of which shall be subjected to test 2, two to test 3, and two to test 4, hereafter specified.

If any coupler, or pair, fails to stand the prescribed test, but before failing stands a sufficient number of blows to make a retest admissable, a second coupler, or pair, shall be taken from the same lot from which the first five were taken. If it (or they) stand the test, that lot of couplers will be accepted. Otherwise that lot will be rejected and another lot of 1,000 couplers will be substituted. Any part of any coupler which has been subjected to test is condemned for retest and for service.

List of tests to which couplers shall be subjected:

1. Striking test on closed knuckle of complete coupler, covering lots of 100 each.
2. Guard arm test, covering lots of 1,000 each.
3. Jerk test, covering lots of 1,000 each.
4. Pulling test, covering lots of 1,000 each.

Test 1.—Striking Test on Closed Knuckle of Complete Coupler. As a preliminary, coupler is to be marked on bottom with a center punched line parallel to axis of shank, the line being extended to inner face of knuckle (see Fig. 1); coupler is then rigidly held in a vertical position in machine with steel fillers and wedges the latter sledged down tight and this sledging operation repeated after each blow, with its axis in center line of drop, pivot-pin hole parallel to line through centers of legs of machine and butt resting solidly on anvil. Blows to strike directly on knuckle.

Three blows of 1,640 pounds, falling 5 feet.

Three blows of 1,640 pounds, falling 10 feet.

The coupler will be considered as having failed to stand this test if it is broken before it has received all the blows above specified, or if any cracks appear more than 1 inch long, or open more than 1-16 inch, or when center-punched line is distorted more than 1 inch, or when knuckle is found to have closed more than ¾ inch from its original position when pulled out against lock by hand, after receiving three blows at 5 feet (for method of measuring axial distortion and knuckle closure see Figs. 1 and 2), or if knuckle will not open and locking devices operate after test. Should the coupler before failing stand three blows at 5 feet, and two blows at 10 feet, another complete coupler shall be provided and tested, as per clause governing retest.

Test 2—Guard Arm Test of Coupler.—As a preliminary, pivot pin, knuckle and locking device having been removed, coupler is to be marked on bottom with a center-punched line, parallel to axis of shank, and extending from coupling face or contour to back end of shank; a center-punch mark must also be placed at tip of guard arm and on lug (see Fig. 3).

Coupler is then held rigidly in a vertical position in machine, with steel fillers and wedges (the latter sledged down tight and this sledging repeated after each blow), butt resting solidly on anvil and blocked to prevent lateral motion, edge of guard arm in line connecting centers of legs of machine. Blows to strike directly on guard arm.

Three blows of 1,640 pounds, falling 3 feet.

Four blows of 1,640 pounds, falling 5 feet.

A coupler will be considered as having failed to stand this test when it is broken before it has received all the blows above specified, or when any cracks appear more than 1 inch long, or open more than 1-16 inch, or when center-punched line is distorted more than 1 inch, or when distance between punch marks on bottom of head has widened more than ⅜ inch. (For the method of measuring axial and guard arm flexure, see Figs. 3 and 4.) Should the bar, before falling, stand three blows at 3 feet, and two blows at 5 feet, another coupler shall be provided and tested, as per clause governing retest.

Test 3—Jerk Test on Complete Coupler.—The couplers will be placed in yoke forgings of machine, and equalizer placed in position in closed knuckles. Blows to strike directly on equalizer, midway between the two couplers.

Three blows of 1,640 pounds, falling 5 feet.

Three blows of 1,640 pounds, falling 10 feet.

A coupler will be considered as having failed to stand this test if it is broken before it has received all the blows above specified, or if cracks appear more than 1 inch long or open more than 1-16 inch, or if equalizer will not stay in place when struck, or if knuckle will not open and locking devices operate after test. Should either or both couplers fail to stand the prescribed test, but both stand three blows at 5 feet and two blows at 10 feet, another complete coupler, or pair of couplers shall be provided, as per clause governing retest.

Test 4—Pulling Test of Complete Couplers.—Couplers to stand a steady pull of 120,000 pounds. A coupler will be considered as having failed to stand this test if it is broken before it has been pulled the prescribed number of pounds, or if any cracks appear more than 1 inch long, or open more than 1-16 inch, or if couplers pull past each other, in machine, or if knuckle will not open and locking devices operate after test. Should either or both couplers fail to stand the prescribed test, but both stand 90,000 pounds, another complete coupler or pair of couplers shall be provided, as per clause governing retest.

In case of the failure of any part of the complete coupler under tests 1, 3 and 4, only such parts of the lot of couplers represented by the test coupler shall be condemned as correspond to the part which failed under the test, but the balance of the parts may be submitted for future test.

Drop Testing Machine.

On account of the change in the design of the standard shank, it was found necessary to widen out the sides which hold the shank in place, as well as to accommodate butts of larger dimensions than the standard.

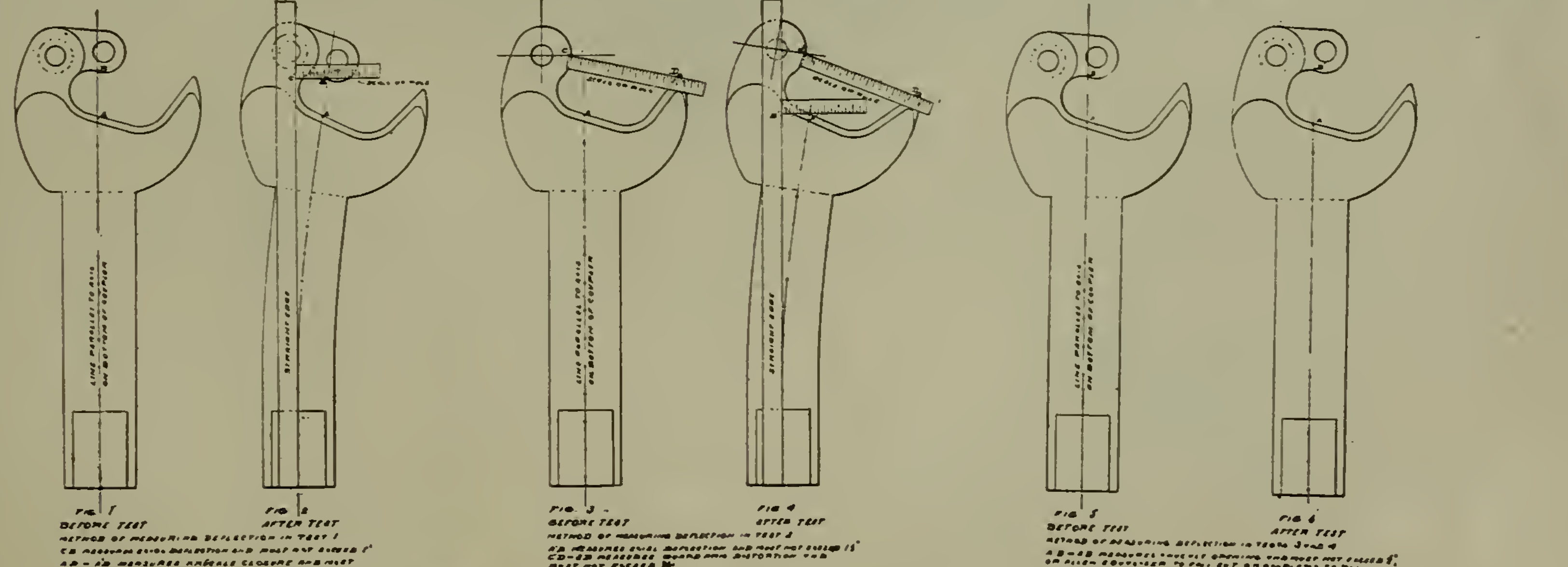
It was found advisable to raise the sides from 17½ inches to 19½ inches on account of the severity of the test with the former height.

Coupler Labels.

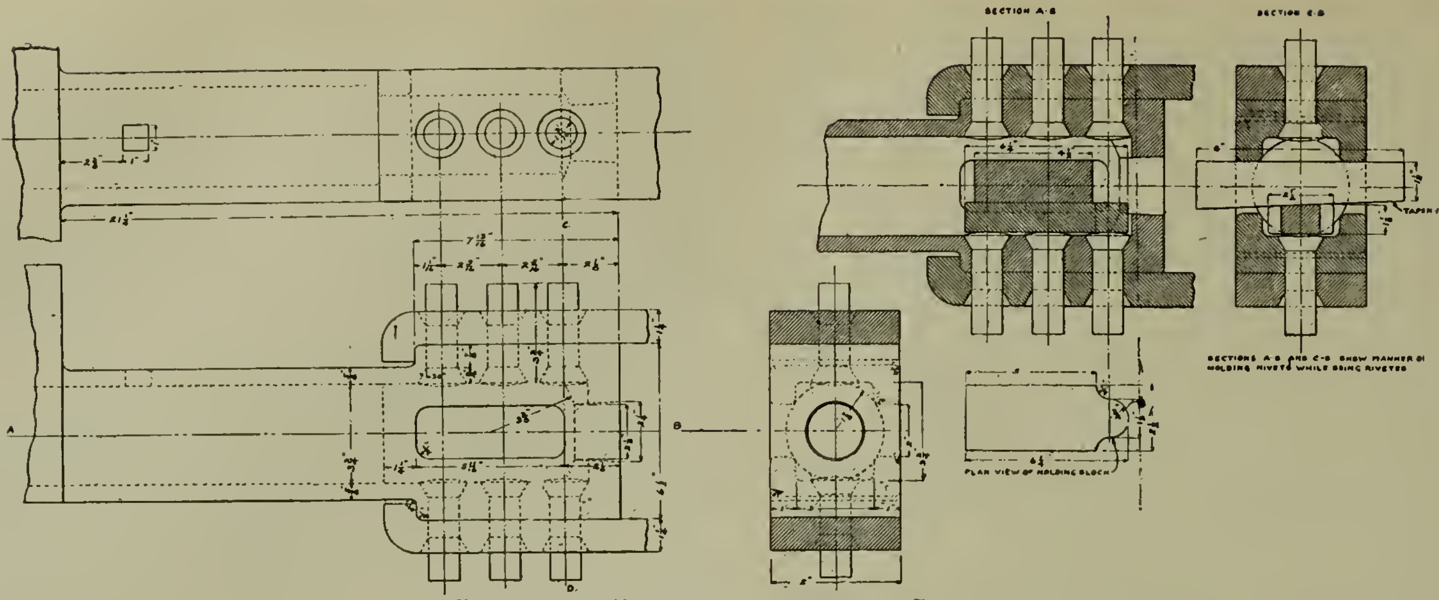
Experience has demonstrated the impossibility of successfully casting in steel a legible label of the present dimensions, and while ½-inch letters might be used to replace the 5-16-inch size, a simpler arrangement, similar to that used on wheels, is preferable. The label now recommended has been incorporated as a part of M. C. B. Sheet "K."

Coupler Contour Gage.

With the new design coupler contour gage it was found through the carelessness or captiousness of an inspector, a coupler could be condemned which was really within the prescribed limits. The contour between the theoretically correct and the inferior limit allowable permits so much play between the gage and the



M. C. B. Recommended Method of Measuring Distortion of Couplers Under Test.



Proposed Butt for 5x7-in. Shank.

coupler head, that the guard arm gaging screw can be made to fall beyond the end of guard arm, even though the latter may be of the proper length. This screw can then be moved to the condemning position without touching the coupler. To prevent this, and to secure approximate coincidence of center lines of coupler head and gage, a spring socket and contact has been added.

Worn Coupler Gage.

There has been some criticism of an indefinite character by some members of the association, against the use of this gage. Your committee, realizing the importance of this gage, both in its use and abuse, has had the matter particularly followed up, and a result of a year's experience, is satisfied that no change at the present time is necessary or advisable. Your committee would strongly recommend that the worn coupler gage be put in general use at repair shops and repair tracks. While this will result in the condemnation of a great many knuckle pins, locks and knuckles, it will not affect a very large number of couplers. The couplers in almost all cases are brought back to gage by the replacement of the knuckle, knuckle pin or the lock, and such couplers as are condemned will be of the short-arm type or of the long guard arm, in the event of the guard arm being seriously damaged. It is the opinion of the committee that this gage should not be used at interchange points, as, for transportation reasons, it is impracticable, its use necessitating the separation of the cars. If the various roads in the Master Car Builders' Association would conscientiously put this gage in use in the manner outlined by the committee, the general condition of the couplers throughout the country would be decidedly improved, but in so gradual a manner as to work no great hardship on the car owner.

Twist Gage.

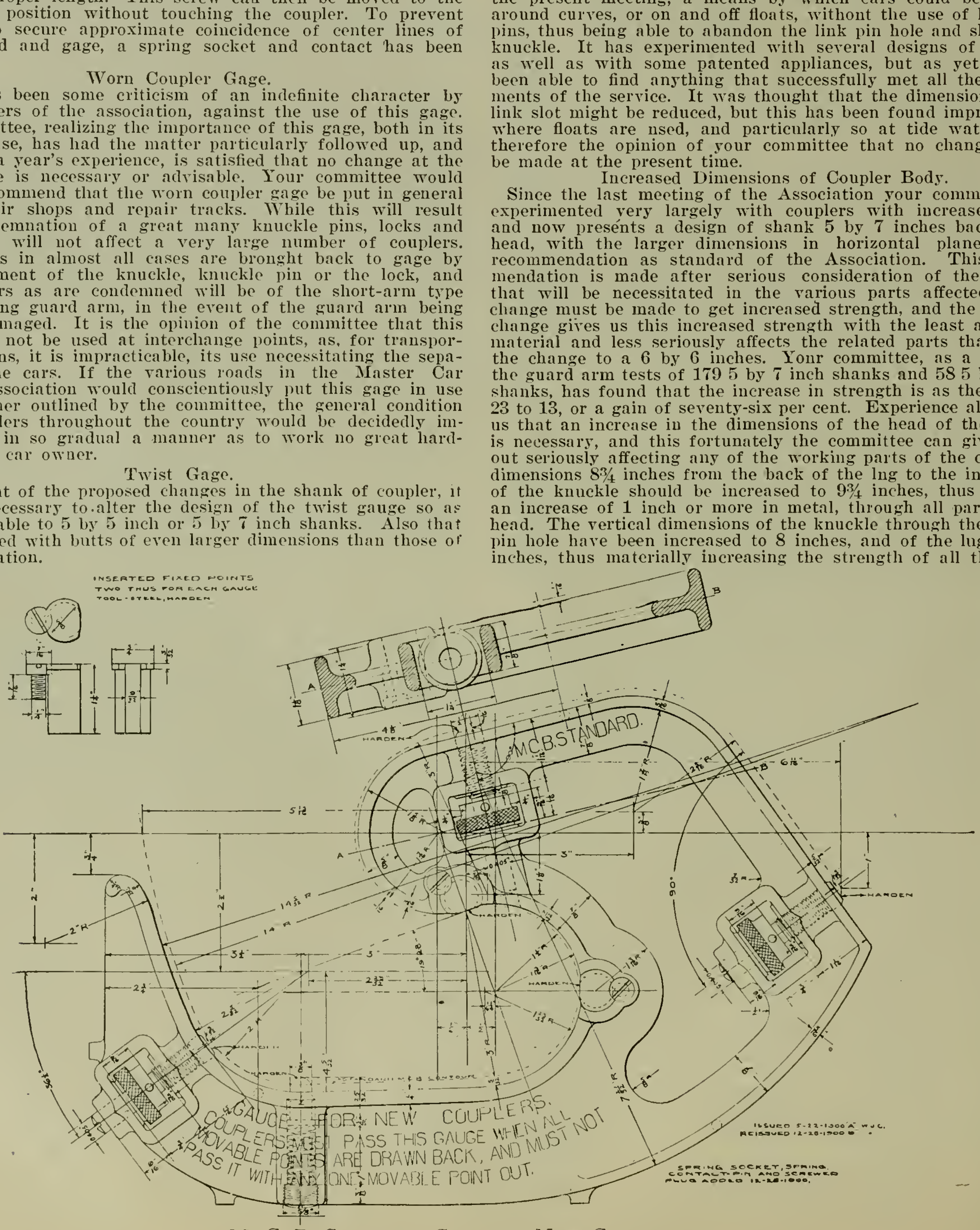
On account of the proposed changes in the shank of coupler, it has been necessary to alter the design of the twist gauge so as to be applicable to 5 by 5 inch or 5 by 7 inch shanks. Also that it can be used with butts of even larger dimensions than those of your Association.

Link Pin Holes and Link Locks.

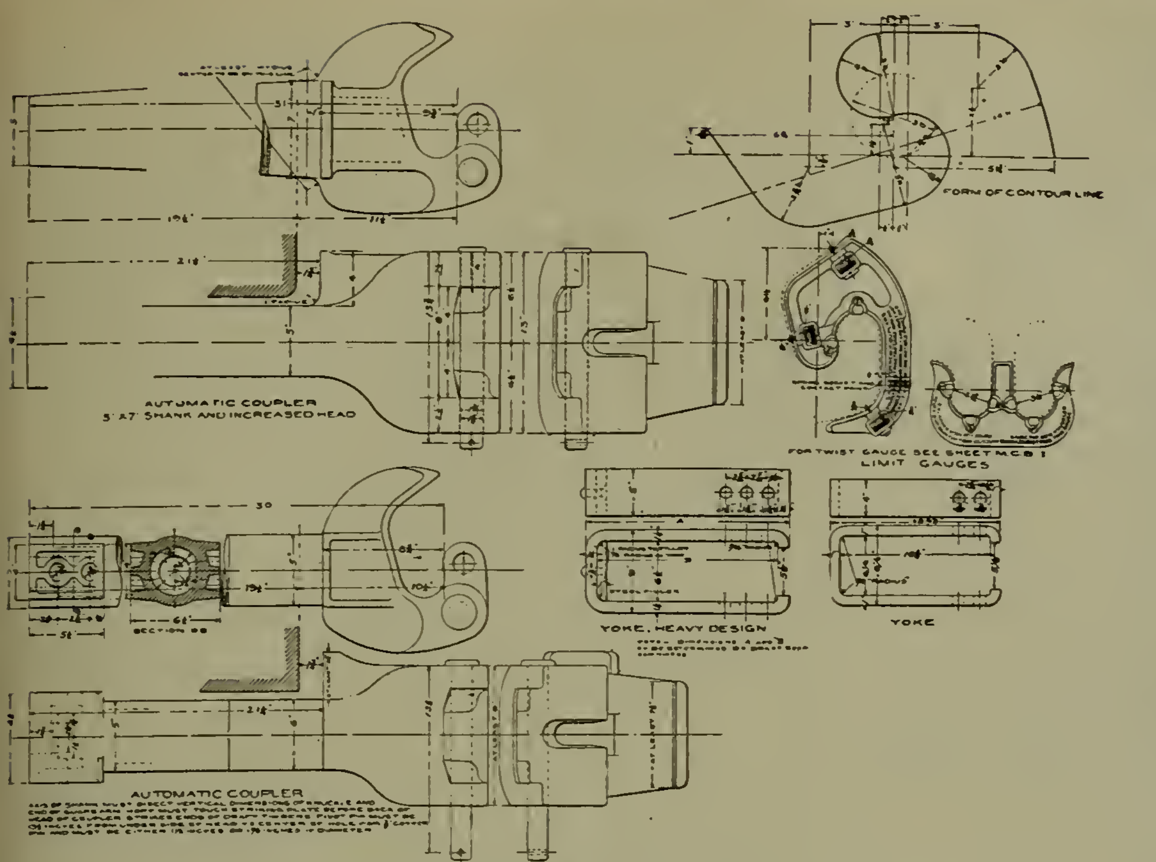
Your committee had hoped to have been able to present, at the present meeting, a means by which cars could be handled around curves, or on and off floats, without the use of links and pins, thus being able to abandon the link pin hole and slot in the knuckle. It has experimented with several designs of its own, as well as with some patented appliances, but as yet has not been able to find anything that successfully met all the requirements of the service. It was thought that the dimensions of the link slot might be reduced, but this has been found impracticable where floats are used, and particularly so at tide water. It is therefore the opinion of your committee that no change should be made at the present time.

Increased Dimensions of Coupler Body.

Since the last meeting of the Association your committee has experimented very largely with couplers with increased shank and now presents a design of shank 5 by 7 inches back of the head, with the larger dimensions in horizontal plane, as its recommendation as standard of the Association. This recommendation is made after serious consideration of the changes that will be necessitated in the various parts affected, but a change must be made to get increased strength, and the proposed change gives us this increased strength with the least additional material and less seriously affects the related parts than would the change to a 6 by 6 inches. Your committee, as a result of the guard arm tests of 179 5 by 7 inch shanks and 58 5 by 5 inch shanks, has found that the increase in strength is as the ratio of 23 to 13, or a gain of seventy-six per cent. Experience also shows us that an increase in the dimensions of the head of the coupler is necessary, and this fortunately the committee can give, without seriously affecting any of the working parts of the car. The dimensions 8¾ inches from the back of the lug to the inside face of the knuckle should be increased to 9¾ inches, thus allowing an increase of 1 inch or more in metal, through all parts of the head. The vertical dimensions of the knuckle through the knuckle pin hole have been increased to 8 inches, and of the lugs to 2½ inches, thus materially increasing the strength of all the parts.



M. C. B. Standard Gage for New Couplers.



Coupler and Yoke Details.

During the coming year your committee hopes to experiment with a head of these dimensions, and at the next meeting of the Association will be prepared to give some definite figures as to its relative strength.

Increased Butt.

At the request of the committee on draft gear, we have seriously considered a redesign of the standard butt, retaining the present dimension of 6½ inches as its depth, lengthening the butt so as to allow the use of a third rivet or bolt. The dimension between the back of the butt and back of the horn has been retained as at present. Your committee submits a proposed arrangement for the consideration of the Association. We have always recognized the impossibility of properly riveting the yoke to the butt because of the inability to hold the rivet. Your committee, therefore, in its proposed arrangement has entirely departed from the old design, and suggests an arrangement whereby the riveting can be successfully done. As the design is quite a radical departure from anything that has heretofore been used, your committee is not prepared to recommend the arrangement as standard until after a series of experiments which are being conducted has proven the correctness of the design.

Heavy Design Yoke.

Your committee has prepared a design of yoke with the strength increased to correspond with that of the increased shank, and to be used in connection with the 5 by 7 shank coupler. The dimensions A and B we have not filled in, as these will be determined by the draft geear committee.

For the coming year your committee has considerable work laid out. As previously explained, it will be necessary to experiment with the new design of head, as well as that of the proposed butt. In addition, proper gages for the butt will have to be developed, on account of the necessity for uniformity of dimensions at all points.

The abandonment of the separate knuckle test in the regular specifications leaves the Association without a test for knuckles which may be purchased separately for repairs. The separate knuckle test has never been other than a rough test of the quality of the material. Your committee is working on a method whereby knuckles can be tested with a dummy coupler, somewhat as are the knuckles in a complete coupler test at the present time.

The committee has also felt for some time that the jerk test might be improved upon by introducing the impact arrangement as exemplified in the method at Purdue University, and recommended by Prof. Goss for the impact testing of material. If successful, this would make unnecessary the use of two couplers in the jerk tests, a dummy being substituted in the impact test for the second coupler.

CAST IRON WHEELS.

(J. N. Barr, Wm. Garstang, J. J. Hennessey, D. F. Crawford, Wm. Apps, Committee).

This report which we give in full was not concurred in by Mr. Garstang, and to the report we append his remarks made during the discussion which followed.

Your committee appointed to investigate and report on the question of locating the inner face of cast-iron wheels to the gage point, and the thickness of metal between the bore and ring core, and to recommend minimum weights for wheels for use under 60,000, 80,000 and 100,000 pound capacity cars, begs to report as follows:

First. As to locating the inner face of hub of cast-iron wheels to the gage point. If the outside face of the hub next to the box projects 3 3-16 inches beyond the gage point, it will allow a clearance between the face of hub and box of one inch in the normal position. The lost motion between the journal, the brass, the wedge and the box is about ⅜ inch. The dimensions given above will afford a clearance of at least ¼ inch between the hub and the box, when all the lost motion between the journal, the wedge, the brass and the box is fully taken up.

It is the opinion of the committee that this amount of clearance is sufficient and that no good will be obtained by increasing or decreasing this amount of clearance. So far as the templet for determining these dimensions is concerned, the committee is of the opinion that it is not practical to make the templet to locate the hub with reference to the gage point, but that the practical method will be to lay a straight edge across the outside of rim, measuring in 15-16 in., which will give the proper location of the face of the hub.

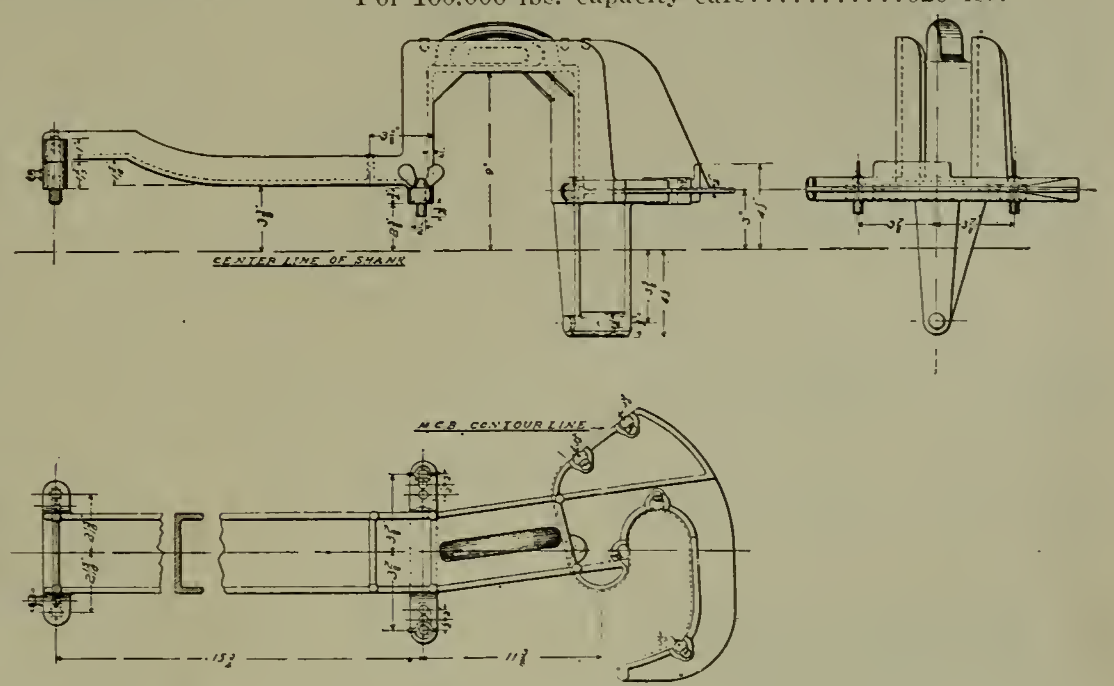
It, of course, should be determined that the pattern is so made that the wheel is 5½ ins. over all between the inside of flange and outside of rim, before the measurements referred to above are taken. This applies to 60,000, 80,000 and 100,000 lbs. capacity cars.

Second. As to the thickness of metal between the bore and ring core. It is the opinion of the committee, based on actual experience, that any thickness greater than 1 in. is sufficient, and the committee would recommend that a thickness of 1¼ ins. between the bore and ring core after the wheel is bored, should be made standard for all sizes of wheels.

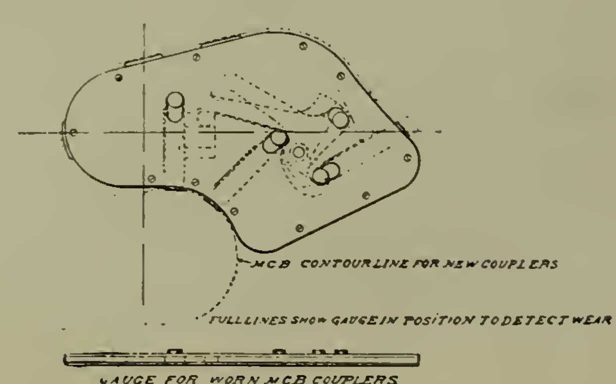
The facts in the case, so far as this committee has information, are that wheels measuring 1 in. to 1 1-16 ins. between the ring core and bore, when the core is finished, have given satisfaction, and so far as the knowledge of the committee extends, it does not know of any case of failure of wheels at this point.

Third. As to the minimum weight of wheels for use under cars of 60,000, 80,000 and 100,000 lbs. capacity, it is the impression of the committee that this is intended to refer to wheels used for repairs of cars in interchange. On this basis the committee would recommend that the minimum weight of wheels used for this purpose should be as follows:

For 660,000 lbs. capacity cars ....550 lbs.
For 80,000 lbs. capacity cars ....590 lbs.
For 100,000 lbs. capacity cars..........620 lbs.



TWIST GAUGE M C B COUPLERS



M. C. B. Coupler Gages.

These recommendations apply only to wheels used for the purpose of repairing foreign cars, and as to minimum weight which should be allowed. At the same time, as a matter of experience, it is the opinion that wheels of fair quality and of the weights given will afford satisfactory results.

It is also recommended that commencing September 1, 1901, wheelmakers should be required to have the nominal weight cast on them, and your committee recommends the following weights:

For 60,000 lbs. capacity cars............575 lbs.
For 80,000 lbs. capacity cars............600 lbs.
For 100,000 lbs. capacity cars............625 lbs.

The committee would also call attention to the fact that in a number of cases wheel patterns have been increased in weight by plastering on material at points which do not serve to increase the strength of the wheel, but merely to attain in the cheapest way the object of furnishing wheels of a given weight. It is extremely important, in going to a heavier wheel, to have the material so distributed that an actual increase in the strength of the wheel shall be obtained thereby.

In order to throw some light on this subject, the committee attaches to its report four drawings showing two patterns of the 60,000 pounds capacity wheel, and two patterns of the 100,000 pounds capacity wheel, which have been in extensive use, and which have given satisfactory results.

The question of quality of wheels is so intimately associated with the question of weight that it is impossible to settle this question without taking both questions into consideration. It is believed, however, that the wheels of the weight recommended, if made of suitable material, will meet all the requirements of the Master Car Builders' test of wheels, and will in practice afford perfectly satisfactory results.

Mr. Garstang spoke as follows regarding the report:

"I am a member of the committee on cast-iron wheels. I was unable to meet with the committee at the time it formulated its report, and there are a few points about the report I do not agree with, and would like to explain them to the convention. Being a strong advocate of universal standards and their maintenance, I am, on general principles, opposed to changing a standard that has become universal unless the benefit to be derived is going to fairly overcome the annoyance and expense of the proposed change. On the other hand, I just as strongly advocate the adoption of such changes as the different conditions in the service require. I believe it to be just as necessary to provide a standard and recommend a limit for the wheels to be used under our 80,000 and 100,000-pound cars as it was to provide an axle for these cars. As the proposition is somewhat different from the axle, and the plain mathematical problem in the latter case has to give away to argument and experience in the case of the wheel, I am in hopes that our combined effort will result in the selection of a wheel design that will give lasting and universal satisfaction.

It would have been much easier for me and a more pleasant duty had I signed the recommendation of the committee on this subject, but, having formed an opinion in opposition to the report, and being prevented from attending the meetings of the balance of the committee, either to present my views or to be convinced by theirs, I have thought it much better not to concur in the report as a whole and to give my reasons for not doing so.

Referring to the report and accompanying blue prints, I cannot concur in the recommendation to change the flange as shown, as the change is at a point that does not seem to be of particular benefit to the wheel, and at the same time would throw out all existing gages and make the cast-iron wheels under one particular class of cars have a different shape flange from the locomotives, passenger cars and cars of lighter capacity in the same service. As the flange was not a part of the subject assigned to the committee, we may all be out of order in mentioning it.

Second—Locating the inner face of hub to the gage point: I cannot concur in the recommendation of the committee to change the dimensions at this point from the present standard. While the change recommended is only one-sixteenth inch, I believe it to be a sixteenth in the wrong direction, if any change is made at all, but as the many thousand wheels now in service have the hubs set 1 inch and 2½ inches respectively from face of wheel, and a standard axle has been adopted with turning points to meet these dimensions, I do not think they should be changed.

Third—The thickness of metal between bore and ring core: The recommendation of 1 1-16 inches of metal at this point throws a thin plate between the two heaviest parts of the wheel and the shrinkage strain is often severe enough to check the wheel at this point. Wheels that are cracked or weakened do not make as good a fit on the axle and are not as easy to fit. I am of the opinion that this dimension should be limited to not less than 1¼ inches, but do not consider it a question of vital importance.

Fourth—Minimum weights for wheels for use under cars of 60,000, 80,000 and 100,000 pounds capacity: It seems to me that this is far the most important question to be decided, and one that should be most carefully considered. It has only been a few years since we all used wheels of 550 pounds or less under our cars, the capacity of which seldom exceeded 50,000 pounds. In changing to the cars of larger capacity, the lighter wheel gradually gave way to one weighing 600 pounds. This change was made, in most cases, because the 550-pound wheel was developing defects under the heavier cars. We might advance as the first argument that we may expect the same defects to develop in the 600-pound wheel if put under cars of 80,000 and 100,000 pounds, and especially so, as the average load is not only greater, but the average speed is greater also, which means more and longer application of the brakes, with a very much greater braking power due to the adoption of air.

Second—As the committee well says, it is entirely out of the question to regulate the quality of material used in the manufacture of wheels for this larger equipment; it is therefore necessary to use a sufficient quantity in an approved design to feel reasonably certain that the wheels so made will not fail in service from structural weakness. I think it is questionable whether the average wheelmaker will be willing to give a guarantee equal to what we are now receiving on wheels if no heavier weight is used under cars of greater capacity, and as many of us are not provided with the elaborate testing plants or facilities afforded other roads for making our own tests, we have to rely entirely on the wheelmaker's guarantee and such test as we can make at their plant. Therefore the length of the guarantee is a very important factor, and, from a financial standpoint, if no other, must be taken into consideration.

If an additional 50 cents to the original cost, with a 25-cent rebate for scrap, will give us from one to two years additional guarantee on the wheels, and at the same time give us a wheel that we all feel must be a little better, I must strongly advocate the additional weight.

Basing our opinion on past experience I would recommend wheels for 60,000-pound cars, 590 pounds; 80,000-pound cars, 640 pounds; 100,000-pound cars, 680 pounds; with a minimum of 580 pounds for 60,000-pound cars; 630 pounds for 80,000-pound cars; 670 pounds for 100,000-pound cars.

Mr. Garstang continuing—The cuts of the flanges shown in the report would indicate that there has been a change; but I understand from Mr. Barr that no change is recommended, and these cuts were simply used for purposes of illustration. We now have an inch clearance between the box and the hub. The committee proposes ⅞ of an inch. We all know it is a frequent occurrence to have journal bearings wear from ¼ to 3-8 of an inch, but that the lateral motion allowed in the wedge and brass takes the wear of the journal brass and allows the box to come in contact with the hub just that much sooner, and I hope that will not be changed.

In regard to the metal between the core of the wheel and the ring core, I have noticed wheels cracked at that point and believe it was due to the metal being so thin at that point and having a large chunk at each side of the center of that point. I do not believe a crack here condemns the wheel, but do not believe it does any good, and I suggest we should not make dimensions less than 1¼ inch."

THE CHEMICAL COMPOSITION OF ALL STEEL CAR AXLES.

(E. D. Nelson, C. A. Schroyer, F. A. Delano, Committee.)

At the convention held in Saratoga, N. Y., in June, 1900, the question of changing the chemical composition of steel car axles as outlined in the M. C. B. specifications, was discussed. The point made in the informal discussion held at that time was that the present specifications provided too high a proportion of carbon.

The first work of your committee was to correspond with those who had taken part in this discussion, and ascertain if possible their reasons for wishing to decrease the percentage of carbon. The result of this correspondence was that a number of instances where steel car axles had broken, were cited to your committee with the statement that such axles had been bought in accordance with the M. C. B. specifications for steel axles, at least in relation to the percentage of carbon contained in the steel.

Your committee was particular to trace out these cases of reputed broken axles, and found that, although the information given was in entire good faith, a careful investigation showed quite clearly that the axles in question which had broken were not known absolutely to have been made in accordance with the chemical compositions required by the M. C. B. specifications; in fact it was quite clear that these axles either were not bought under these or similar specifications, or else, if they were, no means had been taken to see that the axles furnished were strictly in accordance therewith.

It is therefore clear to your committee that so far as these cases of broken axles are concerned, they do not furnish any evidence that the percentage of carbon allowed in the present specifications is too high.

In addition to the above investigation, your committee has been in correspondence with railroad companies who have specifications for steel axles, or who have used the present M. C. B. specifications and the matter seems to stand, so far as the opinion of those in charge of the car departments on these railroads is concerned that the percentage of carbon now allowed is not too high, and it is even intimated in some instances that if any change is made it should be in the direction of higher carbon.

There are some railroads that have used axles of steel having a less percentage of carbon than provided in the M. C. B. specifications, and the opinion on these roads is that they have been getting good axles with somewhat less carbon than in the present specifications. However, this is not positive proof that the amount of carbon as now allowed in the specifications is too high. On the other hand, several railroad companies which have gone into this matter quite thoroughly, not only in connection with car axles, but with steel used for other purposes where alternate stresses tend to break the piece, are quite positive that, if anything, the percentage of carbon should be made higher rather than lower.

Your committee does not feel justified in recommending any increase in the percentage of earbon above that allowed at the present time, but is strongly of the opinion that no decrease should be made, and urges that the specifications in regard to chemical eomposition shall remain as at present.

In connection with this subject, your committee desires to offer some suggestions having a bearing on the subject of the specifications.

First. As to the location of the borings to be taken from steel axles for chemical analysis. This should be distinctly defined by a diagram as shown in Fig. 1, attached to this report, and your eommittee would recommend that this be incorporated with the specifications.

Second. The present M. C. B. axles, except of the later designs, have not had their dimensions determined upon the basis of uniform fiber stress between the center and the hub portion of the axle, it is absolutely necessary that the taper between the wheels should be straight and uniform. It has been found that some manufacturers neglect this, possibly due to a misunderstanding of the importance of this point, and your committee would recommend that a notation to this effect be placed on the standard drawing of M. C. B. axles as shown in Fig. 2.

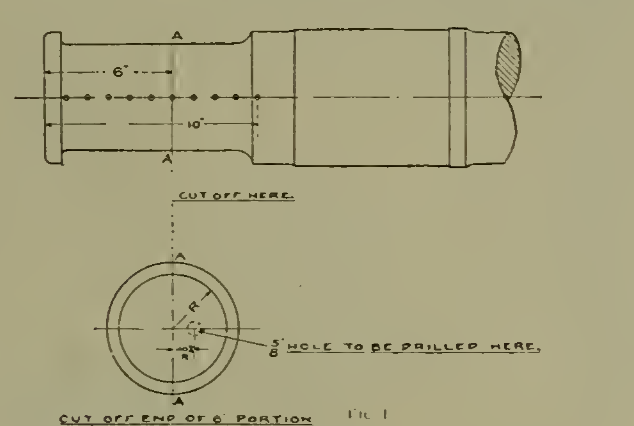
Third. It is further thought by your committee that the question of having all steel axles rough turned should be seriously considered. Provision for this is now ineluded in the M. C. B. specifications, but your committee thinks that sufficient emphasis is not placed on this matter by members of the Association ordering steel axles. There is decided advantage to the railroad companies in getting steel axles turned throughout their length, because it enables the inspector to determine readily whether the dimensions and eontour required are strictly followed. It is thought no great opposition will be made to this practice, as the principal manufacturers are equipped for doing this work.

Fourth. M. C. B. axle "A," having journals 3¾x7 inches, is somewhat small at the wheel seat according to the method followed for the design of axles "C" and "D." The wheel seat of axle "A" should have a limiting diameter of 4⅞ inches, and allowing ¼ inch to be turned off, the origiual size should be 5⅛ inches. As this axle, however, was designed for cars of 40,000 pounds capacity, it may not be considered advisable by the Association to make any changes iu its design.

Fifth. Axle "B," having journals 4¼x8 inches, now has a wheel seat 5 3-8 inches in diameter. The limiting size of wheel seat for this axle should be 5½ inches, and allowing ¼ inch to be turned off, the original size should be 5¾ inches. The center of this axle is now 4 5-8 inches, and your committee would recommend that it be made 4¾ inches, in order that it shall have the same fiber stress as used in axles "C" and "D." The height of drop in the present specifications for this axle is 34 feet. This is incorrect for the axle having a center of 4 5-8 inches, but would be correct for this axle having a center of 4¾ inches. Therefore

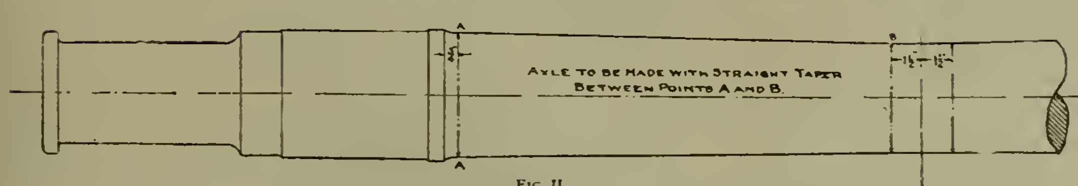
—M. C. B. Axles.—

—Sketch Showing Manner of Taking Borings for Analysis—



—M C B Axles.—

—Notation to be Made on all Drawings of Same.—



M. C. B. Axles.

the change recommended will make the size of axle consistent with the specifications, besides reducing the fiber stress, which is now somewhat greater than in the axles of later and more approved design.

Sixth. Axle "C," having journals 5 by 9 inches, now has a wheel seat 6 3-8 inches. As the limiting size is 6¼ inches, it is thought that the new size should be 6½ inches, leaving the axle otherwise unchanged.

Seventh. Axle "D," having journals 5½ by 10 inches, now has a wheel seat 6⅞ inches. As the limiting size is 6¾ inches, it is thought that the new size should be 7 inches.

Eighth. In accordance with the designated standards of the Association, axles "A" and "B" are specified for use under cars of 40,000 and 60,000 pounds capacity. It is only necessary to remind you of the fact that an axle is designated for carrying a definite weight to make it plain that the axles of the Associatioı should not be designated for cars of particular capacity. This is at once apparent when it is considered that under this assumptiou no consideration is given to the weight of the body of the car which varies through wide limits. This is, of course, a portion of the weight carried, and together with the ladiug makes up the total weight carried on the car axles. Therefore, your committee would ask your consideration for a better designation of these axles, which would be as follows:

Axle "A," designed to carry 15,000 lbs.
Axle "B," designed to carry 22,000 lbs.
Axle "C," designed to carry 31,000 lbs.
Axle "D," designed to carry 38,000 lbs.

Ninth. In conclusion, your committee feel that they should call the attention of members of the Association to the desirability of ordering their axles according to the M. C. B. specifications. There are a number of railroad compauies orderiug steel axles and hav-

APPENDIX A.

DIMENSIONS FOR AXLES.

As Determined by the Method Given by Committee of M. C. B. Association and Reporting to Convention 1896. Revised 1901.

	Nominal Capacity of car.	Weight on each axle, lbs.	Journal. Theo. Diam.	Journal. Size New. Ideal.	Journal. Size New. M.C.B.	Journal. Limit Diam. Ideal.	Journal. Limit Diam. M.C.B.	Wheel Seat. Theo. Diam.	Wheel Seat. Diam. New. Ideal.	Wheel Seat. Diam. New. M.C.B Proposed	Wheel Seat. Limit Diam. Ideal.	Wheel Seat. Limit Diam. M.C.B. Proposed.	Center. Theo. Diam	Center. Diam. New. Ideal.	Center. Diam. New. Proposed M.C.B.	Center. Limit Diam. Ideal.	Center. Limit Diam. Proposed M.C.B.
Axle "D"	100,000	38,000	4.76	5½ x 9	5½ x 9	5	5	6.70	6⅞	7	6¾	6¾	5.73	5⅞	5⅞	5⅞	5⅞
Axle "C"	80,000	31,000	4.88	5 x 9	5 x 9	4½	4½	6.20	6⅜	6½	6¼	6¼	5.31	5⅜	5⅜	5⅜	5 1/16
	70,000	26,000	4.19	4¾ x 9	.	4¼	4	5.93	6⅛	......	6	5⅝	5.07	5¼	....	5⅛	4⅞
Axle "B"	60,000	22,000	3.74	4¼ x 8	4¼ x 8	3¾	3¾	5.49	5⅝	5¾	5½	5½	4.69	4¾	4⅝	4¾	4⅜
	50,000	18,000	3.49	4 x 8	.....	3½	3½	5.13	5⅜	.....	5¼	4¾	4.38	4⅝	......	4½	4⅛
Axle "A"	40,000	15,000	3.13	3¾ x 7	3¾ x 7	3¼	3¼	4.81	5	4⅞	4⅞	4⅝	4.10	4½	4¼	4⅛	3⅞
	30,000	13,000	2.99	3½ x 7	..	3	3	4.59	4¾	....	4⅝	4¼	3.91	4⅛	......	4	3½
	20,000	10,000	2.73	3 x 7	......	2¾	2¾	4.21	4⅜	.....	4¼	4¼	3.58	3¾	....	3⅝	3½

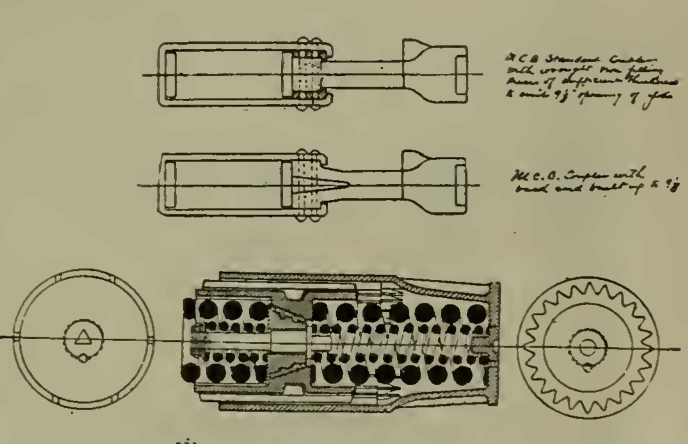
ing specifications varying slightly from those of the Association. It would appear to be to the advantage both of the manufacturers and of the railroad companies, to have these specifications uniform and your committee would urge serious consideratiou of this question.

DRAFT GEAR.

(E. D. Bronner, C. M. Mendenhall, Mord Roberts, T. A. Lawes George F. Wilson, Committee.)

As regards draft gear for freight ears, the relative conditions now are very similar to what they were about ten years ago and prior to the adoption of the present recommended practice of the Association for coupler attachments. These conditions were clearly set out in a paper by Mr. C. A. Schroyer before the Western Railway Club in November, 1890, and a paper by Mr. D. L. Barnes in May, 1891, before the New York Railroad Club. Then on account of iucreases in the size of trains the streugth of the draft rigging was being exceeded. It is believed that the present M. C. B. rigging has served a good purpose, but the time has come when it must be strenthened to suit new eonditions.

The draft gear failures which have been referred to in discus-



Westinghouse Friction Buffer.

Fig. I.

sions during the past year seem to be chiefly breakages of the old riggings which were not designed for the work they are now called upon to do. So far as the committee has observed, several draft gears of recent design are showing good results in service. Of course, in considering auy record of this kind it must be borne in mind that most of these gears are practically new and also that they are favored by the large number of old cars with weak draft rigging, which fails first and so relieves the rest of the draft gear in the train. This is mentioned here because there seems to be an impression that most of the draft gears now being applied are inadequate, which has certainly not been demonstrated up to this time.

Car Design Favorable to the Draft Gear.

The use of metal underframing, allowing the draft attachments to be placed between and fastened direct to the sills, is looked on as one of the most important steps which can be taken in car design favorable to the draft gear. Experience so far has shown that with metal underframes the front and back follower stops can best be lugs united in one casting with heavy connecting ribs. This gives a large area in contact with the sills and permits of the use of an ample number of rivets. In several cases where single follower lugs have been used, concentrating the strains on a small area of the sill, the webs of the sills have been badly distorted, and in other cases, where sills had been reinforced, these single lugs have been sheared off. The committee has heard of no cases of failure where both lugs were on a single casting.

Some anticipate trouble from the greater rigidity of the metal frames. To compensate in the metal underframe for the greater elasticity of wood to absorb shocks, one road proposes to place the flanges of the center sills facing each other and put long timbers in between the flanges, extending the full length of the car. To these timbers the draft attachments are then bolted. Another plan is to use a channel end sill filled with a wooden timber which carries the striking plate. Still another design (Fig. 7) has been used on some Chicago & Alton cars. In this the draft gear in buffing is reinforced by high capacity spring resistance through a range of about ½ inch. Another plan is to use spring buffers. The committee is of the opinion that the introduction of steel underframes will favor the draft rigging, eliminating the trouble from loose attachments due to the shrinkage of wood and the backing off of nuts.

What the committee considers an important principle is that with metal underframes, and wooden cars with low floors, the line of draft should be on the neutral axis of the center sills. It is realized that it is not always possible to place the draft rigging on the neutral axis of the center sills with this construction, but this does not affect the correctness of the principle.

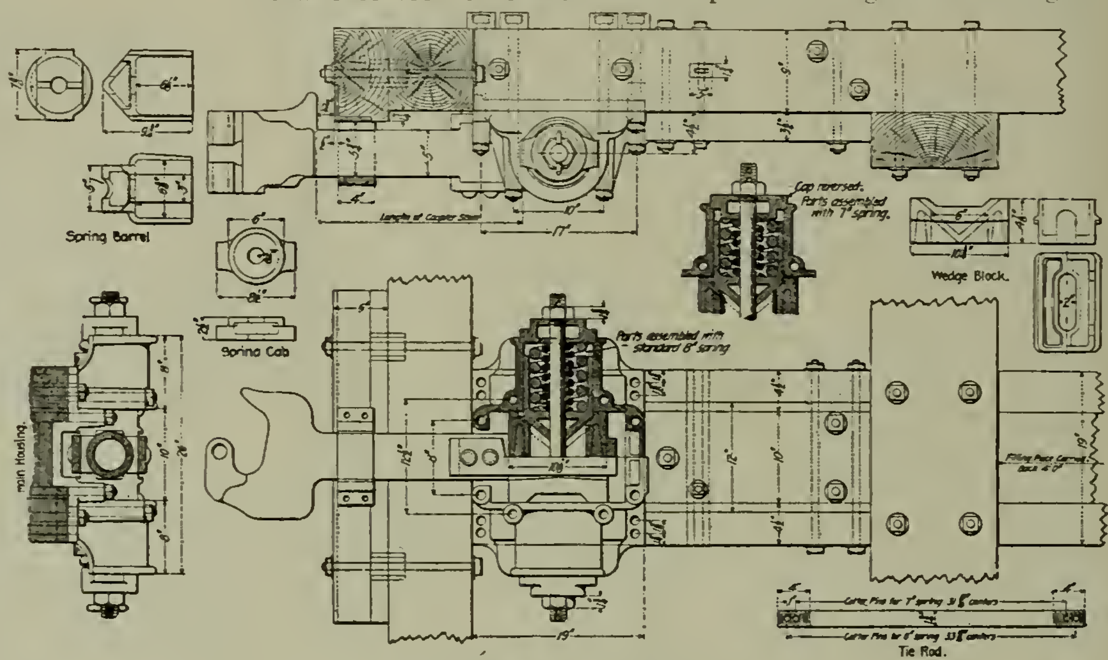
Where the lowering of the car floor is objectionable the committee recommends that the draft extend at least to the body bolster. There are, however, preferences for continuous draft timbers, and a design in metal is shown (Fig. 17), consisting of two unbroken steel channels running from end to end of the car in place of the draft timbers. This is a design of the Lake Shore & Michigan Southern Railway. A design of the Baltimore & Ohio with continuous wooden draft timbers is also shown (Fig. 13).

Another construction recently used by the Chicago, Burlington & Quincy (Fig. 9), puts the line of draft on a level with the bottom of the center sill; this avoids cutting away the end sill about the coupler.

There would seem to be no reason why there should not be uniformity in new car construction regarding the spacing of center sills. The present recommended practice of the Association is an 8-inch sill spacing. This now seems inadequate, and on account of the general use of both twin and tandem spring arrangements it seems desirable to modify this and settle on two dimensions of sill spacing. The committee suggests 10 inches and 14 inches. These dimensions are recommended because one or the other will take, conveniently, any of the draft riggings now being used, and will enable two lengths of follower plates to be used instead of a rigging of both the twin and tandem types, and the 14-inch spacing will take any rigging attached between the center sills. In metal construction this wider spacing is also required to enable the rivets at the bolsters to be machine driven. It is recommended that 10 inches and 14 inches be adopted as standard distances between center sills.

Designs of Draft Gear.

As showing recent practice in draft gear, drawings are presented of various gears which are now on the market, or are being applied by railroads in accordance with their own designs. It will be seen that with one exception these gears are designed

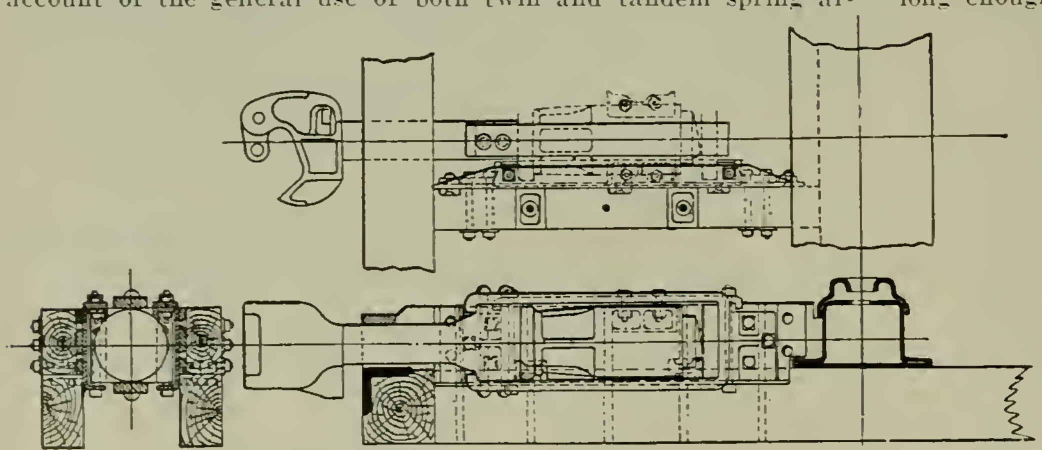


Sessions-Standard Draft Gear.

Fig. 3.

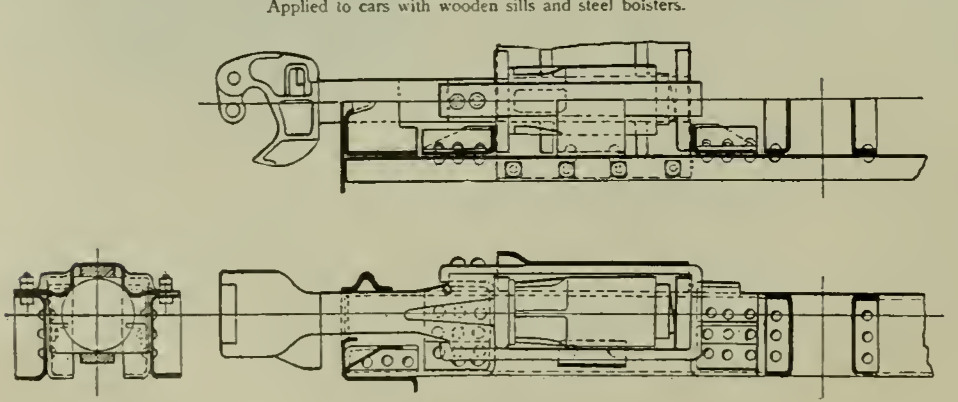
to pull the car from the head end, which seems to be the type of draft gear that is generally preferred, although this one gear is used extensively.

While there are two ways of receiving the pulling forces on the car, through attachments at the front end or through attachments at the rear, the principle of all draft gear as regards buffing forces is alike, i. e., the buffing strains are taken by the draft gear proper until the spring or other resistance is exhausted when the remainder of the shock is transmitted direct to the car framing through the coupler horn or buffer blocks, if present. In the latest draft rigging, the friction gears, the capacity of the gears to absorb shocks has been increased to between 100,000 and 160,000 pounds, having a smaller proportion of shock to be transmitted at the coupler horn, this increased capacity being obtained with practically no recoil. It is readily conceded that the theory of the friction draft gear is correct, but few have had any experience with these gears; they have not been in service long enough to estimate their life or wearing qualities, or in any



Westinghouse Friction Draft Gear.

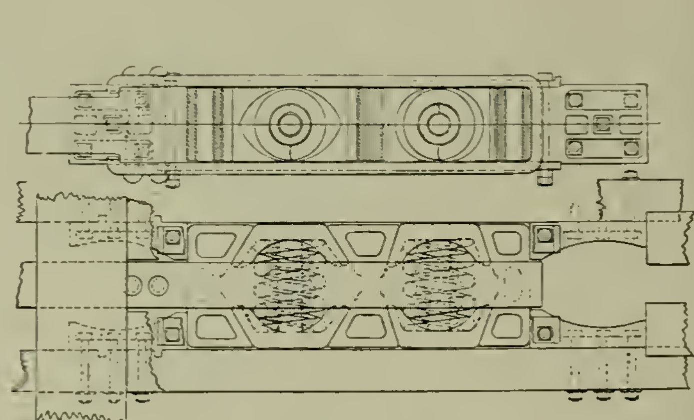
Applied to cars with wooden sills and steel bolsters.



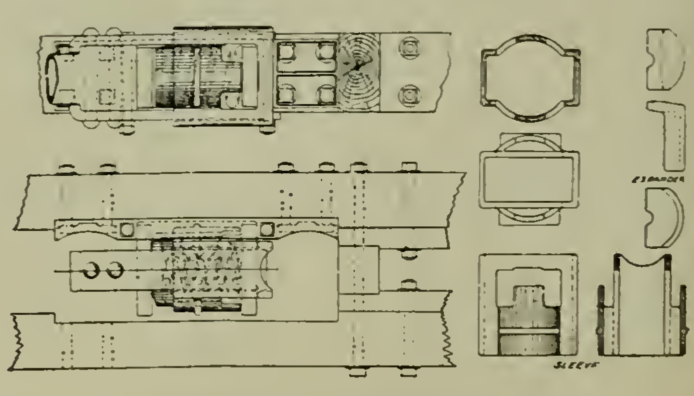
Westinghouse Friction Draft Gear.

Applied to steel cars.

Fig. 2.



Piper Draft Gear and Buffer

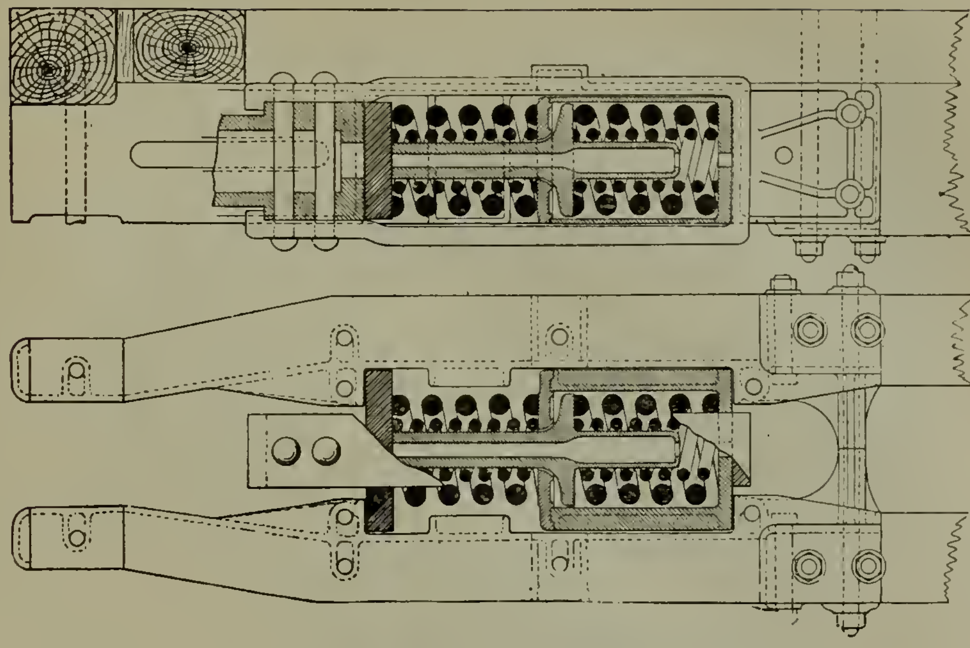


McCord & Co. Coupler Spring Dampener.

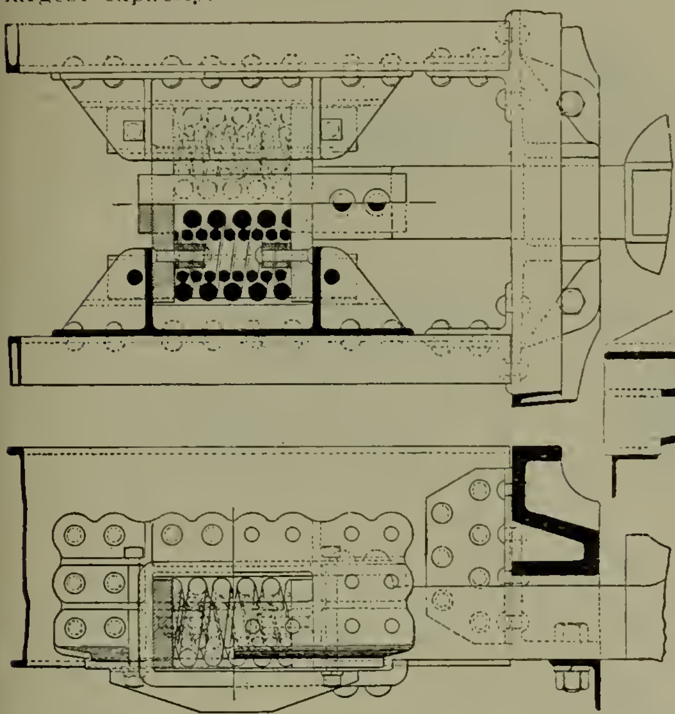
Fig. 4.

way determine whether the increased first cost and greater complication is warranted. At the present time the committee has no recommendations to make as between friction and spring gears.

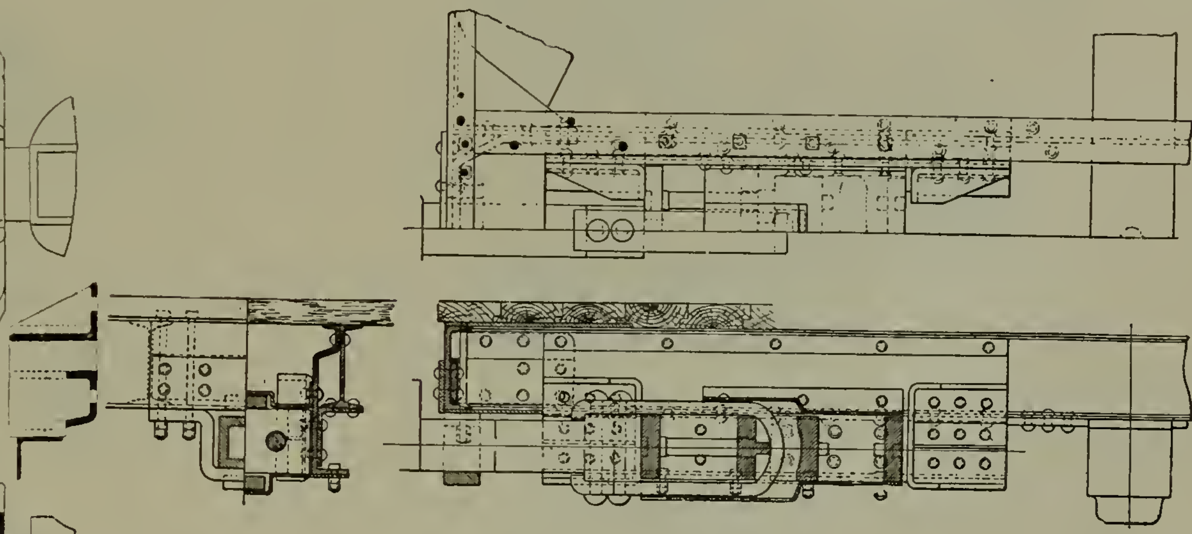
Last year the draft gear committee disagreed as between the tandem and twin spring arrangements. The present committee considers that the arrangement of the springs is largely a matter of preference. Both have advantages and disadvantages. As the tandem arrangement is usually applied, the breaking of one spring does not cripple the rigging as with the twin arrangement shorter followers can be used with the tandem; the pull is more central and it is easier fitted to old cars with the sills close together. The twin arrangement, on the other hand, permits of a shorter and lighter yoke. In some cases the long leverage or tandem yoke causes trouble by shearing off the rivets which join the yoke to the coupler. The rear spring of the tandem arrangement extends back so far from the end of the car that it cannot be inspected without going under the car, and it is doubtful if the rear spring and follower ever gets much attention from the inspectors. None of these objections are very serious, and the committee, in its future recommendations, will provide for the use of both twin and tandem spring arrangements. The committee is of the opinion that draft gear of the same capacity should be used on small cars as is used on cars of the largest capacity.



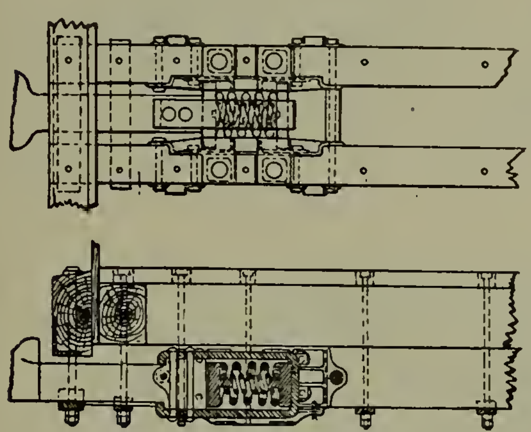
Butler Draft Gear Attachment.
Fig. 6.



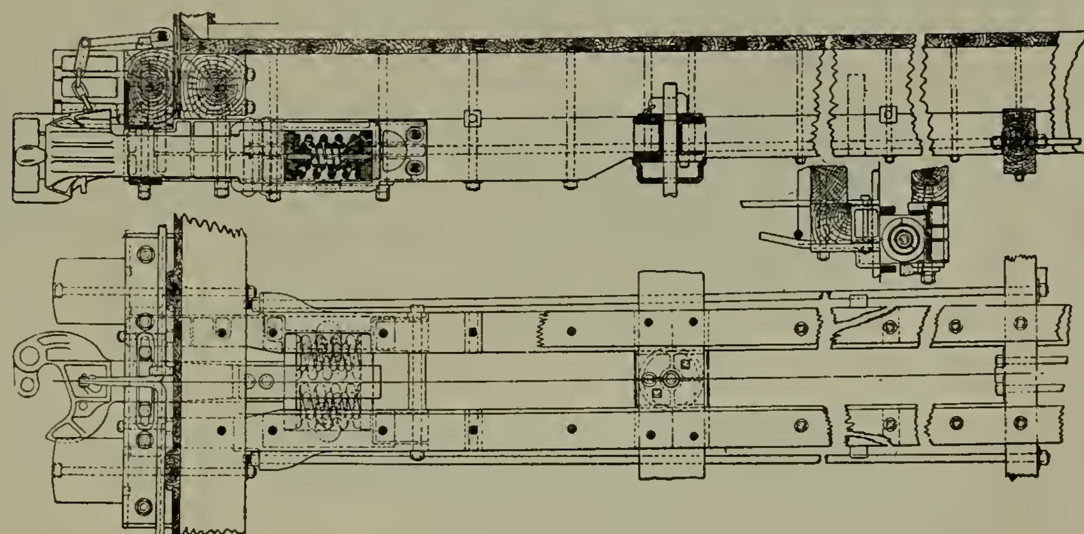
American Car & Foundry Co. Draft Gear.
Steel cars, 60,000 to 100,000 lbs. capacity.
Fig. 5.



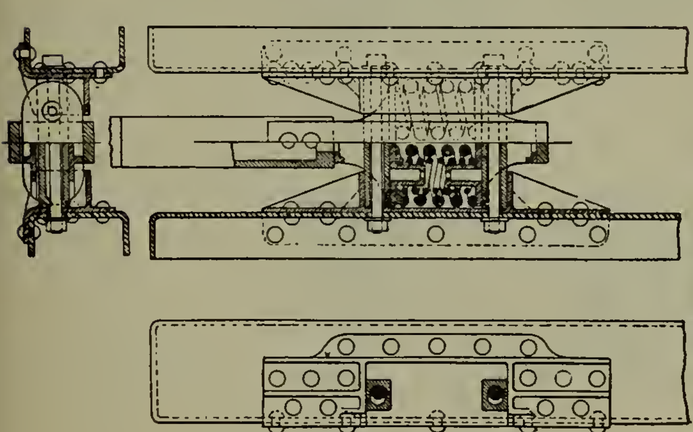
Draft Gear, Chicago & Alton R'y
100,000 lbs. capacity car.
Fig. 7.



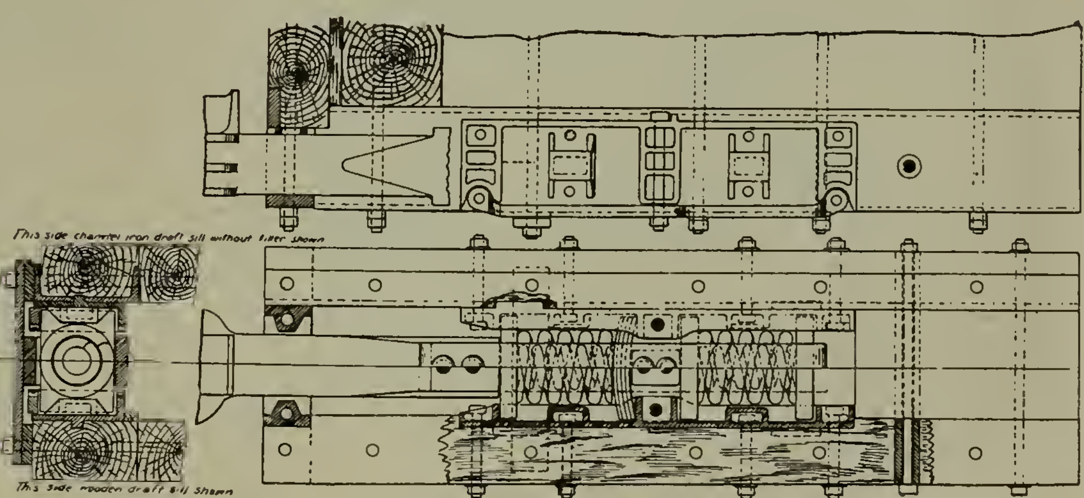
Conrath Single-Spring Draft Gear



Gould Malleable Draft Beam No. 97.
Fig. 10.



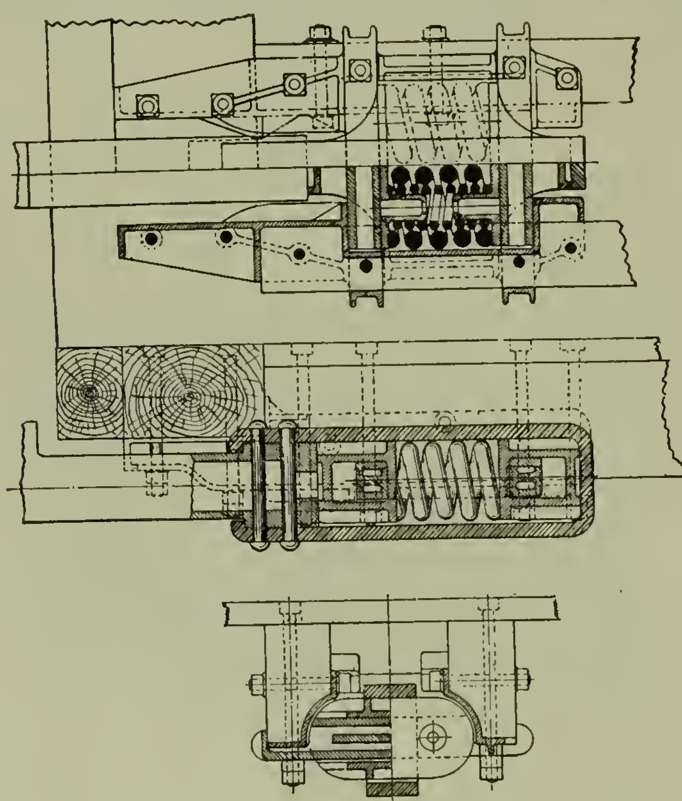
Dayton Draft Gear
80,000-lb cars with pressed steel sills
Fig. 8.



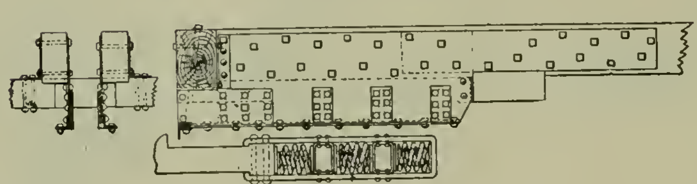
Hinson Draft Gear Attachment.
Tandem with Spring Steel Follower Plates.
Fig. 11.

Wooden Draft Timbers and Metal Beams.

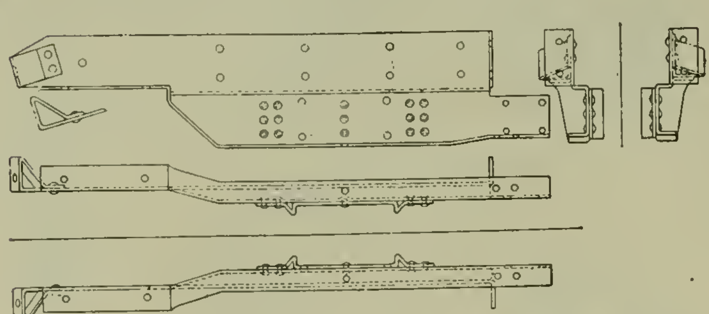
Metal draft beams are being used extensively in place of wood timbers where the rigging is placed below the sills. These are of a variety of designs; they are of various lengths and are commonly made in each case to suit the car framing. The committee has considered the advisability of recommending a standard spacing of bolts and lugs, with a view to having different draft riggings as a whole interchangeable one with another. It is free to say that the adoption of such a standard has met with little favor and is considered rather impractical even by members of the committee. The point is made, and it seems reasonable, that these metal beams will probably last the life of the car and will require renewal only in case the cars are broken in wrecks. If the metal beams do not do that, they will fail to meet the expectations of designers. With this in view, it seems hardly worth while to attempt to standardize this detail, as a good deal must be sacrificed for the sake of uniformity. Any such general scheme for a standard spacing of bolts and lugs would, first of all, mean the doing away of the shoulder at the sill or dead block, as it will readily be seen that the location of this shoulder from the end of the beam is governed by the car framing; that is,



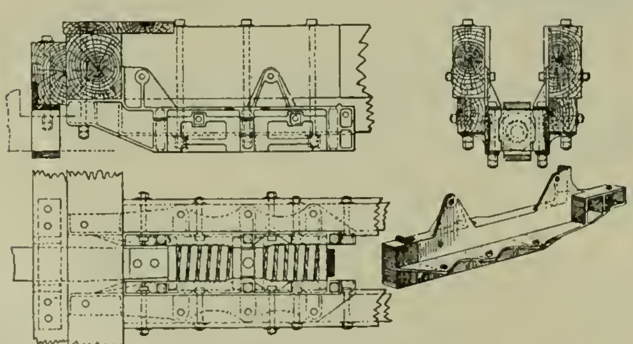
C. B. & Q. R. R.—Dayton Twin Springs and Sill Plates.
Line of draft at bottom of sills.



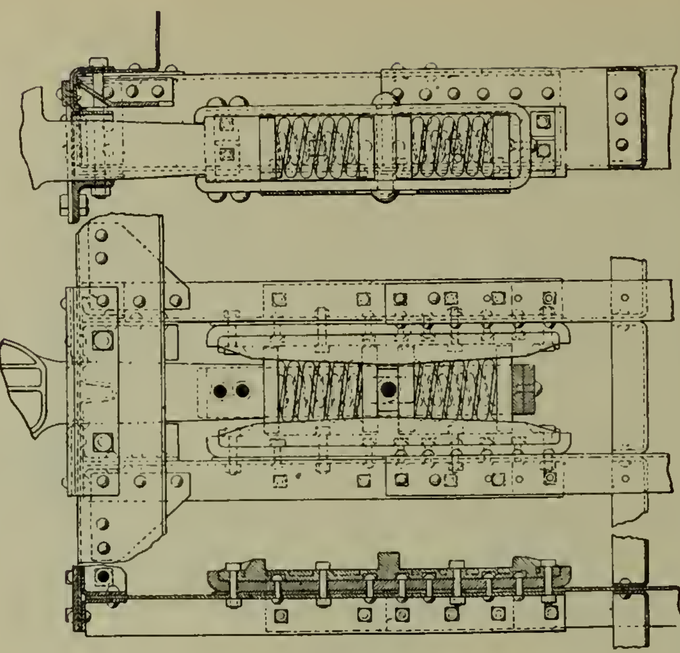
Francis' Plate Metal Draft Gear.
Fig. 9.



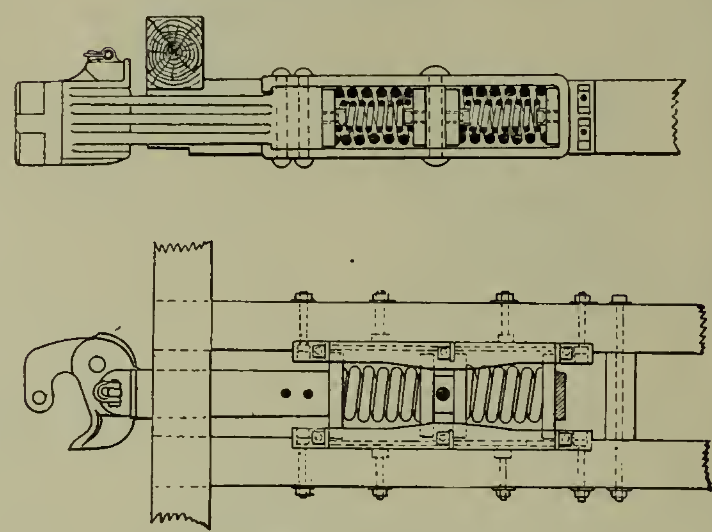
Heishley's Pressed-Steel Draft Gear.



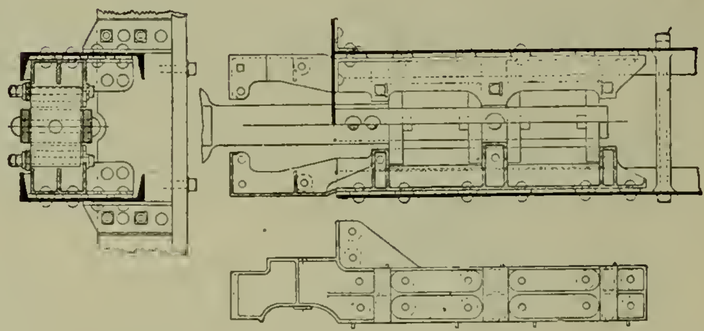
Miner Draft Gear.
80,000 and 100,000 lb. capacity low-draft cars.
Fig. 12.



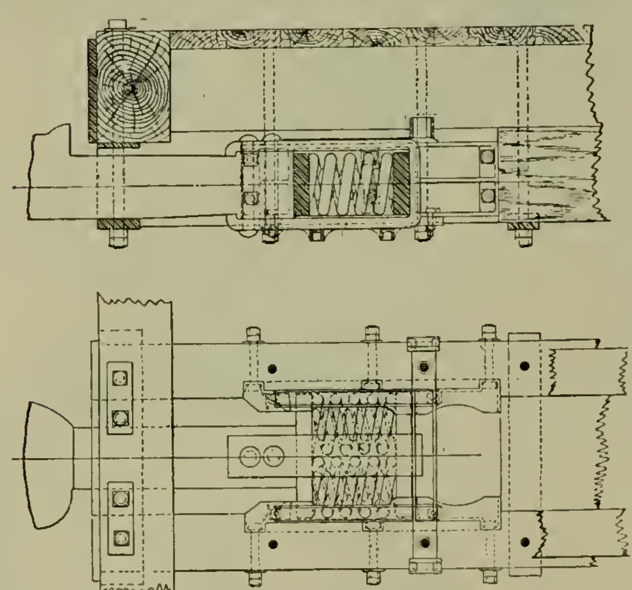
Miner Draft Gear.
Applied to 100,000-lb. capacity cars; B. & O. R. R.



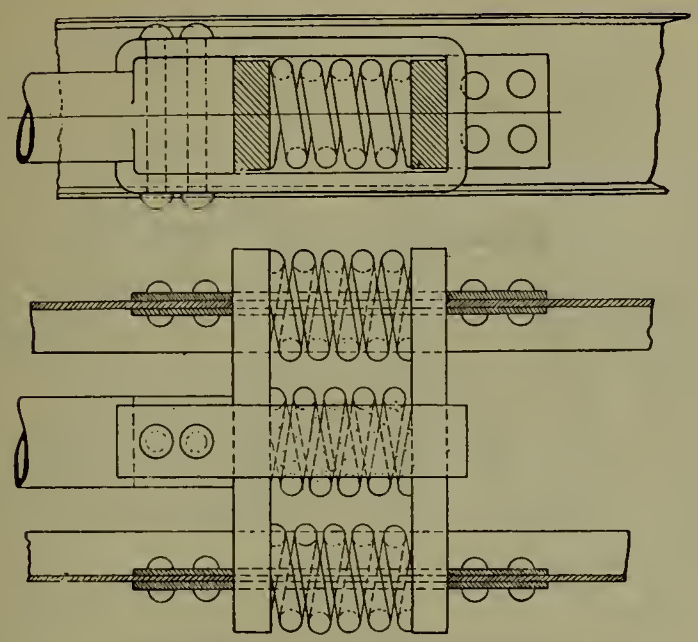
Miner Draft Gear.
60,000 and 80,000 lb. cars, wooden sills.
Fig. 13.



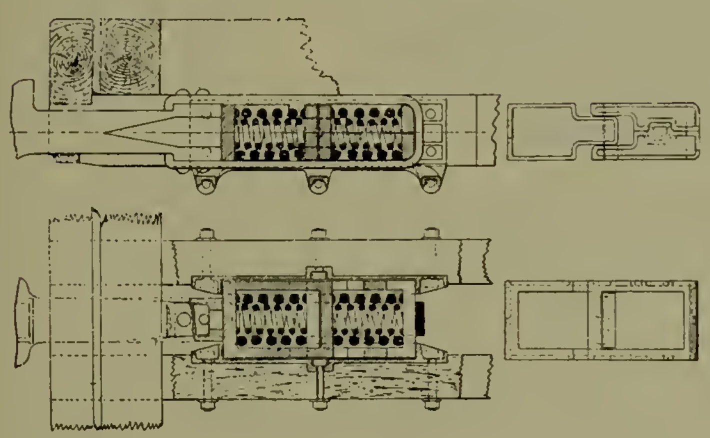
Miner Draft Gear.
A. T. & S. F. R'y 80,000-lb. box cars with steel center sills.



Monarch Draft Gear.
Cleveland, Lorain & Wheeling R'y.
Fig. 14.



L. M Slack Triple-Spring Draft Gear



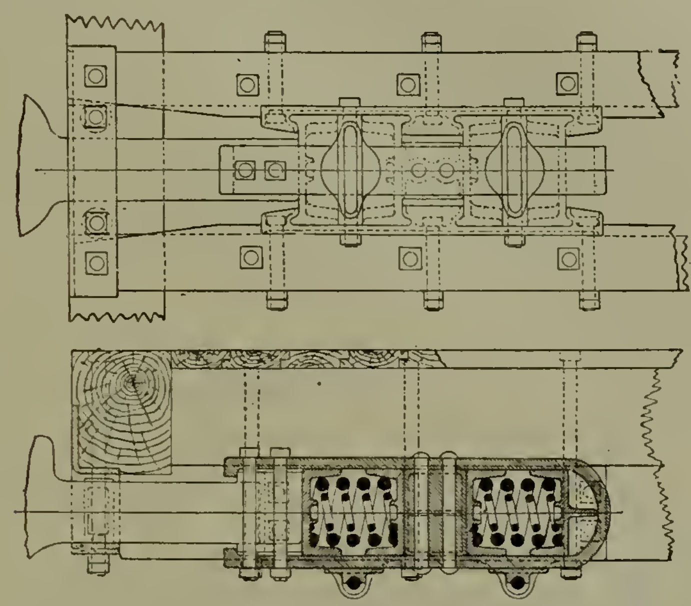
Thornburgh Draft Gear.

Tandem-spring box followers.

Fig. 15.

by the sizes of timbers used and also by whether a dead wood is used outside the end sill. The lug or lugs would then be the only projections above the upper face of the metal beam, and these could easily be located a fixed distance from the end of the beam. In the same way the vertical bolts holding the beams up to the sills would all have to be in line and a fixed distance from the inner face of the center sill, and the bolt spacing would need be a rather arbitrary one. To insure that one draft rigging as a whole would interchange with another, the distance from the bottom of the sills to the line of draft would have to be fixed. It would not be hoped to make so good a construction in this way as by designing the metal beams with ample shoulders to suit the car framing. The committee merely presents this idea to the convention for discussion, as some have expressed themselves in favor of a standard metal draft beam.

No better way is known of attaching wooden draft timber or metal beams to the sills than by vertical bolts, which should be ⅞ inch or 1 inch in diameter. Wide keys or lugs are pre-



Wilmington Malleable Iron Co. Tandem, A2, Draft Gear.

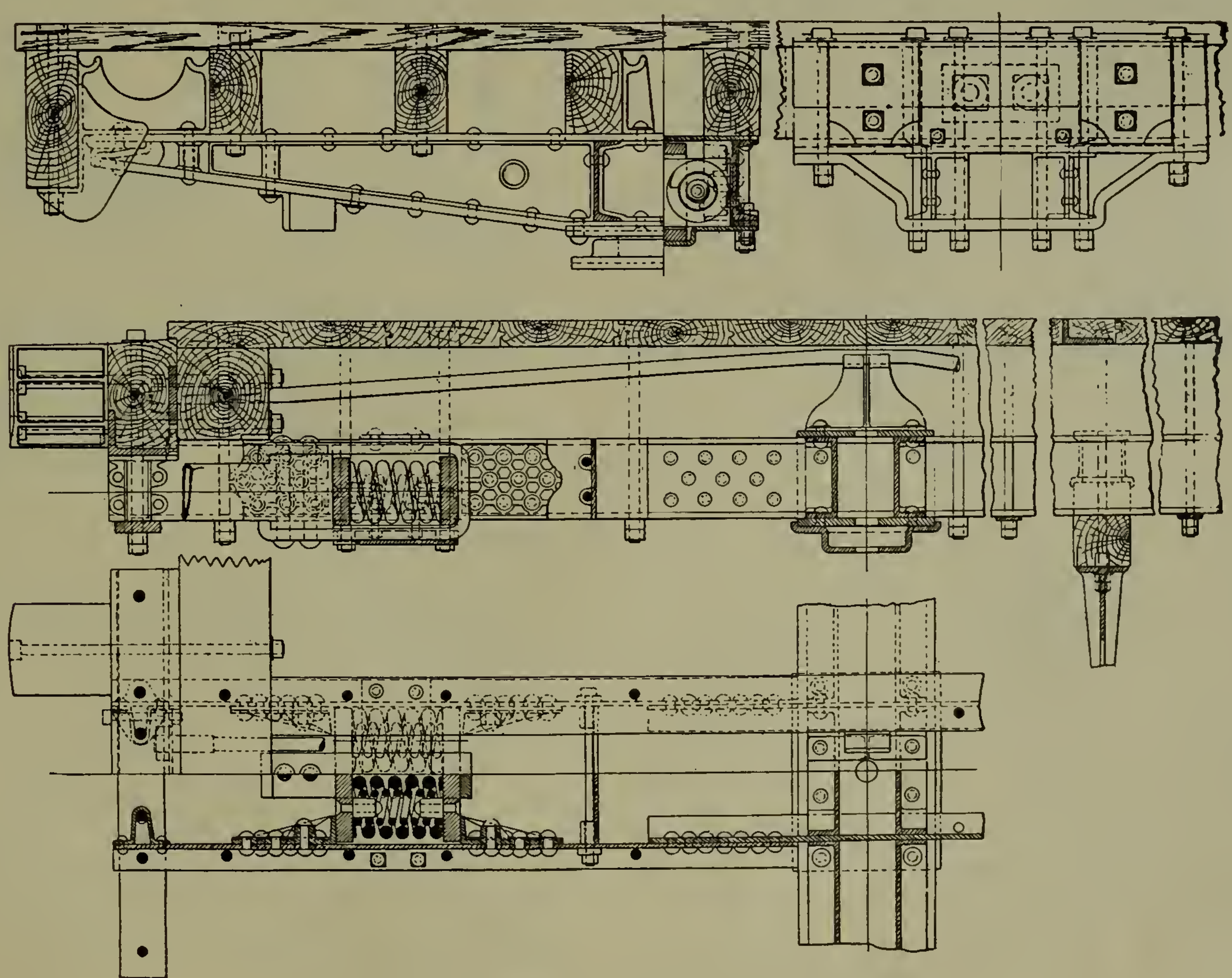
Fig. 16.

ferred to small keys, well removed from the body bolsters, where the sills should be maintained the full section.

Springs.

It is found that the M. C. B. draft gear spring, 6¼ inches in diameter by 8 inches high, is used generally in spring riggings; at least the dimensions are adhered to and should be retained.

The Cleveland, Cincinnati, Chicago and St. Louis railway is using draft springs of larger capacity than the M. C. B. spring but of the same outside dimensions. These springs have three coils which fit closely one coil within another. The outer coil tested alone to 6 inches, requires a pressure of 16,700 pounds: the second coil alone, 5,400 pounds, and the inner coil alone, 1,400 pounds. Compressed separately to 6 inches, the coils thus have in all 23,400 pounds capacity, but when assembled, a little



L. S. & M. S. R'y Experimental Draft Gear Hopper Bottom Gondola.

Fig. 17.

over 28,000 pounds is required to compress the group to 6 inches. The difference is accounted for by friction of one coil on another. This is mentioned here as showing how the capacity of a spring of the standard dimensions can be increased.

M. C. B. Recommended Practice.

The committee does not feel at this time that it is in position to recommend anything in the way of detail designs to take the place of the present recommended practice for coupler attachments, but it hopes to get from the discussion of the topics suggested and from the tests to be made the data needed to make final recommendations.

Tests.

The intention is to make draft gear tests early next summer. The convention is asked for a free discussion of this question of draft gear tests and the members are urged, in addition, to try on the rear of tenders the new draft gears whichh seem to have merit, so that there may be accumulating some data from actual service.

THE ESTABLISHMENT OF A JOINT LIBRARY IN CONNECTION WITH THE AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.

(J. T. Chamberlain, Committee.)

The undersigned was appointed a committee to confer with a similar committee of the American Railway Master Mechanics' Association, to consider the establishment of a joint library for the two Associations.

The matter has been carefully canvassed from the standpoint of both Associations, and as a result of the joint deliberations, would report that it is deemed inexpedient at the present time to establish a joint library:

First. Owing to the expense involved.

Second. In all large cities excellent reference libraries are maintained, whose facilities are available to all.

Third. There are comparatively few of our members who would be likely to avail themselves of such a library if established.

Following the topical discussions which we are compelled to omit from this issue owing to lack of space was the annual election of officers, which resulted as follows:

President—J. J. Hennessey, C., M & St. P.

First Vice-President—J. W. Marden, Boston & Maine.

Second Vice-President—F. W. Brazier, N. Y. C. & H. R.

Third Vice-President—W. P. Appleyard, N. Y. N. H. & H.

Executive Committee—George W. Demarest, William Renshaw and J. T. Chamberlain.

Treasurer—John Kirby.

After which the convention adjourned.

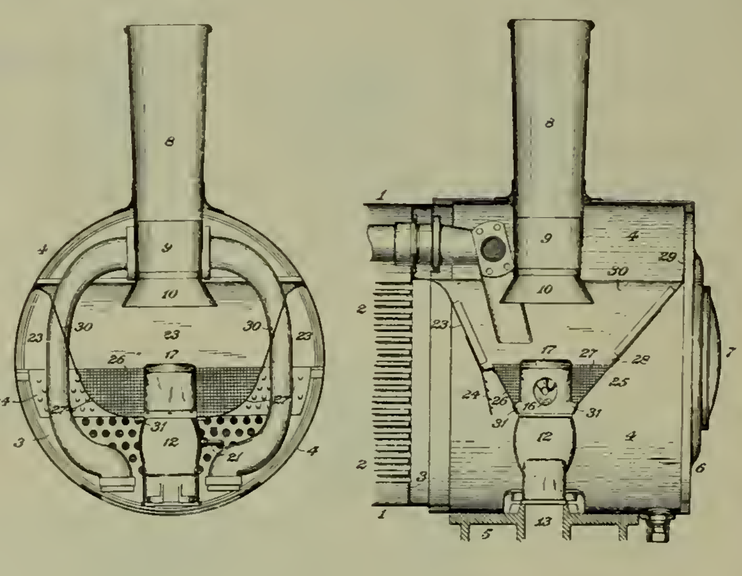
Interesting New Railway Patents

Player Locomotive Draft Appliance

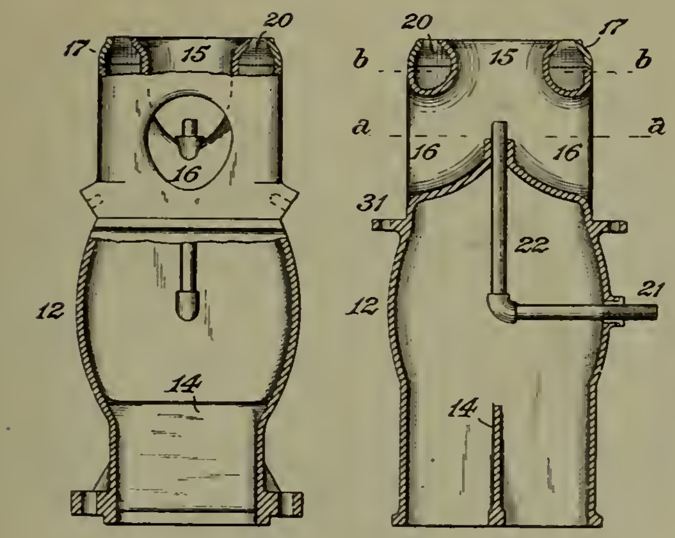
THE object of an invention patented by John Player, of Dunkirk, N. Y., is to provide a draft appliance for locomotive or other engines in which the draft upon the fire is created by the utilization of the exhaust steam from the cylinders, by the employment of which a greater and more uniform draft may be maintained and the back pressure in the cylinders be reduced relatively to construction heretofore known or proposed.

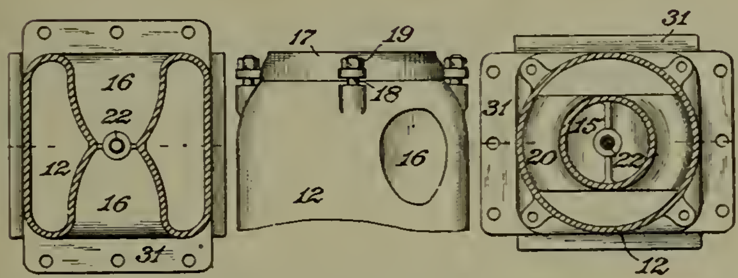
The leading and essential feature of the invention consists in the combination, with a smoke-box, of an exhaust-pipe having an annular nozzle of large area for the escape of the exhaust steam and provided with an internal passage for the entrainment of a portion of the gases or combustion of sufficient area to enable the entrained gases to partially destroy the vacuum created in the interior of the annular column of escaping steam, said gases being admitted through openings located above a spark-arrester, so that the effective point for the creation of vacuum may be properly centralized in the smoke-box. The intensity of the vacuum is thereby augmented with a materially lower velocity of the escaping steam, and an increase in the discharge area of the exhaust-nozzle of from thirty to fifty per cent. has been found to be satisfactorily attainable in actual practice.

The invention is herein exemplified as applied in connection with a locomotive-boiler of the type now standard on railroads. An exhaust-pipe is connected at its lower end to the cylinder-saddles and communicates with the exhaust passages thereof, a vertical bridge extending upwardly for a proper distance in the exhaust-pipe to separate the currents of steam from said passages, as in ordinary practice. The interior of the exhaust-pipe is for the major portion of its height substantially unbroken or unobstructed (the small blower-pipe hereinafter described being the only member which extends into it), so as to present nearly to its top a passage for the transverse of exhaust-steam, which is of the full width of its bore. The shell or wall of the exhaust-pipe is double at and for some distance below its top—that is to say, is composed of an inner and an outer body of metal. The inner body surrounds a central passage for the discharge of gases which are entrailed through lateral inlet passages adjacent to the top of the exhaust-pipe and an annular cap or tip of metal is secured removably to lugs on the outer body, annular exhaust-steam discharge opening which constitutes the exit of the exhaust-pipe, being presented between the inner body of metal and the cap or tip. The inlet passages are located above the spark-arrester—that is to say, on the side of the netting thereof which is farther



from the tubes—both for the purpose of effecting the entrainment of gases at a proper level and to prevent the discharge of solid particles before passing through the netting of the spark-arrester. The blower-pipe is preferably inserted through the shell of the exhaust-pipe, at one side thereof, and is provided with an upward extension, the discharge opening of which is concentric with the gas-discharge passage, so that entrainment of gases and consequent augmentation of draft may be effected when steam is discharged through the blower-pipe. If preferred, a passage may be cored in the casting for connection with the blower, or it may be caused to discharge in small jets disposed around the central passage, or it may be unconnected with the ex-

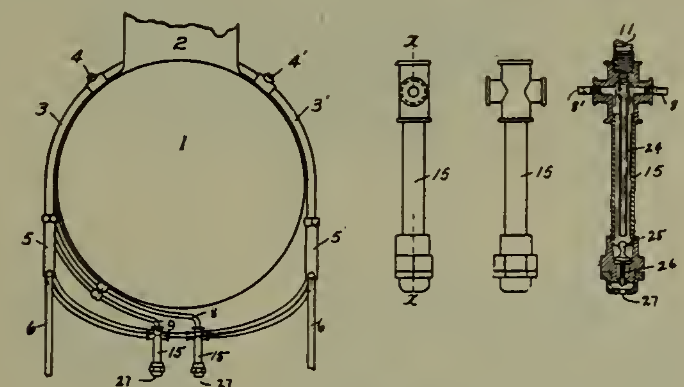


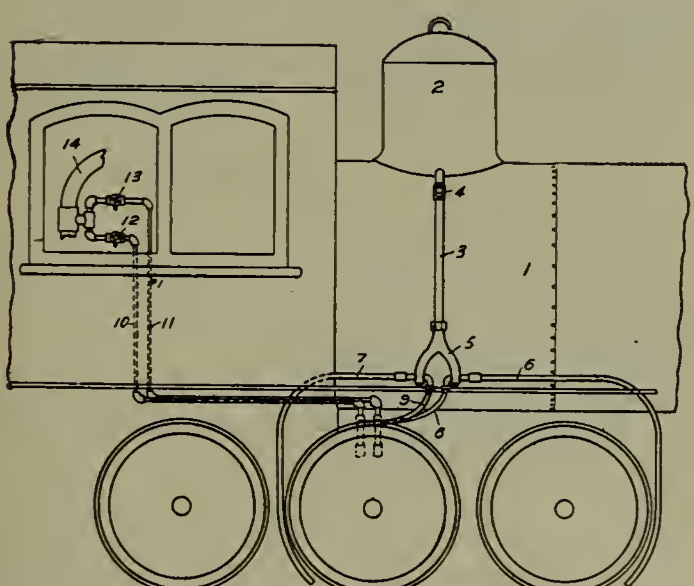


haust-pipe and applied externally in the ordinary manner. The spark-arresting appliance employed does not in and of itself form part of the present invention.

Gapp Locomotive Sander.

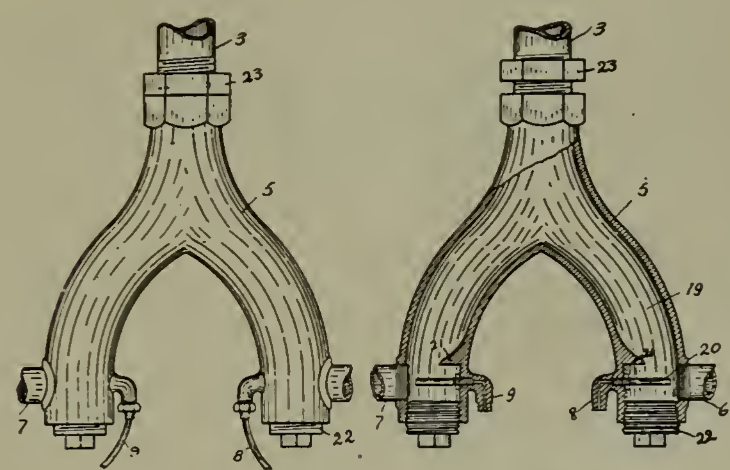
A sanding device for locomotives has been patented by John Gapp, of Scranton, Pa., and it relates more particularly to that class of sand apparatus in which a jet of compressed air is used to force the sand through the pipes; and the objects of the invention are to eliminate the difficulties arising from condensation-water in

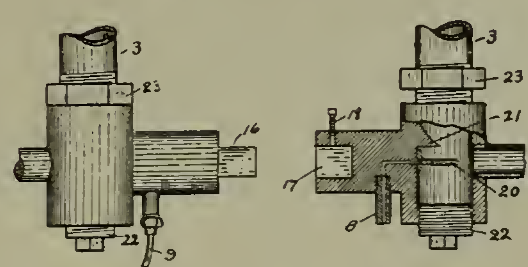


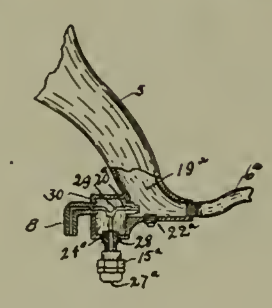


the sand-pipes consequent upon the introduction of cold-air blasts therein, to prevent the clogging of the pipes by settling of gravel and other heavy substances therein, to simplify the construction, to decrease the weight, to increase the efficiency and improve the form of such devices.

For the better understanding of the construction let it be noted that in order to force a prompt delivery of sand through the pipes leading from the sand-box on locomotives to that part of a rail next to a drive-wheel it has been found necessary to introduce a jet of air from the reservoir used for operating on air-brakes in connection with the train and locomotive and since during the interval between the times when the sand-pipe is used the air within the pipes assumes a temperature generally higher than the surrounding atmosphere and since the lower ends of the pipe are open and otherwise exposed to the effects of steam and moisture the air within the pipes becomes charged with considerable moisture, there is a considerable production of condensation-water upon the induction into the pipe of the compressed air, which suddenly expanding lowers the temperature of the atmosphere very greatly and suddenly. This condensation-water is sufficient to so wet the sand within the pipes as to make it soggy and immovable under the ordinary pressure, and at certain temperatures the condensation-water is actually frozen in the pipes, completely clogging them from operation. It should be noted that in the traps provided heretofore the sand surrounds the jet-tube, embedding it, and portions of gravel are thereby permitted to gather around the jet-tube to further increase the difficulty by holding moisture and assisting in the clogging of the sand.



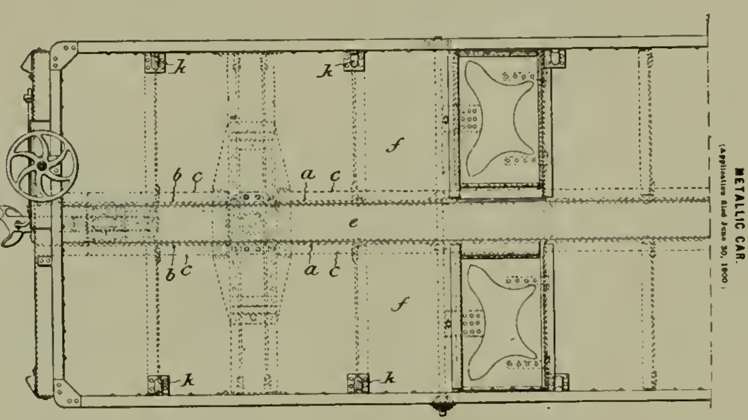




The device is so constructed as to obviate the difficulties above referred to. The jet-tube is set backwardly in the trap, so as not to be embedded in the sand and yet allowing the sand to be delivered by gravity from the sand-box to the portion of the pipe immediately in front of the jet, while the air introduced into the jet is brought through a rising pipe of sufficient size in which, if condensation takes place, the condensation-water will not be raised by the current of air and squirted into the sand, as by the old method, but will be drained to a lower part of the pipe and there discharged through a safety-valve, which remains open when the air is not turned on and closes by the pressure of the air when the apparatus is in operation.

New Schoen Car.

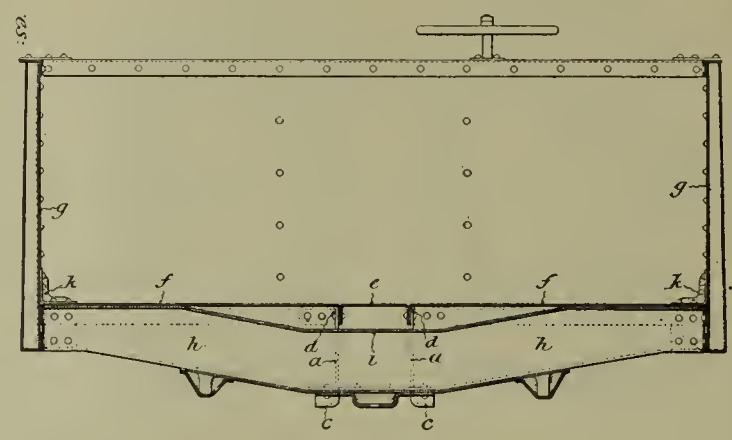
The Pressed Steel Car Co., of Pittsburg, Pa., is the assignee of a patent recently granted to Charles T. Schoen, of Philadelphia, Pa., and John M. Hansen, of Bellevue, Pa., in which patent the object has been to produce a metallic car body, the floor of which is practically free from rivets, so that in case of it being necessary to use shovels for unloading the car there would be no obstructions, such as projecting rivet-heads, to retard the work.



In carrying out the intention there are used central sills of substantially L-shape in cross section and floor plates of channel form or substantially U-shape in cross section and rivet the flanges of these floor plates to the upper flangeless edges of the sills and to the side plates. For the purpose of permitting uninterrupted passage of the inner flanges the body bolsters are centrally depressed or dished. The invention is illustrated as applied to the type of car shown in Patent No. 647,906, dated April 17, 1900, and granted to the Pressed Steel Car Company as assignee of the same inventor. That car has no side sills, but has body bolsters which extend continuously across the underframe and receive center sills between them and the inner ends of draft-rigging sills, the outer ends of the latter being supported upon the sills and the side plates of the body being riveted to the transoms projecting from the center sills and draft rigging sills.

In the present invention the center sills and draft rigging sills, preferably of pressed steel, have bottom flanges only—that is to say, they are of L-beam instead of channel form and their flangless edges are uppermost. The floor plates are of channel or U-form—that is to say, they have longitudinal edge flanges on both edges—and there are two series of such floor plates, one of a width to fit in between the center sills and draft rigging sills, and the other to fit in between the sills and the side plates, and the flanges of these floor plates are riveted from below to the sills and are also riveted together with the side plates. By this construction there are no projecting rivets inside the car body on the floor, and hence, in the use of shovels for unloading the car the shovelers meet no obstructions to their work.

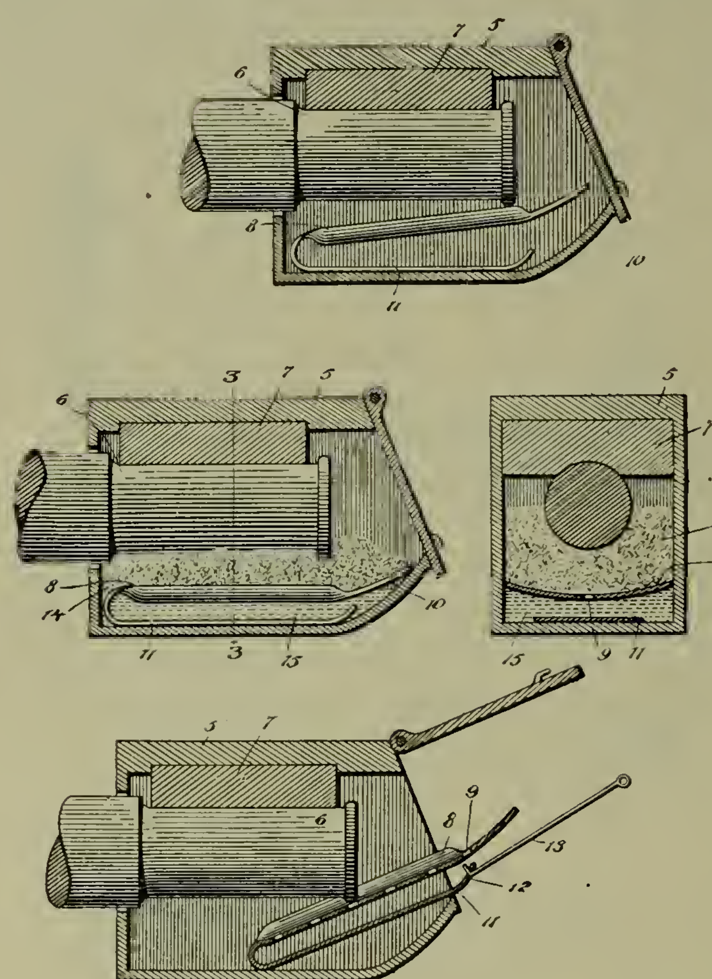
In order to permit the uninterrupted passage of the flanges of the floor plates from end to end, the body bolsters have central depressions—that is to say, they are dished. It is advantageous to use corner brackets at



intervals, which are riveted to the floor plates and side plates and serve to reinforce and stiffen these parts at their juncture. By using flanged floor plates and riveting their flanges to the upper flangeless edges of the webs of the sills these flanges serve as compression members for said sills.

The Parsons Journal Oiler.

A simple device, designed to be placed in a journal-box to hold the absorbent packing yieldingly against the journal and by the use of which a less amount of packing is required than is ordinarily used, has been patented by Fred E. Parsons, of Marshall, Minnesota. Arranged in the lower portion of the journal-box is a



packing-supporting plate which is transversely curved upward from its center to its edges and extends the full width of the journal-box. At its central portion this plate is provided with a series of perforations and its free end is turned upward, and is extended beyond the end of the journal, so as to prevent the packing from sliding off the end thereof. This plate is made of spring metal and has connection at its inner end with a bottom member or plate of spring material, which rests upon the bottom of the journal-box. The free end of this plate is turned upward and is provided with a perforation in which the hook end of a rod may be engaged for the purpose of inserting the device or for removing it.

In operation the device is to be placed in the journal-box below the journal, and then the packing of the waste or similar absorbent material is placed on the top thereof and is held in yielding engagement with the journal by the plate. The oil is to be placed in the lower portion of the journal-box and will pass through the perforations in the packing-supporting plate and be absorbed by the packing, from which it will pass to the journal. In using a device embodying this invention there is derived a benefit from the upward pressure of the spring-plate, which gives constant contact of the packing against the journal. The device requires no other fastening than that of the pressure of the packing.

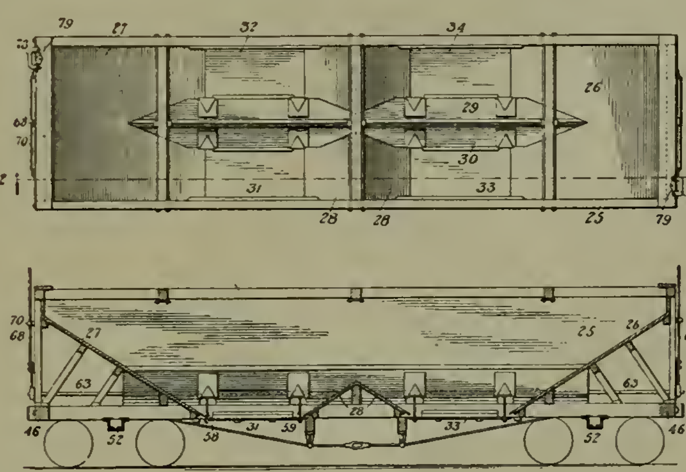
Williamson and Pries Dump Car.

A dump car has been recently patented by Henry C. Williamson and Herman Pries, of Michigan City, Indiana.

The body of a car is, generally speaking, of the gondola type. At each end of the car there is a longitudinally disposed incline, extending downwardly toward the center of the car. At the middle of the car there is a double incline sloping downwardly in each direction toward the ends of the car and longitudinally as to the car body, and at its central line there is a double incline, which extends from the incline at one end to the incline at the other end. These several inclines are so disposed that four dumping apertures are provided—two at each end and two at each side of the car—and each of these apertures is provided with a door, each of which is hinged to a sill of the car, its swinging edge meeting one of the central sills.

The car is provided with four central sills, all located below the central inclines and spaced apart for the accommodation of the central truss rods, five in number. The outer pair of the central sills extend the entire length of the car and are framed into the end sills. The inner pair of the central sills is shorter, their ends abutting against the cheek plates of the draft timbers. A truss rod plate is applied to the ends of the inner pair of central sills, and the central truss rod passes through this plate, so that its strain is applied to the ends of the sills through the plate. The two outer pairs of the central truss rods pass over a truss saddle, supported by the body bolster and the two members of each pair diverge in vertical plane from this saddle toward their ends, the outer rods passing longitudinally through the draft timbers and the two inner rods of each pair passing over these timbers. All of these four truss rods pass through the end sill. This arrangement of central sills and central truss rods provides two longitudinal trusses for the center of the car—viz., an inner truss, of which the inner pair of central sills constitute the compression members and the central truss-rod the tension member, which truss not only aids in supporting the load, but receives the thrust strain of the draw bars, and an outer truss, of which the outer sills constitute the compression member and the outer rods the tension member. This truss in addition to its function of in part supporting its load also sustains the drawing strain of the draw bars.

Each of the dump doors is supported and controlled by means of two chains, which pass upwardly over spools or sheaves and are secured to and wound about drums, the chains of the door at one side of the car passing under the drums, and the chains of the door on the opposite side of the car passing over the drums, so that the doors open and close simultaneously. The doors at the two ends of the car are preferably separately controlled, and to that end a rod projects inwardly from each end of the car, along its central line and below the longitudinally disposed double incline, and upon each of these rods is mounted a pair of drums, to which the chains are attached. Upon the outer end of each rod there is fixed a ratchet wheel, the hubs of which are journaled in the plates, secured to the framing of the car. The hubs of the drum are journaled in suitable bearings carried by cross timbers of the car frame. A bifurcated lever is loosely pivoted on the hubs of the ratchet wheel and its upper end projects above the end of the car. An actuating pawl is pivoted between the legs of the lever and cooperates with the ratchet wheel. A retaining pawl is pivoted between the plates on which the hubs are journaled, so as to engage the ratchet wheel. Each of the legs of the lever to engage lugs depending from the retaining pawl, so that when the lever is swung to the limit of its advance movement this pawl is raised so as to free the ratchet wheel and permit the doors to fall.



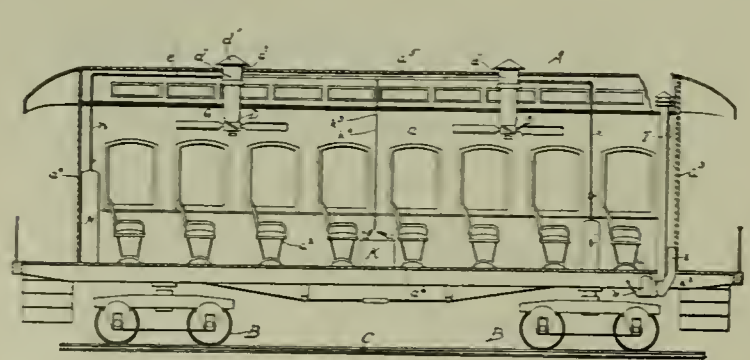
As thus constructed, the car may be built in very large sizes, so as to have a capacity of fifty tons or more of ore or coal, the central sill and truss rod arrangement, without trenching upon the body of the car, and thereby limiting its capacity, affording adequate strength both to support the load and withstand the drawing or pushing strain when the car is coupled into a long and heavy train.

Mastin Ventilating Apparatus for Cars.

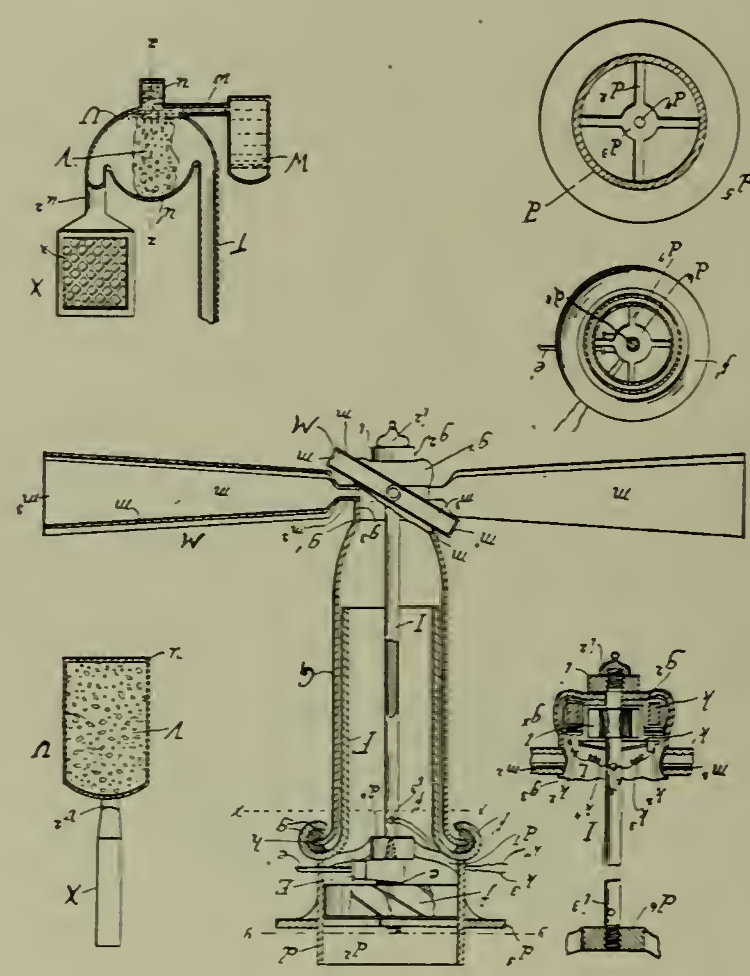
Mr. Thomas H. Mastin, of Kansas City, Mo., has patented a ventilating apparatus for cars which provides means for the expulsion from the car of impure vitiated air and filling its place with currents of purified air and at the same time exhausting the heated air during its agitation. Within the apartment of the car and extending through the top thereof is the novel air agitating and ventilating apparatus which is constructed as follows: The upper portion of the apparatus consists of a cylindrical fan case of suitable length, the upper end of which case extends through a circular opening in the roof of the car and a short distance above the outer side of said roof and fits closely the sides of said opening. Within the fan case is a compressed air motor of ordinary construction, having a supply pipe, the vertical shaft of which motor extends upwardly and is journaled within an opening of a disk.

With the lower end of the case is rigidly connected the upper end of a ventiduct or tube, upon which is journaled a rotary tube. The lower end of the rotating tube extends downwardly a short distance below the lower end of the ventiduct, and is shaped to form the sides of a plate. Within the ventiduct is a stationary hollow shaft, the upper end of which shaft is secured within the fan case, and the lower end of said shaft being extended downwardly through the bottom plate of the receptacle at the lower end of the rotary tube. Within the receptacle at the lower end of the rotary tube are the fields of an ordinary electrical fan motor, the said fields being connected with the sides of the receptacle, so as to rotate in unison therewith. The amature is secured to the hollow shaft and concentric with the field.

The fan blades are hollow to form conduits for the passage of the vitiated air to the rotary tube. In the outer ends of the fan blades are openings for the free entrance of the air, which openings extend from one inner side portion of a fan blade to the other in width. Within the car is a compressed air storage tank, which is supplied with compressed air in the well-known manner. With the top of the tank is connected one end of a supply pipe, the outer end of which pipe being connected with the supply pipe, leading to the compressed air motor. For the purpose of purifying the air entering the car, which is induced by the suction and forcing fans in the ventilating apparatus, an air induction tube is employed, one end of which extends through the roof of the car, near the inner side of the car, and the lower end through the bottom of the car and connected with the side portion of a receptacle, in which is located a sponge.



In the operation of the invention compressed air from the tank is admitted to the motor through pipes, and power imparted to the shaft thereof, and to the air suction and forcing fan on said shaft. At the same time a current of electricity from a storage battery is transmitted to the electric motor, and the rotary tube is caused to revolve the fan blades, and act to agitate the air in their circle of rotation. During the rotation of the fan blades the air suction and blast fan acts to draw the heated air in the apartment of the car through the openings in the fan blades, which passes within the rotating receptacle and the rotary tube, thence through the stationary ventiduct, and is expelled from the car by the action of the fan blade, the degree of speed of



the air suction and blast apparatus being in excess of the degrees of speed imparted to the fan blades by the action of the motor. Simultaneous with the rotation of the fan blades the draft upon the heated air in the apartment of the car causes an induction of air from outside of the car within the air induction tube, which air passes downwardly through the sponge receptacle and is purified from smoke and gas in passing through the sponge.

Personal Mention

Charles H. Burns, master mechanic of the Houston & Texas Central, died at Houston, Texas, on June 5, at the age of fifty-two years.

Mr. William Pestell, formerly employed by the Lynn & Boston R. R. as electrical engineer, has been appointed superintendent of motive power of the Worcester Consolidated Street Ry., of Worcester, Mass.

Mr. A. N. Monteer, who has been master mechanic of the Kansas City, Fort Scott & Memphis for 27 years, has resigned that position.

Mr. T. E. Merritt has been appointed master mechanic of the Cincinnati, Richmond & Muncie R. R. at Richmond, Ind.

Mr. J. R. Garrick has resigned as master mechanic of the Galveston, Harrisburg & San Antonio at El Paso, Tex., and Mr. G. P. Drodge has been appointed acting master mechanic.

Mr. Thomas Garrick, assistant master mechanic of the Southern Pacific at Los Angeles, has been appointed acting master mechanic at San Francisco to succeeed Mr. F. L. Bates, resigned.

Mr. Charles Hagen, master car builder of the Wheeling & Lake Erie, has been granted a leave of absence on account of ill health, and will go to Europe. The duties of the office will be assumed by Mr. C. S. Morse, acting general master mechanic.

Mr. John S. Chambers, master mechanic of the Lehigh Valley at Elizabethport, N. J., has been appointed superintendent of motive power of the Atlantic Coast Line, with headquarters at Wilmington, N. C., in place of Mr. T. H. Symington, resigned.

Mr. James Lauder, heretofore general foreman, has been appointed master mechanic of the Gulf, Colorado & Santa Fe at Cleburne, Tex., in place of Mr. L. H. Waugh, appointed general foremen of the shops at Gainesville, Tex.

Mr. E. H. Wade, assistant master mechanic of the Chicago & Northwestern at Chicago, has been appointed master mechanic at Eagle Grove, Ia., in place of Mr. F. G. Benjamin, transferred to the Madison division, and is succeeded in the first named position by Mr. A. B. Quimby, heretofore division foreman at Huron, S. D.

M. A. R. Kipp, formerly general foreman of shops of the Pennsylvania lines at Dennison, O., has been appointed master mechanic of the Wisconsin Central, with headquarters at Fond du Lac. Wis.

Mr. G. T. Neubert, late master mechanic of the eastern division of the Atchison, Topeka & Santa Fe, has been appointed general shop foreman of the San Francisco & San Joaquin Valley at Point Richmond, Cal.

Mr. Maynard F. W. Robinson, for seven years with the Santa Fe shops at Cleburne, Tex., has been promoted to the general foremanship of the Santa Fe shops at Gainesville.

Mr. James Collinson, heretofore acting assistant superintendent of machinery of the Atchison, Topeka & Santa Fe, has been given the title of general master mechanic, with headquarters at Topeka, Kan. Mr. Milton Player, roundhouse foreman at San Bernardino, Cal., has been appointed master mechanic of the eastern division, with headquarters at Topeka, Kan., to succeed Mr. G. C. Neubert, resigned.

Mr. T. M. Downing, heretofore master mechanic of the Detroit & Lima Northern, has been appointed superintendent of motive power and equipment of the reorganized road, the Detroit Southern, and the Ohio Southern, with headquarters at Springfield, O.

Mr. C. R. Ord, master mechanic of the Canadian Pacific at Winnipeg, Man., has been transferred to McAdam, N. B.

Mr. Albert E. Manchester has been appointed superintendent of motive power of the Chicago, Milwaukee & St. Paul system, succeeding S. P. Bush, who resigned some time ago.

Mr. Frank F. Coggin has been appointed foreman of engines of the Maine Central. Mr. Coggin will have full charge of all engines in service, engineers and firemen, engine houses and engine house men. He will arrange engines and crews for all trains. Division foremen, engine house foremen, engineers and firemen and traveling engineers will report direct to him.

Mr. W. E. Singleton, who has heretofore been acting master car builder of the Florida East Coast road, has been appointed master car builder.

Mr. W. A. Nettleton, superintendent of motive power of the Kansas City, Fort Scott & Memphis, has tendered his resignation to take effect July 1, when the above road is merged with the St. Louis & San Francisco.

Mr. Chas. Gardner has been appointed general roundhouse foreman at the Washington terminals of the Pittsburg, Cincinnati, Chicago & St. Louis.

Notes of the Month

The Ashton Valve Company, Boston, Mass., manufacturers of pop safety valves and vacuum gauges, are getting out a line of locomotive chime whistles, to be of extra heavy construction and specially adapted to high-pressure service. The company have also several new devices for railroad service which will shortly be placed on the market.

In calling attention to the advantages of the Michigan Central as a route to the Pan-American Exposition, Mr. F. J. Bremhall, of that road, has issued some very handsome and artistic publications. "Buffalo Illustrated" and "Detroit, the City of the Strait," are so very neat and attractive that they fairly compel the traveling public to read them.

An order for 250 steel gondola cars for use on the government railways of Australia in New South Wales was received by the Pressed Steel Car Company this week, through its foreign agents, the Transportation Development Company, Inc. These cars will be somewhat similar to those now in use in Australia, except they will be all steel instead of wood.

"Central Station Experiences" is the title of a very interesting as well as a very instructive book recently issued by the Power Publishing Company of New York City. It is a series of narratives which have appeared in Power and have now been reprinted and published in book form. In it are told the trials and tribulations of a steam engineer while learning to run an electric station.

The stockholders of the American Locomotive Company elected the following officers at a meeting in New

York on June 24: Pliny Fisk, George R. Sheldon, S. R. Callaway, W. Seward Webb, A. J. Pitkin, J. Bryan, F. H. Stevens, C. Miller, J. E. French and George H. Hoadley. The directors met and selected these officers: President, S. R. Callaway; first vice-president, A. J. Pitkin; second vice-president, R. J. Gross; secretary, Louis Best; treasurer, C. B. Denny; controller, C. E. Patterson.

Armstrong Bros. Tool Company, "the tool holder people," of Chicago, report that their tools have been meeting with great success recently in a new field, namely, the shipbuilding industry. Among the many shipyards now using the Armstrong tool holders are Cramps, Newport News, New York Shipbuilding Company, Eastern Shipbuilding Company, Chicago Shipbuilding Company, Detroit Shipbuilding Company, and many of the United States navy yards.

The firm of Gardner & Robinson, of Chicago, desire to announce that they have recently made arrangements so that they are in a position to furnish all kinds of heavy steel plate work, including tanks, draught stacks and blast furnace work. They are also prepared to supply ore, cinder and hot metal buggies, etc. This work will be manufactured for them by the Enterprise Boiler Co., of Youngstown, Ohio, which concern they represent in Chicago territory.

At the annual meeting of the directors of the Sargent Company, on May 29, 1901, the following officers were elected: Geo. M. Sargent, chairman board of directors; W. D. Sargent, president; H. K. Gilbert, vice-president and treasurer; Day McBirney, secretary. This company is also planning a considerable extension to its present works at Chicago Heights, Ill.

We have received a copy of the new Catalogue of Graphite Productions of the Joseph Dixon Crucible Company, which is a very handsome example of modern up-to-date catalogue making and very fully covers the list of Dixon's graphite productions. In it will be found a general description, with illustrations, of their principal Graphite Productions arranged, as far as possible. for easy reference.

The Alabama Great Southern Railroad has placed an order with the Richmond Locomotive Works for four consolidation locomotives with following general dimensins: Cylinders, 20 in. x 26 in.; driving wheels, 58 in.: driving wheel base, 15 ft. 11 in.; total wheel base, 23 ft. 11½ ins.; weight in working order, 142,500 lbs.; weight on drivers, 124,900 lbs.; 61 in. exended wagon top boiler; steam pressure, 200 lbs.; firebox 102¾ in. x 41⅞ in.; tubes 271 in number, 2 in. x 14 ft. 4⅝ in.; tank capacity, 5,000 gallons.

An order for steel cars has been received by the Pressed Steel Car Company. The order is for 400 cars, and the railroad ordering them is the Chicago & Alton. One hundred and fifty of these cars are to be hopper bottom gondolas, similar to those already built for the Erie R. R., of 100,000 pounds capacity, and with the following general dimensions: Length over all, 31 feet 6 inches; length inside, 30 feet ¼ inches; width over all, 10 feet; width inside, 9 feet 6 inches; height of side above rail, 10 feet. The cars will be fitted with New York air brakes, Gray iron journal boxes, P. R. R. draft rigging, Munton couplers, M. C. B. journal bearings, and Schoen trucks. The weight of each car will be 35,514 pounds. The other 250 cars will be pressed steel flat bottom gondolas, similar to the 600 cars already built for the Alton Railroad. The cars will be of 100,000 pounds marked capacity, and will have the following general dimensions: Length over end sills, 43 feet 3 inches; length inside, 41 feet 9 inches; width over side stakes, 10 feet; width inside, 9 feet 4⅞ inches; height from top of rail to top of body, 7 feet 8¼ inches. The cars will be fitted with specialties as designated for the hopper bottom cars. The weight of each car will be 35,600 pounds.

The sale of the Rogers' Locomotive Works may be reopened after all. In court in New Jersey recently Vice-Chancellor Emery announced his decision against allowing the International Power Company to file a petition to have the sale to Elliott G. Smith and Francis H. Holran reopened, on the ground that the International Company was neither a stockholder nor a creditor of the Rogers Company; but at the same time he sanctioned the filing of a petition directed to precisely the same end in the name of a stockholder of the Rogers Works, and signed a rule directing Smith and Holran and the receivers of the Rogers Company to show cause why the sale should not be reopened. This rule is made returnable on June 29. The offer of the International Power Company, stated at $655,000, as against $602,000 bid by Smith and Holran.

Arrangements have been concluded for the purchase of the Shelby Steel Tube Company by the United States Steel Corporation. The plan contemplates the acquisition of every share of stock and the complete merging of the two concerns. The Shelby Company were incorporated in New Jersey about 17 months ago, and are the largest manufacturers of seamless steel tubing in the world and the most formidable competitors of the National Tube Company, now in the United States combination. Their outstanding capital stock consists of $5,000,000 preferred and $8,175,000 common, and it is understood that the price paid will be, in stock of the United States Steel Corporation, the equivalent of about $50 per share for the preferred and $10 per share for the common. The Shelby Company consolidated last year 10 concerns, with combined productive capacity of 100,000,000 feet of tubing a year. Hitherto the Shelby Company have supplied all of the tubing of the American Bicycle Company. A member of J. P. Morgan & Co. remarks naively: "Some of the Shelby officials will be dispensed with. The effect of economies in that way is, of course, one of the objects of the consolidation."

The Michigan Central is rapidly increasing its equipment and improving its motive power, and is getting ready for a big business during the Pan-American season. During May and June they will receive from the Schenectady locomotive works ten new large passenger locomotives. In addition to this increase of motive power, the Michigan Central has made contracts with the American Car & Foundry Company for 1,500 box cars, 35 feet long and of 40 tons capacity, and 500 furniture cars, 45 feet long and of 30 tons capacity, to be delivered this summer. Ten new first-class passenger coaches are now being completed at the company's shops at West

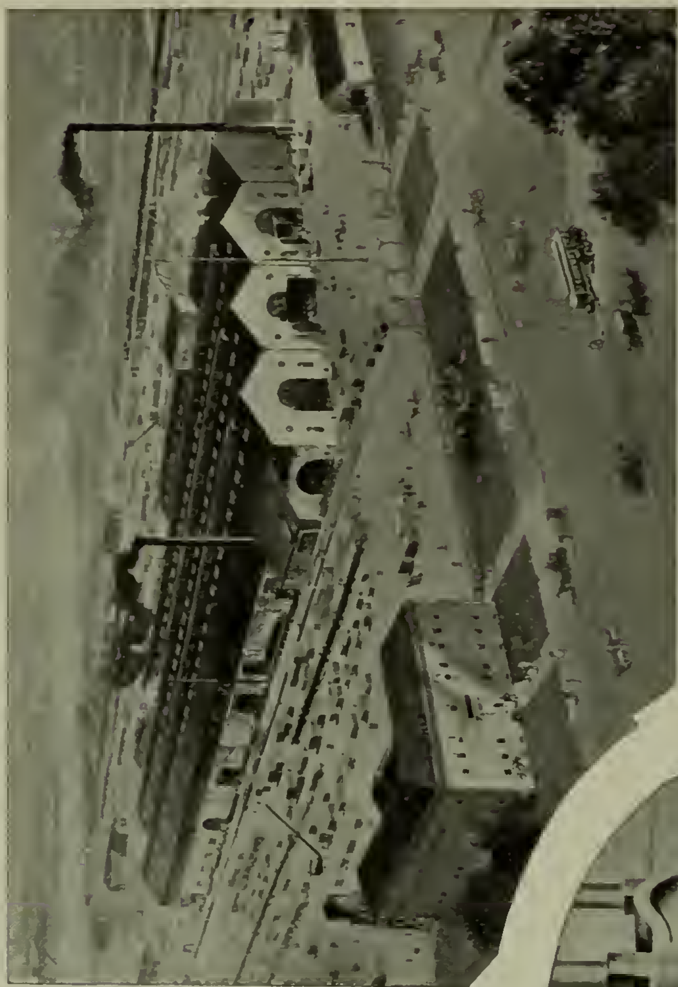
Detroit. They are of fine mahogany finish, two toilet rooms, special lavatory facilities, finest high back seats with special upholstery designs, and with a seating capacity of sixty-eight. The headlinings are cream and gold, designed to produce the best lighting effects in combination with an extra number of Pintsch gas lamps.

The Pressed Steel Car Co. has just received another large order from the Philadelphia & Reading Railroad. The order is for 1,000 low side gondola cars and 100 flat cars. Both types of cars are to be built entirely of steel. The gondola cars are to be of 110,000 pounds capacity, similar to the low side gondola cars already built for the P. & R. R. R. The general dimensions will be as follows: Length over end sills, 35 feet 10½ inches; length of car inside of body, 34 feet; width of car over side stakes, 9 feet 11⅝ inches; width of car inside of body, 9 feet 4 inches; height from top of rail to top of body, 5 feet 3¼ inches; depth of car body from floor to top of sides, 1 foot 1 inch. The car will be equipped with Fox pressed steel pedestal truck frames, cast iron chilled wheels, open hearth steel axles, Westinghouse air brakes, pressed steel brake beams and Chicago M. C. B. automatic couplers. The flat cars are to be of 110,000 pounds capacity and will have steel floors. The general dimensions of the flat cars are: Length over end sills, 35 feet 6 inches; width over sills, 9 feet 6 inches; width over side stakes, 10 feet 1¾ inches; height of floor above top of rail, 3 feet 6¼ inches. The flat cars will be equipped with Fox pressed steel trucks, cast iron chilled wheels, open hearth steel axles, Westinghouse air brakes, pressed steel brake beams and Chicago M. C. B. couplers.

The Standard Pneumatic Tool Company, of Chicago, manufacturers of the well-known "Little Giant" pneumatic tools, have just issued one of their new catalogues "F," illustrating and describing the "Little Giant" pneumatic drills, hammers, reversible boring, flue rolling, reaming and tapping machines, riveters and other air appliances, which they manufacture. In it will be noted several new and novel illustrations of the adaptibility of pneumatic tools for certain classes of work. The catalogue is most handsomely gotten up and finely illustrated with half-tones showing the various tools manufactured. The introduction so fittingly describes their object in sending out their new catalogue that we quote it herewith: "The time has arrived when we deem it unnecessary to extol and elaborate upon the many uses to which pneumatic tools may be adapted, as practically all concede the great advantages to be derived from their use in nearly every field of industry. We simply desire to call your attention to the principles upon which all successful portable pneumatic tools should be constructed, viz.: Economy in the use of air, lightness, simplicity and durability of construction and excellence of workmanship. These features are all found and embodied in all of the 'Little Giant' pneumatic tools."

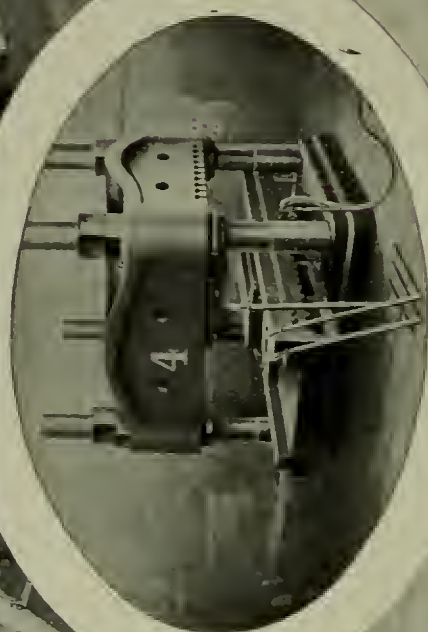
Pittsburg is still holding its own in the matter of sending out rolling stock for the railroads of this country. Every day sees a large shipment of steel cars leaving the city from the works of the Pressed Steel Car Company, and the company now has on its books orders sufficient to keep the 10,000 men on its pay rolls busy for some time to come. During the last week of May 400 hopper coal cars, similar to the 600 cars built and shipped to them during the early part of the year, have been ordered by the Chesapeake & Ohio Railway. Another order received by this company during the same period was one from the Algoma Central Railway for 50 ore cars of 120,000-lb. capacity. Upon a recapitulation made by the officials of the company, it was found that, including the cars built during May, 1901, the total number of cars shipped since the industry began four years ago is 40,578. At the present rate of production the company will build this year nearly as many cars as have been constructed since the inception of the company. During May the total number built and shipped was 2,705, an average of a little over 100 cars for every working day. This average has been kept up for several months now and the Company's officials believe that in the future the average will be even greater than it has been in the past. The enormity of this output can best be realized when it is known that in addition to the cars built by this company, there is a large output of bolsters, truck frames, center plates, brake beams, etc., and that in May alone the consumption of steel amounted to over 40,000 tons. With this amount of steel plates and steel structural material, 13 steamers 500 feet long, 50 feet beam and 50 feet deep could be constructed.

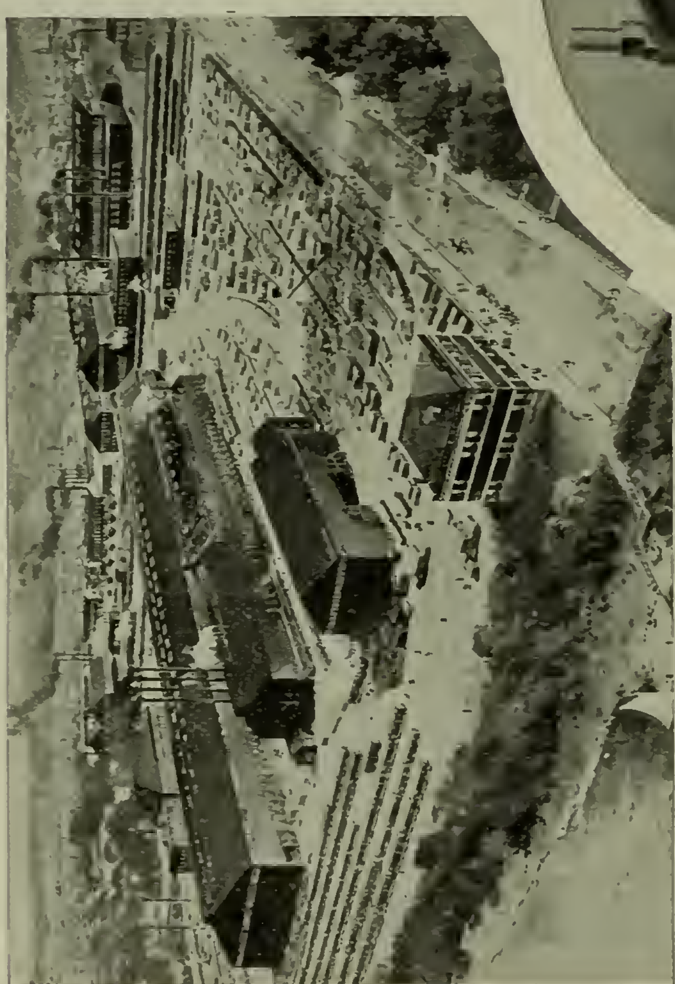
Some interesting references to the output of one of Pittsburg's large manufacturing plants appears in the report of Lord Cromer upon the finances, etc., of Egypt in 1900. Embodied in this report is the statement of Major Johnstone, president of the Railway Board, in regard to the supply of "goods wagons," or freight cars on the Egyptian Railway Administration Railroad. The cars referred to were designed and built for this road by the Pressed Steel Car Company of Pittsburg. The report is as follows: "Among the improvements effected during the year which has had the greatest effect, is the putting into service of 200 30-ton American wagons ordered by my predecessor. The result has exceeded my anticipations; the complaint of want of wagons had almost ceased to exist, partly, no doubt, because the demand is not at present so great as it has sometimes been at this season. and partly from improvements in other branches of the service, but mainly owing to a great addition to our carrying power, which is represented not only by the capacity of the wagons, but by the fact that, owing to their extreme lightness, our goods engines can draw 20 per cent more net load in these than in our ordinary stock. These very light wagons are produced by a special process, for which only two firms, one in England and one in the United States, possess the necessary appliances. The English firm lays itself out for the heavier class of work, which finds favor with the English engineers; its prices are high, and, as it is extremely full of work, it is not in a position to give very quick delivery. The American firm lays itself out for a very light and cheap while serviceable class of work which finds favor in that country and is very rapidly produced. The result of the purchase has been a great gain in carrying capacity obtained in a very short time at a very small cost."



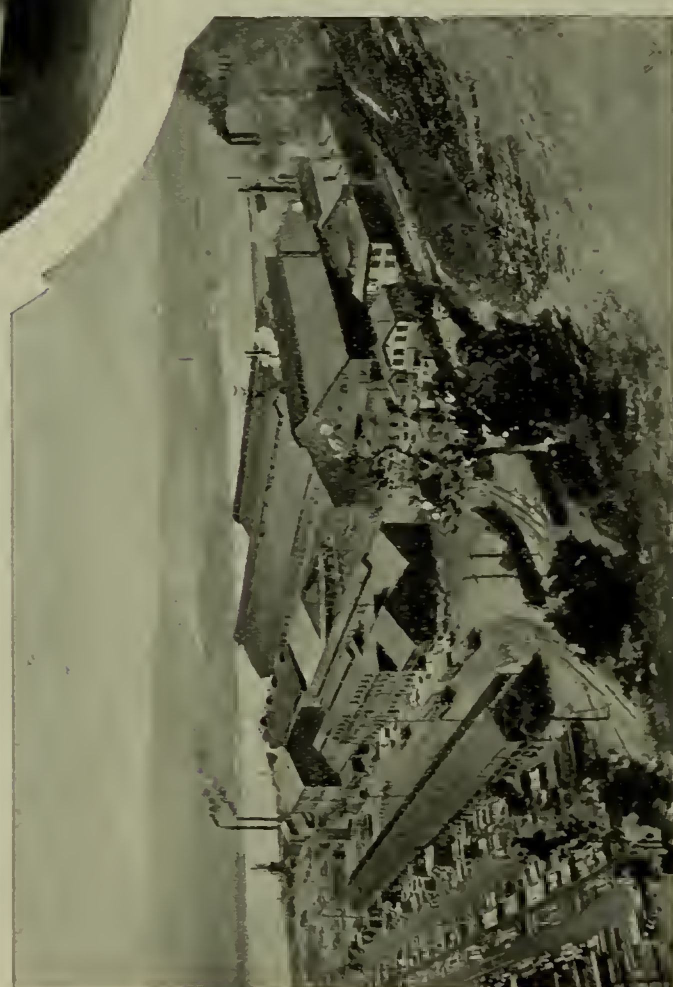
Joliet.

McKee's Rocks.





Pittsburgh.



Allegheny.

The Pressed Steel Car Company have just issued a new catalogue from which we have reproduced a full page illustration showing their various plants. The catalogue describes in a general way the work they are doing, and from another article which appears in this issue it will be noted that during the month of May the Pressed Steel Car Company built and shipped 2,705 cars, or an average output of 100 cars for every working day for the month. This average output of 100 cars for every working day has now been maintained during the months of March, April and May, and in addition to this they are making large shipments of pressed steel freight truck frames, tender truck frames, bolsters, side stakes, center plates and various other steel specialties. As the work of building one steel car is probably equivalent to the building of about three ordinary wooden cars the comparative output which has been reached is something enormous. There is being consumed very close to 1,500 tons of steel plate every day. The typographical appearance of the catalogue is very fine indeed, the best paper, presswork and illustration having evidently been used.

Car Foremen's Association of Chicago

June Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Wednesday evening, June 12th, 1901. The meeting was called to order at 8:00 p. m. by President Sharp. Among those present were the following:

	Effinger, W. P.	Raferty, T. J.
	Earle, Ralph.	Rosenbaum, L.
	Evans, W. H.	Sharp, W. E.
	Grieb, J. C.	Stewart, H. A.
	Krump, M.	Swinson, Norman.
Bates, G. M.	Kline, Aaron.	Williams, Thos.
Delsing, Fred.	Morris, T. R.	Williamson, G. B.
Etten, L.	Prickett, Jas.	Wessell, W. W.

The minutes of the previous meeting were approved as printed in the Railway Master Mechanic. Secretary Kline: The following have made application for membership:

Geo. K. Edwards, Gen'l Car Inspector, N. Y. O. & W. Ry., Middletown, N. Y.

President Sharp: The storm appears to have materially affected the attendance this evening, as it is the smallest in the history of the Association. However, the program has been distributed and there are some parties present who are interested in the subjects presented, and as we have our program already printed in the Railway Master Mechanic for the July meeting, we will take up the program for this evening and dispose of it.

Subject No. 1 is: In case a new Janney coupler complete is applied to a foreign car account Janney head broken, knuckle and pin lost, what is proper charge against owners?

Mr. Bates (C., B. & Q.): I believe this case is fully covered by Arbitration Case 565.

Secretary Kline read the decision referred to, which it was agreed covered the case in question.

President Sharp: Subject No. 2 is: In making bills for repairs to foreign cars, should malleable iron brake heads for metal beams be considered under the heading of manufactured articles, or should they be charged at the regular price of 3c per lb. for malleable iron per M. C. B. rules?

Mr. Grieb (C., M. & St. P.): I am of the opinion that articles of the kind enumerated—brake heads, etc.—should be classed as ordinary castings. They are usually bought separately for repairs, and not directly from the manufacturer, and therefore are sold for the price of ordinary malleable castings.

Mr. Prickett (C. & E. I.): I think Mr. Grieb decided that about as it should be. The M. C. B. rules has set a price for malleable iron, and has set a price for cast iron. I think it should stand as laid down in the M. C. B. rules.

Mr. Evans (B. & O.): That is about my idea of it. I think as these metal brake beams come more and more into use the castings will become more prominent and I think we can well begin to charge them out as malleable iron castings.

Mr. Morris (C., M. & St. P.): I would make a motion that it is proper to charge the regular price of 3c per lb. per M. C. B. rules for malleable iron brake heads. Carried.

President Sharp: We now come to Subject No. 3: When billing for destroyed bodies of twin hopper bottom gondola cars, should bill be governed by the price set forth in Section 25 of M. C. B. Rule 5, or can body be considered as that of a car designed for special purposes and bill rendered at present cost price per Section 27 of M. C. B. Rule 5?

Mr. Bates: I am of the opinion that Section 25 of Rule 5 covers this case, inasmuch as it makes provision for hopper bottom gondola cars. I do not think we can consider hopper bottom gondola cars as a special car.

Mr. Evans: In regard to a wooden gondola car I do not know but Mr. Bates' idea of the matter would be correct, as the rules specify hopper bottom gondola. I would not consider that a twin hopper, as compared with an ordinary single hopper, there should be any material difference in price, but when it comes to a steel hopper, which I presume from the subject, is to be included in the discussion, I would consider that that was altogether another matter. A steel hopper I certainly would consider as a car of special construction and should come under Section 27. I am not advised whether this subject is intended to take up the steel hopper or not. If it is intended only for the wooden hopper gondola I think that would enlighten the discussion.

Mr. Bates: As I understand it, it is intended to cover a wooden car. I do not understand that it is to take in a steel car at all.

Mr. Morris: I think that the rules provide for this and they are not to be considered as cars of special build. I believe that Section 25 of Rule 5 covers it entirely.

Mr. Bates: I move you that it is the sense of this meeting that the price as set forth in Section 25 of Rule 5, fully covers this case. Carried.

President Sharp: Subject No. 4 is report of a committee, of which Mr. Shannon is chairman. As he is not present we will have to defer this subject until our next meeting.

A paper was read by Mr. Grieb on passing cars at interchange points with defects for which defect cards are subsequently asked. The paper is given herewith.

"It has occurred to me that the existing practice of handling defect cards which are procured after a car has passed beyond the point of receipt, could be modified to advantage. The point raised is one of ordinary detail, and I think the Members of this Association will readily appreciate its force without much explanation or argument.

It is the practice at Chicago, as well as at other large terminal points, to receive on record cars with defects, for which the delivering line is repsonsible; and in order not to detain either the car or the load, same are forwarded and defect card is then requested.

According to our experience, some time elapses before cards are received, and as you know, all cars are not sent to shop for defects for which cards are asked. It is customary to ask the agent or carsmith at destination of car to send it to the nearest shop when empty, if defects are sufficiently serious; and in other cases, after card has been received, to ascertain present location of car from Car Accountant, and arrange with him to get car to shop.

Anyone who has followed this practice and has seen the stacks of telegrams and other papers that will accumulate in an attempt to transact business through this channel, will very readily appreciate the fact that it is expensive. There is no doubt but that more money has been spent in some cases in locating cars in an endeavor to have repairs made than the cost of the repairs amounted to. Aside from all this, we must consider the important features of expense involved in the deadhead mileage made by moving such cars, and the consequent loss of equipment while the cars are in bad order. That this represents an item worthy of consideration is apparent from the following resume, showing the number of cars handled by the C., M. & St. P. Ry. during the past six months:

December	8	
January	8	
February	14	
March	12	
April	14	
May	15	17
	—	—
Average		11 5-6 per month.

It would seem that this could readily be avoided by re-introducing the custom in Chicago of exchanging defect cards, provided with two stubs, each road furnishing its cards bound in books of fifty to its connecting lines, for the purpose of allowing the receiving company to issue the cards for such items as are properly chargeable to the delivering line, retaining one stub in the office and sending the other stub immediately to the company whose card is issued as notice of the action taken.

It might be well to place some restrictions on the issuing of these cards, and I would suggest the following:

No cards to be issued except for items duly on record in the office of the receiving line, which record shall at all times be accessible to the delivering line.

Cards to be issued strictly according to the M. C. B. Rules, and only for new defects or missing material.

Cards not to be issued on cars property of receiving line when empty.

Cards not to be issued for cars property of delivering line, if the conditions are such as to insure the return of cars to point of receipt.

Cards not to be issued under any circumstances after car has left receiving station.

The benefits to be derived from this procedure, and which I think are very evident, are briefly as follows:

Reduction in deadhead mileage now made necessary by moving cars toward repair point simply because defect card is to be issued and bill thereby authorized.

Loss of service of equipment while engaged as above.

Avoiding the correspondence now made necessary by requesting cards for cars that have passed receiving station.

Avoiding correspondence and tracing for location of cars after cards are received.

Saving in expense by reason of repairs which are made simply because card was secured."

President Sharp: What will you do with this paper?

Mr. Morris: I do not think, with the attendance we have this evening, we can do justice to the paper nor get a proper idea of what the other members think of the proposition laid down by Mr. Grieb. For myself I would say that it has been a source of constant annoyance to us to locate cars that are allowed to go forward on the road with defects for which the delivering company is responsible, and I would like to find out from other roads whether they have the same trouble. I do not see how it can be otherwise because these things are practically done the same by all the roads here, and therefore, in order to get the views of the different members and get their co-operation in case it was thought best to put this into practice, I would move that we postpone the discussion of this paper until the next meeting.

President Sharp: If that is the wish we will have this discussion appear as subject No. 1 on our next program.

It may be of some interest to state what the Board of Directors did at their meeting this afternoon. The question of a day's outing and also of a summer vacation was discussed but it was thought advisable not to adjourn for the hot months of the summer, as we can accomplish more by proceeding with our regular meetings, perhaps making them more interesting, and that we will gain by doing it. By taking a vacation we will lose a certain amount of interest and will have to go over the same ground when we resume business in the fall.

In the matter of a day's outing, the question of a trip down the drainage canal has been suggested, either by boat or rail. It was thought best to call the attention of the members to this proposition tonight in an informal way, as some one may have a suggestion that is better. Of course you understand we are looking for the railroad company, or some other company, to furnish the necessary transportation and go to some point where it will be interesting to all the members of the Association and their wives and families, and have a general good time for a day; and it will no doubt be of great benefit to the Association, as well as of great interest to the members. We thought best not to appoint a committee just at this time, but to ask the members of this Association to consider themselves a committee of one to make suggestions,—write to the Secretary and tell him what you think would be the very best trip to take and why, and why the facilities in that direction are better than some others. We have already taken the question up with parties who have boats on the canal. We have the matter under consideration with the Santa Fe people but have not had a reply, and we would be glad to have suggestions from any who are present.

Mr. Evans: For my part I would think it would be considerable more of an outing for the Car Foremen's Association to take a trip on the water. We all get more or less riding on the railway cars and I would suggest that whatever is done towards an outing be with a view of taking either a lake trip or a trip upon the drainage canal. I think it would afford more pleasure and be considerable more of a novelty and recreation for the Car Foremen's Association.

President Sharp: To go down the drainage canal there would be more or less expense attached to it. We would have to hire an excursion boat, but as to the cost for such an arrangement. I do not know what the regular excursion fare is down to the end of the canal. I believe I have heard some one say it was $1.00 for the round trip.

Mr. Grieb: It seems to me that a trip by boat over the drainage canal would be very pleasant and thoroughly enjoyable to all of us. If the regular charge is $1.00 per capita for making the trip by the ordinary excursion boats it seems to me this Association, going in a body, can get a little rebate on that, possibly enough for a luncheon on the boat, so that we could have the entire day's outing for one dollar. Personally I cannot imagine a more pleasant trip. I suppose church parties, etc., who make that trip and charge possibly not to exceed a dollar, still have something left for the treasury. I am very much in favor of the idea of making such a trip, either in July or August, or whenever it is decided to go, and let each one individually pay his share of the expense.

Mr. Bates: I believe it would be a good idea to have a committee appointed to investigate this matter and make a report at our next meeting, as to how much it would cost. We will probably have a better attendance at the next meeting and let the members express themselves whether they wish to pay this little expense or not.

Mr. Prickett: I think that would be a very good suggestion, for a committee to be appointed to investigate what the charges would be. We have a membership of about 450, but there would possibly not be over 250 or 300 go, although by taking our wives it would make a pretty good sized body and I think it would be a very pleasant trip to go down the canal. It has been talked about a good many years and I should like to see it.

President Sharp: I might say I do not believe it necessary to appoint a committee just now from the fact that we have some parties looking into the matter of boats now and they will be in readiness to report soon. I think we had better let it rest at that until the thing takes a more decided turn.

The meeting then adjourned.

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RAILWAY MASTER MECHANIC

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A Monthly Railway Journal

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Communications on any topic suitable to our columns are solicited.

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Vol. XXV. CHICAGO. AUGUST, 1901. No. 8.

THE promotion of a motive power official into the higher operating departments has seemed heretofore to be the exception rather than the rule. The advancement of Mr. Delano, of the Chicago, Burlington & Quincy, and Mr. Potter, of the Pennsylvania, and the recent appointment of Mr. Frank W. Morse, of the Grand Trunk, as third vice-president in charge of transportation, motive power and car departments, would seem to indicate a new order of things and that the mechanical department is to receive the consideration which is its due as one of the most important departments of the railway service.

IN another part of the paper will be found a notice to the effect that the Central Railway Club of Buffalo will hold its September meeting the morning of the twelfth, instead of the regular hour, reserving for the afternoon a brief program of exercises in observance of the event of Railroad Day in the Transportation Building. As the Central Railway Club has undertaken to make the arrangements for this day, they desire that all members and friends of the club will be present in order that the attendance on the day in question may be sufficiently large to make a record in the history of the Exposition.

IN another part of this issue will be found several pages given up to description of the Pan-American Exposition at Buffalo and the exhibits which are there shown. No attempt has been made to more than touch on certain portions of the exhibition which come more or less within the field of the RAILWAY MASTER MECHANIC. While the Buffalo Exposition is remarkable in many ways, perhaps the most striking features are the color effects of the buildings by day and the illumination by electric lights at night. Buffalo certainly has an exposition of which she may well be proud and which is well worth going to see. For a large portion of the descriptive matter and illustrations we are indebted to Mr. Mark Bennett, superintendent of the Press Department, which has done most creditable work.

THE paper read before the Car Foremen's Association of Chicago on the Proper Method for Stencilling the Capacity and Light Weight Upon Cars, together with the illustrations which we reproduce in another portion of this issue, is well worth the attention and consideration of the reader. The scheme proposed is simple, yet very effective and economical, and is at the same time from an artistic point of view certainly most desirable. The suggestion of a new panel for a new weight is a good one. It gives an opportunity in re-stencilling the car to do a good job by doing it better and in much less time than by painting over the old weights and re-stencilling the new weights on. Any such daubing as shown on one of the cars illustrated, of course spoils the entire effect of any car, no matter how perfect or complete it may be in other details.

IN the progress toward higher steam pressures in locomotive boilers, the importance of thorough workmanship during construction is directing attention to a matter in this department which has not generally received its fair proportion of care. Thoroughly good work can only be obtained from intelligent and well trained workmen, and even to secure the best results from operations in boiler shops, now almost wholly performed by machinery, the machines must be handled with intelligent skill—it is another case of the man behind the gun. Elsewhere in this issue is published the the contribution of a foreman boilermaker, in which the results of this neglect are stated and some suggestions made tending to a betterment of the present conditions. Appreciation of the necessity for care in the selection of apprentices and then really instructing them has been more apparent in the machine shop than in the boiler shop. This should not be, for in the course of his work, a boilermaker has as much occasion to use his judgment as has a machinist, and even more occasion for familiarity with the rules and principles involved in the laying out of work, while any entry into the large question of design requires an equally high grade of intelligence and training. Mr. Graves voices a practical sentiment in advocating, instead of the usual Utopian idea of securing technical training in boys for practical workmen, merely a little care in the selection of boys who have secured in the public schools education sufficient for their needs, and who merely need a certain amount of instruction in the application of such an amount of knowledge to make them intelligent as well as skilled workmen. While we hold that making specialists of apprentices by confining them to but merely one detail of a trade is the cause of the increasing difficulty in securing all around workmen and then the monotony to the apprentice incident to such distribution is the reason for his rapid loss of interest and the increasing disinclination apparent among bright boys to enter shop apprenticeship; still, Mr. Graves offers a suggestion on this point, which seems of value, where he advocates a division of the boys into special and ordinary apprentices—with a slight modification of the usual meaning of these terms. The special apprentices are to be favored as regards instruction and opportunities beyond the ordinary lot—this to be the reward of displayed interest and capability. While the careless, lazy, dull or inattentive ones, on which instruction is a waste of effort, are to be left in the class whose lot is the monotony and drudgery of the incapable. Such a plan would appear to attract a good class of boys, to benefit all concerned and to have become really necessary in most shops.

Communications

Tremont, New York City,
July 17th, 1901.

To the Editor of the Railway Master Mechanic:

The term "superheat" is used in engineering circles largely like patent medicine; it's applied to pretty much everything—hot things and cold things alike. Mr. Snow lays special stress upon the pressure governing the temperature, then he throttles the pressure down 50 degrees in order to superheat. If Mr. Snow closes the throttle sufficiently to reduce the pressure from 200 lbs. to 100 lbs., he has passed the point when he benefits from superheating, and is now "wire drawing" the steam. When the throttle is closed sufficiently to "wire draw" the pressure down 50 degrees, the area of the throttle opening is away below that of the port opening (no matter how much you have your reverse lever hooked up), and the cylinders are not receiving sufficient steam; they are being "starved," which the indicator will instantly show by the drop in the M. E. P. The above conditions are positively not practical for high-speed road work. To run with the trottle partly closed is a good thing—the correct thing; but it does follow that to run with it almost shut would be better.

The locomotive is equipped with two throttles, one practically at each end of the dry pipe, which must be operated in unison; the reverse lever through the medium of the link motion forms a perfect throttle in every sense of the word. This is one of the factors which interfere with carrying the superheating business to ridiculous extremes. The position of the reverse lever governs the position of the throttle; there is a "sensitive" relation between the two; the design of engine, setting of valves, speed, load, grade, etc., make a difference in their relative positions; but when you get the correct equilibrium between them for the work in hand, you have struck the most efficient point at which to work the engine. A careful, observing engineer can come very close to this, but it requires the indicator to solve problems and get things just right, and it's a very great shame the indicator is not in more general use on locomotives.

MR. M. E. INGALLS.

President Cleveland, Cincinnati, Chicago and St. Louis Railway.

Mr Ingalls entered railway service in 1870, since which he has been president of the Big Four railroad and the railroads from which it grew. The Cincinnati and Lafayette railroad reorganized and consolidated with the Cleveland, Columbus, Cincinnati and Indianapolis railway in 1889, forms the Cleveland, Cincinnati, Chicago and St. Louis railway, of which Mr. Ingalls is the head.

The Master Mechanics' formula for the M. E. P. is 80 per cent of boiler pressure. This is universally conceded to be too low for present practice, but to reach this mean away down in the cylinders the "hot sides" of the dry pipe would have to do some mighty tall hustling after Mr. Snow adjusted the throttle.

There is an enormous difference in temperature in different parts of the same boiler; this is no "misinformation" and there is nothing "absurd" about it. If this were not so, boiler design, construction and maintenance would be a very different problem. This difference in temperature effects the steam, not in pressure, but with respect to either a gaseous or a saturated state. Steam at the forward end of boiler contains a greater percentage of water than that immediately over the intense heat of the furnace, and will not produce an evaporating effect upon the contents of the dry pipe, but just the reverse. Further, in some of our modern engines the lower portion of the dry pipe is immersed in the water; in fact, I have in mind one of the latest designs of boilers where the horizontal part of dry pipe is almost entirely below the water level. This is brought about by the attempt to get a large cubical space within the firebox, and to get as many tubes in the boiler as possible, which raises the crown sheet and also the water level. Now, the delivery from the injectors is tapped into the forward end of boiler, away from the furnace, in order that the cold feed water will absorb the remaining heat from the cold end of the boiler tubes. Therefore this water is comparatively cold and will produce a condensing effect upon the steam passing through the dry pipe.

The closer the throttle is to the cylinders, with short, direct steam passages, the better, in this respect the dome placed on the first course would be "nice," but—you would get wet steam and the cylinders would be working too much on the hydraulic principle. The best position for the dome is directly over the furnace tube sheet; this will give the best steam in the boiler, and any further back is a mistake. A "long dry pipe," which Mr. Snow advocates, is bad practice; it has a condensing effect upon the steam after passing the throttle and contains a large volume of steam which all has to be worked out after throttle is closed before you begin to stop. This is a very important factor when you are waltzing along at a 70-mile-an-hour-gait and want the emergency to get in its fine work as quick as possible.

Mr. Snow is considering the locomotive too much on the basis of stationary engine practice. This is what caused him, in May, to refer to an engine "running slowly," which was not under consideration. A locomotive operates under conditions vastly different from any other type of engine, conditions nowise obtained in any form of stationary practice. Things that look nice, work nice and are nice in stationary practice generally amount to flat failures when applied to a locomotive.

P. Emerson Waddell.

Delaware, Ohio, July 9, 1901.

To the Editor of the Railway Master Mechanic:

It is a fair prophecy to make that the class J. engine of the Lake Shore road designed by Mr. W. H. Marshall, Superintendent of Motive Power, is a pattern of engine that all roads must follow that want the most powerful, high-speed engine.

The design is ideal and Napoleonic—nothing can be added, no change made that will increase the above mentioned qualities, save dimensions. The large fire box insures the ample supply of steam—the vital factor lacking in the eight-wheel American type. It has been shown by experiment, in which a locomotive style of boiler set up as a stationary boiler, and a forced draft used giving the same vacuum in the smoke arch as the locomotive exhaust furnishes, and with the shell and flues divided up into spaces by partitions every two feet in the shell that the fire box and first two feet of the flues immediately in front of the flue sheet, furnished some eighty per cent of the steam. This being the fact the value of the fire box surface comes into prominence at once. The capacity of the boiler to furnish steam is like a merchant's capital, or reserve bank account, it is a necessity that carries one merchant through safely while his competitor for want of it, in a pinch, fails. It is a fact that it is not the number of miles an engine makes that puts her into the "back shops," but the number of revolutions she makes. The 80-inch drivers of class J. therefore promises a serviceable and economical engine on repairs. The high steam pressure means a high smoke arch temperature, if ordinary length of flues are used, and as these must be increased in length to get in the three pair of drivers, the lengthening of the flues to 19 feet is a benefit all around. The increase of the flues diameter to 2¼", is probably a necessity to prevent the front end of the flues from cooling—but it is questionable if 2⅜" flues would not have been still better, in view of the high smoke arch temperature that promises to result from 2¼" flues.

The three pair of drivers give ample adhesion, which may be increased, and the useless four-wheel truck gives place to the Mogul single pair of truck wheels. The cylinders are of course ample for the adhesion. The four elements on which the power and speed of all locomotives depend—quantity of steam, adhesion, size of cylinders and diameter of wheels are in class J. engine combined and no change from this design seems possible that will make these engines more powerful or faster. An increase of dimensions—a larger engine is of course possible—but with the restricting guage of track no change in design seems possible that will better these engines, and the "Marshall type" promises safely to be the universal future engine.

Frank C. Smith.

The Pan-American Exposition

THE Pan-American Exposition, now being held at Buffalo, N. Y., which opened on May first last, is notable for a number of important and interesting features which surpass any former enterprises of this kind. The court settings, that is, the symmetrical placing of the principal large buildings with reference to one another so as to form a system of connecting courts, each with its special features, forms a most beautiful picture. The principal courts are the Court of Fountains and Plaza, which form a north and south perpendicular and connects with a transverse court called the Esplanade. Two minor courts open into the Esplanade known as the Court of Cypresses and Court of Lilies. These courts, about 33 acres in area, with a magnificent

MACHINERY AND TRANSPORTATION BUILDING—WESTERN ENTRANCE.

decoration to complete their beauty, give to the eye a vista of exceptional grandeur, from whatever point they are seen. Each of the courts has its special fountain feature. The Court of Fountains contains a pool covering about two acres. These fountains are in the form of magnificent sculptures in large number. Surrounding the main group of buildings and bordered with a double row of trees and grassy banks is a broad canal more than a mile in length. At certain points this canal forms a part of the court vistas, but has more to do with the rich embellishment of that portion of the grounds outside the main buildings. Lagoons that lose themselves amid lawns and gardens tap the main waterways at various intervals and at the southern side of the Esplanade broaden into lakes.

The horticultural and floral embellishments and the sculptural and plastic decorations present a most pleasing richness of design and delicacy of detail. The color decorations vie with the brilliant gardens in their agreeable effect upon the eye. Such elaborate color decoration upon the exteriors of the great group of buildings is a

MACHINERY AND TRANSPORTATION BUILDING.

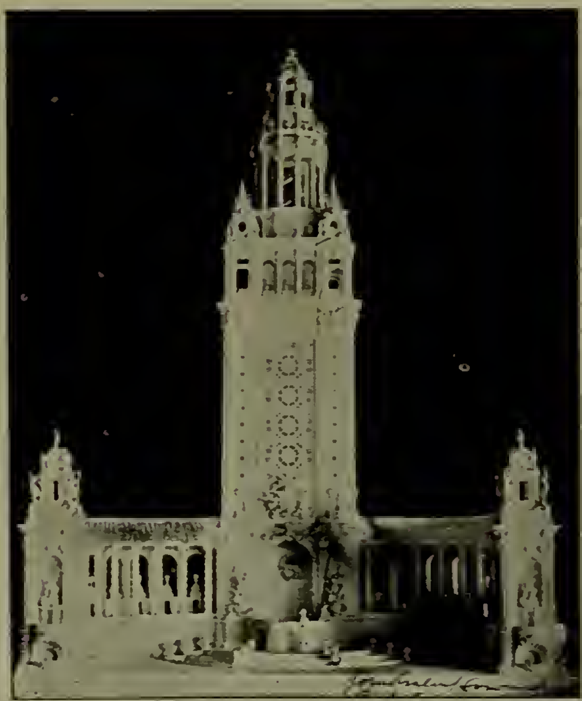
distinct departure from the custom observed at former expositions.

With all its beauty by day the exposition will probably be remembered more because of the wonderful electric lighting effects at night. The centerpiece of the illumination is the Electric Tower 409 feet in height. The tower stands in a broad basin, in which fountains and electrical effects are produced. The main body of the structure is 80 feet square, and it is flanked on the east and west by long curved colonnades which sweep to the southward and terminate in airy pavilions, forming a semi-circular space 200 feet across. From the surface of the water to the top of the colonnades is 110 feet. This portion of the structure is enriched by a system of decorative rusticated bands, which give an aspect of great solidity to the base. The shaft of the tower is treated with great simplicity. The center of each side is paneled with fantastically perforated work, through which is indistinctly revealed the massive framework of the tower. This feature produces a remarkable effect when lighted from within. The main shaft of the tower terminates in an elaborate entablature at the height of 200 feet. The crown of the Tower rests upon this entablature and is composed of three stories of

ELECTRICITY BUILDING.

diminishing proportions and varying design. The lower of these stories is an arcaded loggia, rich in ornamentation and having the wall surfaces brilliantly colored. Pavilionettes at the corners terminate in light fantastic cupolas.

The second stage, or lantern of the tower crown, is in the form of a high circular colonnade, entirely open, so as to allow the effect of the sky to be seen between the columns. A spiral staircase within the colonnade leads to the stage of the tower, the cupola, over whose soaring dome is poised the figure of the Goddess of Light, thus



ELECTRIC TOWER.

dominating the entire exposition, which owes so much to her generously exerted power.

The entrance to the tower is across an ornamental bridge from the Plaza, on the north side. Elevators carry passengers to the various floors which are devoted to the different purposes of the exposition, such as reception rooms, offices, restaurants, belvideres and amusement halls. A large restaurant and roof garden, at a height of 200 feet, gives the diner a broad and beautiful view of

THE ILLUMINATION AT NIGHT.

the exposition and the surrounding landscape. From the cupola the eye can sweep the whole Niagara frontier and look far into Canada, beyond the majestic river that separates that country from the United States.

The entire exterior of the Tower is studded with more than 40,000 electric lamps, so arranged that a great variety of effects can be secured. At a height of 360 feet on the tower is a searchlight, with a 30-inch projector, the beam of which flashes through space with great brillinacy for many miles, embracing in its grand circle the Falls of Niagara, the harnessed energy of which operates the machinery which generates its lighting power.

In the basin, where the most strenuous water effects are produced, is a magnificent group of statuary in which the sculptor has portrayed his artistic conception of the Genius of Water. In the basin in front of the statuary the water boils to a height of four or five feet, thus carrying out still further the idea. From a niche in the Tower, 70 feet high, pour 13,000 gallons of water per minute, which is broken into an immense water screen or veil by means of a deflector. On each side of the center of the structure are located two groups of water jets, with 26 large pillar jets, throwing water to a height of fifty feet. On the arc of a circle, whose center is the niche, are 42 large jets, throwing water in a parabola

THE "UPSIDE DOWN" HOUSE.

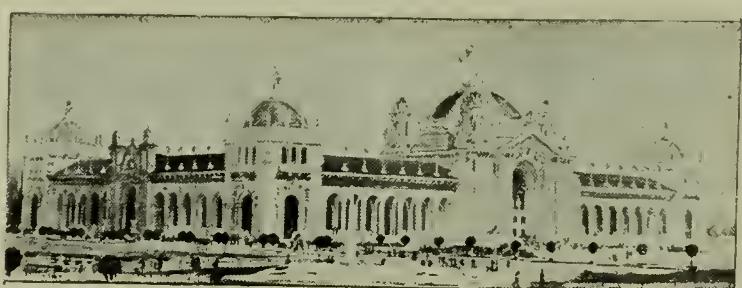
curve toward the cascades in front of the niche. The splendor of the scene under the play of colored lights of various intensity, is indescribable. Under the water in the basin are 94 searchlights, each lighting up its individual water display.

The number of buildings devoted to the various industries is very large and complete. The United States government and many of the individual states are represented by separate buildings. No attempt will be made in this article to give any description of any buildings but those whose departments are closely allied to the field covered by the RAILWAY MASTER MECHANIC.

Probably of first and greatest interest to our readers is the Railway Exhibit Building, which is located on the axis of the Grand Court in the extreme northern portion of the grounds and adjoining the General Steam Railway right of way. It is for the combined use as a railway station and for the exhibition of rolling stock and other railway equipment. The architectural style of the building closely follows the Mexican Spanish type of the free Renaissance. It is a long, low structure, 116x560, with wide overhanging eaves and tile roof; the chief architectural features of the front being the two main entrances, surmounted by gables richly ornamented in high relief and flanked by low towers on either side. The western end of the building is occupied by the railway station, in which are located the various ticket offices, waiting room, toilet rooms and sub-offices of the Bureau of Admissions, and the entrances and exits stiles. The railway exhibits occupy about two-thirds of the building, in which tracks are installed for the accommodation of model trains, locomotives, etc. The wall space of this portion of the building is used by the various railway companies for the exhibition of scenic photographs and other illustrations of points of special interest along their respective lines. Access to and from the railroad platforms and suburban trolleys is had by means of broad flights of steps down to subways under tracks from which steps lead up to each platform.

ELECTRICITY BUILDING FACADE.

This illustration shows one of the Facades of the Electricity Building, which is 500 feet long and 150 feet wide. The splendid architecture and rich decorative effects form a picture worth going a long distance to see.

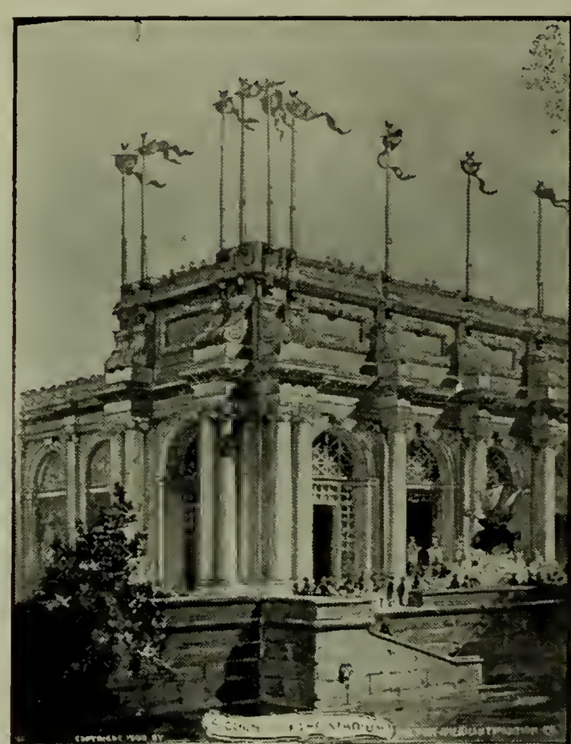


MANUFACTURES AND LIBERAL ARTS BUILDING.

The Manufactures and Liberal Arts Building covers more than four acres, and contains the very latest productions of the mills and factories of the United States and other countries of the Western Hemisphere. Exhibits showing the processes of manufactures constitute a very interesting feature of this division.

OFFICIAL EMBLEM.

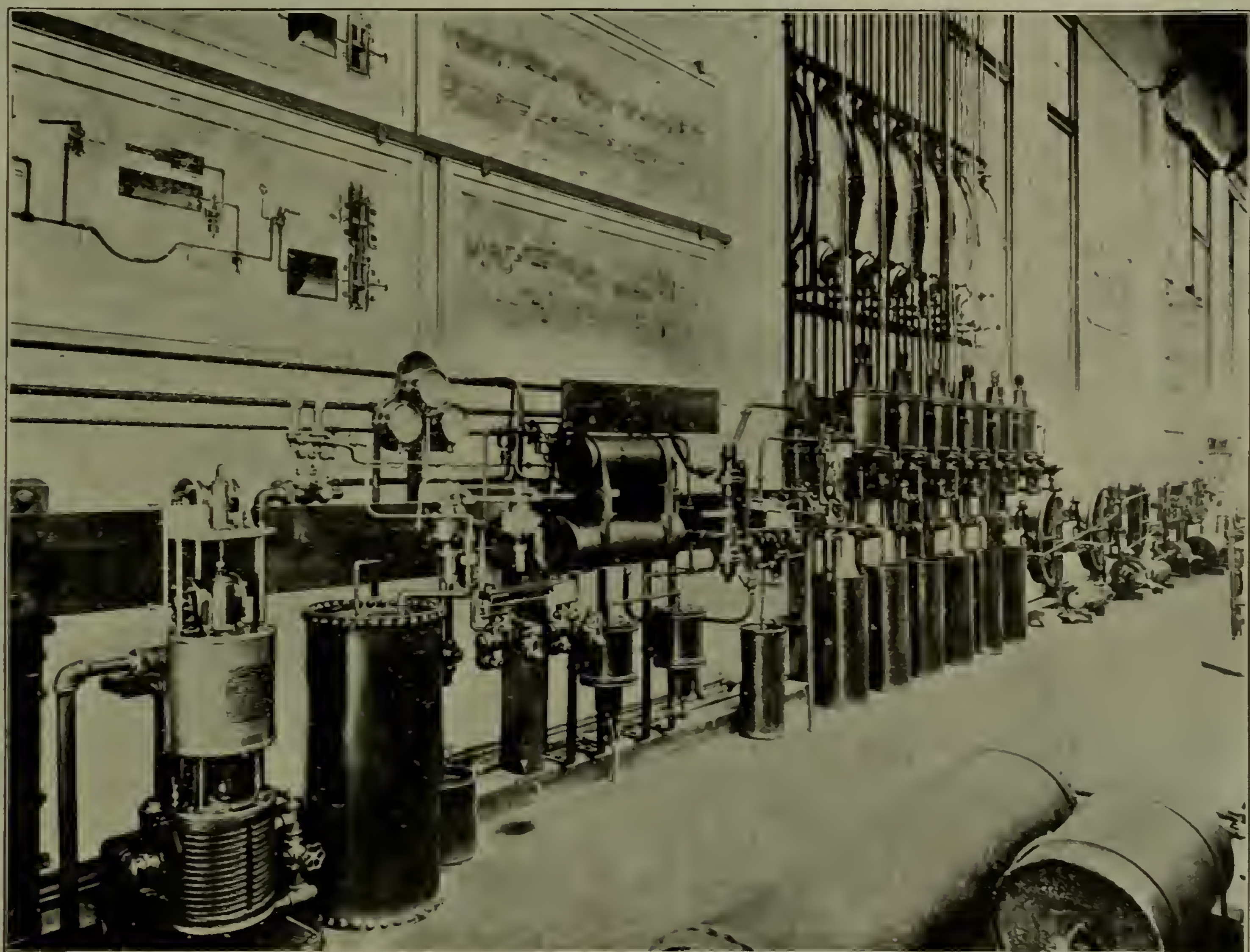
The official emblem of the Pan-American Exposition was designed by Raphael Beck, of Buffalo. It was accepted as the most artistic and suitable from several hundred designs submitted, and has the especial merit of effectively symbolizing one of the chief purposes of the Exposition, which is to bring into closer social and trade relationship the republics, states and territories of North and South America. The emblem shows a fair maiden typifying the North, extending a kindly hand to clasp that of her brunette sister of the South, thus forming a bond of continental sisterhood and establishing a unity of sentiment and interest among the countries of the Western Hemisphere.



CORNER OF STADIUM.

The accompanying illustration of a corner of the Stadium shows the massive and beautiful character of the architecture. This is a very large structure and during the Exposition season there are held athletic carnivals of particular interest. The entrance to the Stadium is a large building having an arcaded arrangement on the ground floor.

The Machinery and Transportation Building at the Pan-American Exposition is one of the largest and handsomest of a large group. Its dimensions are 500 by 350 feet. It is in the Spanish Renaissance style of architecture and is covered with the staff which is used to give exposition buildings the appearance of solidity and massiveness. The four facades of the building are so broken by architectural features that there is nothing of monotony or severity. All have an arcaded effect. Every window is a deeply recessed arch with wide soffits and carvings. Every entrance is composed of one or more high arches with massive pillars at the sides. And every pillar and pilaster is of very elaborate detail. The south entrance is 72 feet wide and 41 feet high. Every window is grilled and finished with fidelity to the most artistic ideas of the architects of the Spanish Renaissance. At the four corners of the great building are four towers with open pavilions fifty feet above the ground. Above the great arched entrances on the east and west sides are massive domes. Two very tall towers rise above both the north and south entrances and help to complete two wonderful architectural compositions. Those over the south entrance are each 196 feet high, and those over the north entrance 176 feet high.



Westinghouse Exhibit.

The handsome and commodious Electricity Building at the Pan-American Exposition is greatly admired by all visitors. The structure is 500 feet from east to west, and 150 feet wide, giving an exhibition space of 75,000 square feet. The South Facade fronts the Mall and the north fronts the Midway. The east end is toward the massive Electric Tower, while the west faces the Grand Canal. The building is long and low. The openings of the pergola-like loggias, placed at frequent intervals, present a delightful effect, showing more and more of the details of the pilasters and openings as the eye travels to the end of the building farthest away from the observer. There is a pleasing ending at each corner of the structure, with a low-domed pavilion tower, and the facade is interrupted at the center by a double-towered entrance. This entrance, wide and high, is spanned by an ornamental arch and supported on each side by columns. The towers, also, have minor entrances through them. The towers of the building rise to great heights, two over the south entrance being 158 feet high, and two over the north entrance, 128 feet high. They are very elaborate in design and among the most beautiful features of the exposition architecture. The connecting work between the towers, the towers themselves, the pavilions at the corners of the building and similar places, are brilliantly illuminated and made gay with banners and flags. The modelled relief work of the building is of the choicest design. The general ornamentation of the structure is frescoes is an interesting mixture of reds, greens and yellows. The general color scheme follows that of the Machinery and Transportation and other groups of buildings of the Exposition.

The cost of the Pan-American Exposition, exclusive of exhibits, has been about $10,000,000. The authorized capital stock of the Exposition is $2,500,000. The authorized bond issue is $2,500,000. The government appropriation is $500,000. The cost of the Midway is $3,000,000. The New York State appropriation is $300,000 and in connection with the New York building about $100,000 will be expended by the city of Buffalo and the Buffalo Historical Society. The appropriation from states and foreign countries together with the cost of buildings to be erected on the Exposition grounds by the City of Buffalo and by private citizens will bring the total cost of the Exposition up to fully $10,000,000.

The exhibits representing various departments are in most cases well displayed and quite interesting. We have not space to give to more than just a few of them and where we were able to obtain views of exhibits we have done so.

Among the largest and most complete of any of the exhibits was that of the Westinghouse companies.

To the visitor at the Exposition the numerous industrial enterprises associated with the name Westinghouse are probably familiar; 1,250,000 of their air brakes are now in service throughout the world.

Among the railway motors included in the Railway Exhibit are a Westinghouse 56 motor for heavy suburban and interurban service, a 50-C- for heavy railway service, and a 69 motor for city and suburban service. There is also a large number of type "C" induction motors adaptable where constant speed is required, and of variable speed type "F" motors. Passing now to the Railway Exhibits Building we find in the southeast end of this building the exhibit of the Westinghouse Air Brake Company. A rack representing a six-car train, including the locomotive, is equipped with the high speed brake. Each part is duplicated and cut in section, and connected in tandem to its relative part, so as to show every feature of its application. One of the interesting features of this arrangement is the 9½-inch air pump top-head cut in sections and working in unison with the top-head on an operating pump.

The air is supplied by four motor-driven duplex air compressors, which are also part of this exhibit. These compressors are especially adapted to supply compressed air for air brakes on electric motor vehicles as well as various other industrial uses.

The American Automatic Slack Adjuster, in addition to being shown in connection with the six-car high speed brake train, is also attached to the cylinder on a neatly designed model engine truck, likewise a model locomotive frame with three pairs of drivers connected, and a complete equipment for a passenger car. These models are so designed as to show the proper method of applying this device to the standard equipment, and its operation in automatically regulating the brake piston travel.

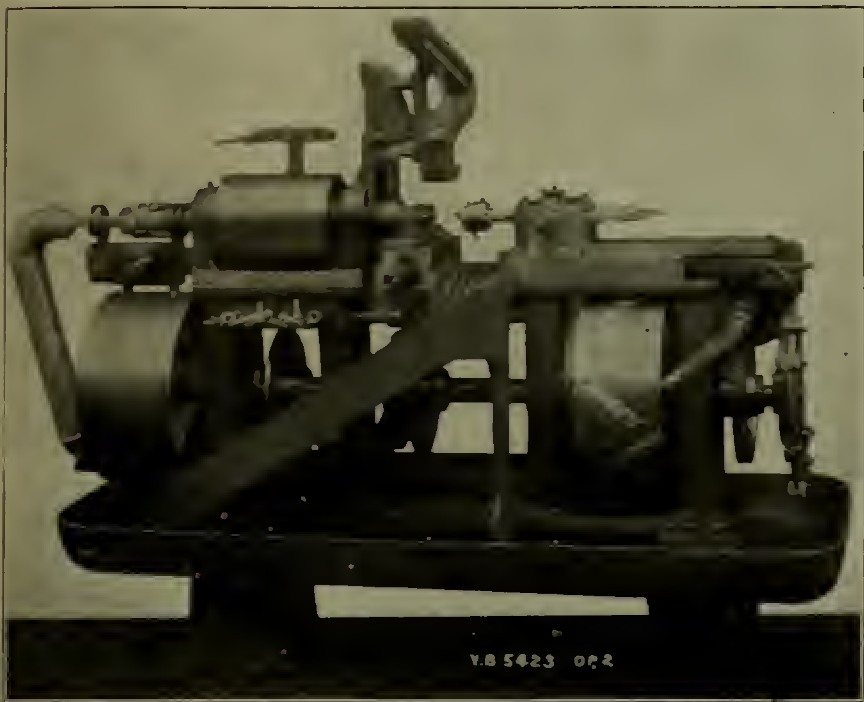
The Westinghouse Friction Draft Gear suitably mounted on full size models of draft rigging which show

Pratt & Whitney Co. Exhibit.

its application to different forms of cars, both of the wooden and the pressed steel type, is on exhibition. There are also on view complete full sized apparatus cut to show in detail its mechanical construction.

The Westinghouse electric brake and car heating apparatus is shown in full operation at the exhibit. The apparatus consists of two elements, a brake and a car heater. The brake may be installed and used independently of the heater, but the operation of the heater is dependent upon the use of the brake, the produced heat being derived from energy that would otherwise be wasted. This combination of a magnetic track brake with a wheel brake of maximum power produces a braking effect greatly in excess of any heretofore attained. Moreover, cars equipped with the complete apparatus are heated without using the line current and therefore without cost for the electrical energy employed in heating.

A pictorial representation of the development of the power brake from the earliest forms of hand brakes is an interesting feature of the Westinghouse Air Brake Company's exhibit. These pictures, some of them almost



Pratt & Whitney Co. Exhibit—No. 14. Automatic Screw Machine.

full size, are arranged chronologically, so that the progress made by each improvement is readily seen and the complete advance in the art of braking railway vehicles from the most primitive to the most modern methods is clearly shown.

The exhibit of the Pratt & Whitney Company, of Hartford, Conn., comprises machinery, small tools, standards and gauges, and we illustrate herewith a photograph of one of the show cases exhibiting tap and die stock sets, milling cutters, reamers, cylindrical caliper and thread gauges, also some fine bench precision machinery. In addition to the small tools, gauges, etc., exhibited in this case, they also exhibit the following machines:

One 10-inch toolmakers' engine lathe.

One 13-inch weighted engine lathe, 1900 model.

One 14-inch gibbed engine lathe, 1900 model.

One 14-inch pillar shaper.

One No. 1 two-spindle centering machine.

One No. 2 die sinking machine, complete with set of tools.

One No. 3½ double head power milling machine.

One cutter grinder.

One No. 2 turret head hand screw machine, with equipment of tools for manufacturing cocks and keys.

One 16-inch turret head chasing lathe, with friction head and tools.

Two No. 12 automatic screw machines, 1900 model, with magazines and equipment of tools for producing typewriter parts from iron castings.

One No. 14 automatic screw machine, 1900 model, with equipment of tools for producing ½-inch hexagon head screws.

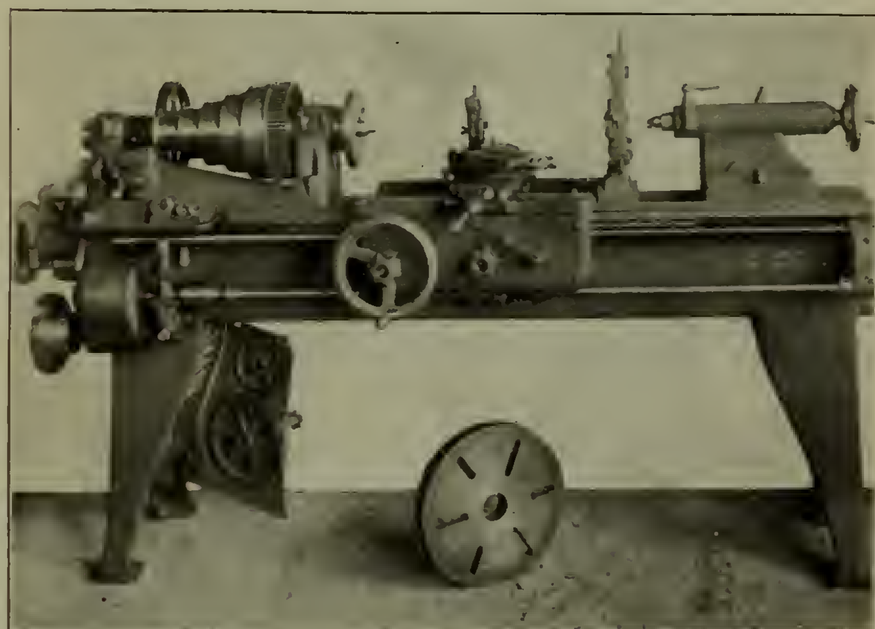
One No. 12 two-spindle profiling machine, 1901 model.

One 24-inch Standard measuring machine, complete with microscope and graduated bar.

One No. 1 type "C" adjustable multi-spindle drill.

We also illustrate in addition to the photograph of the show case their 1900 model 14-inch engine lathe, their 1900 model No. 14 automatic screw machine with magazine attachment.

The Safety Car Heating & Lighting Company, who own the Pintsch system of railroad car, buoy and beacon lighting for the United States and Canada, make a very interesting exhibit of that celebrated system at the exposition at Buffalo. In addition to their lighting system, they also show complete and working models of their direct steam and hot water circulating systems for railroad car heating. Besides these models, some of their steam heating specials, such as automatic steam traps, Straightport couplers, end train pipe valves, etc., are shown attractively on an exhibit frame erected for that purpose. A picture of the "Safety Company's" booth is shown in this issue. It does not, however, do full justice to the attractiveness of the display, for a great part of its beauty lies in the pleasing combination of colors that have been employed. The hanging of the booth are of a rich green color, while the mouldings and ornamenta-



Pratt & Whitney Co. Exhibit—No. 14. Engine Lathe.

tion of the exhibit frame and the woodwork are all tastefully done in white and gold, these three colors being the dominant tones in the decoration. The lamps shown are all gold plated and appear to excellent advantage.

In addition to the Standard Pintsch lamps, some very attractive designs for side lighting are shown, notably a fixture displaying a cluster of three lights, the globes of which are shaped like incandescent electric light globes. This fixture would make a very ornamental addition to the fittings of either private or dining car. A complete and prettily arranged dining car table is made the means for displaying an attractive three-light candelabra designed for use in dining cars. A Pintsch gas broiler for buffet cars and an automatic flash light lantern for use on Pintsch lighted buoys are two other specialties exhibited by this company.

THE SAFETY CAR HEATING & LIGHTING CO.'S EXHIBIT.

The exhibit of the Pressed Steel Car Company is located in the Railway Exhibit Building, through which passengers on the Belt Line gain access to the fair grounds. The exhibit consists of five cars, a box car similar to those built for the Erie Railroad, with wooden superstructure and pressed steel underframe; an all-steel self-clearing hopper car similar to those built for the Central Railroad of New Jersey; a self-clearing all-steel hopper ore car similar to those built for the Duluth & Iron Range R. R.; a twin hopper all-steel flat bottom gondola like those built for the Pittsburgh & Lake Erie R. R., and a steel flat car similar to the cars built for the Rio Grande Western R. R. In addition to the cars, this company exhibits truck frames, bolsters, brake beams and other specialties for use in car construction. One feature of the exhibit is the use to which the box car has been put. The car is a fine specimen of freight car construction and has been handsomely fitted up inside for use as an office and reception room. There are a large number of photographs showing types of cars built by this company in the past and also models of freight trucks. The exhibit is a comprehensive one and was the first to be installed in the building which is used exclusively by railroad supply houses.

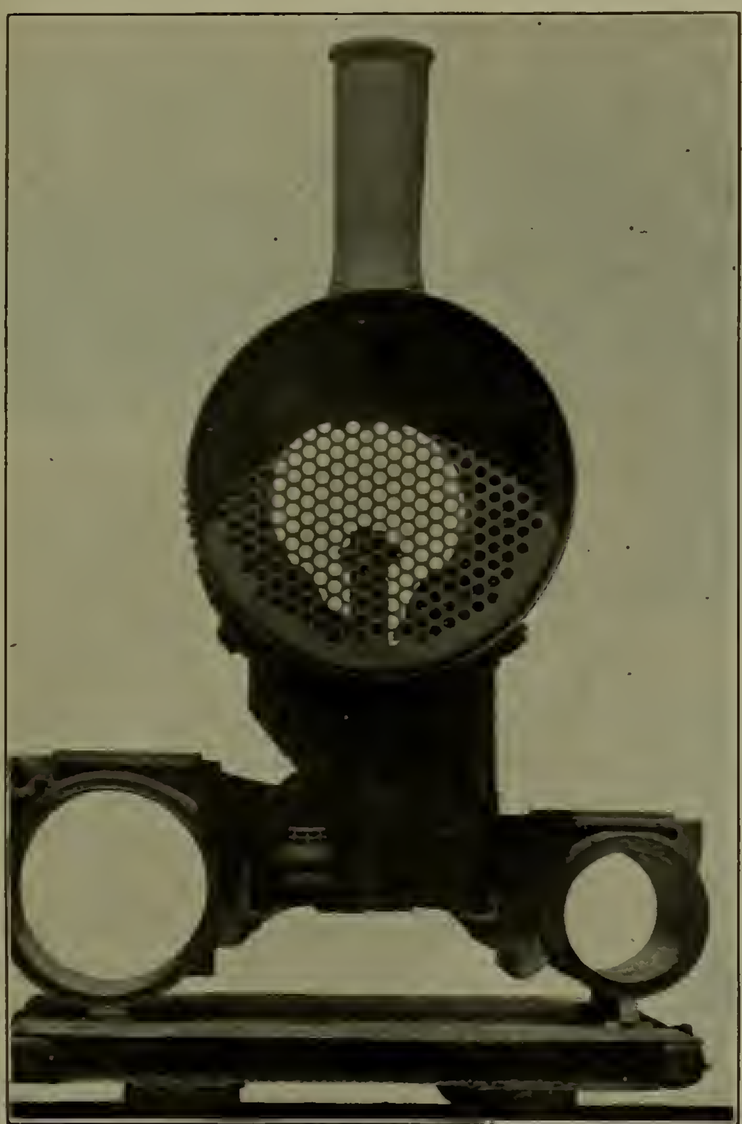
The exhibit of the Richmond Works of the American Locomotive Company includes their "Tramp" compound locomotive No. 2427. Everyone is no doubt more or less familiar with the history of this engine, which has been tested on many of the largest railway systems in this country and has traveled through thirty-five states and territories, from the Atlantic to the Pacific and from the Great Lakes to the Gulf of Mexico. So much has been written regarding that we hardly feel it necessary to say more. We illustrate it, however, in connection with this article and also present two photographic views of the pair of compound cylinders and front end of locomotive which the Richmond Works are exhibiting at Buffalo. As will be noted, the saddle of the low pressure cylinder has been cut away to show the operation of the intercepting, reducing and emergency valves.

RICHMOND "TRAMP" COMPOUND, NO. 2427.

The Baldwin Locomotive Works are exhibiting at Buffalo two locomotives, one a compound consolidation locomotive built for the Lehigh Valley R. R., and a locomotive for the Illinois Central with a boiler and tender of special construction, embodying the inventions of Cornelius Vanderbilt. Also a locomotive for the Buffalo & Susquehanna R. R., and an electric locomotive for mining purposes.

The Brooks Locomotive Works exhibit four locomotives, among which is one of the locomotives designed for the Pere Marquette R. R., full illustration and description of which appeared in our June issue. The Schenectady Locomotive Works exhibited among others the locomotive No. 975, which was attached to the special exhibit train of the Delaware, Lackawanna & Western R. R.

Many of the railway companies have interesting exhibits and most of the lines running in Buffalo have placed



Richmond Locomotive Works Exhibit.

in service new and special equipment which will be described and illustrated in the columns of the Railway Master Mechanic. The Chicago & Northwestern Ry. has an attractive booth arranged like a ticket office and also a miniature railway. The Canadian Pacific and Grand Trunk railways both have booths for the display of photographs and other matter of advertising nature. The Grand Trunk has issued a very neat folder giving a good description of the exposition. It also contains a city map of Buffalo which visitors to the exposition no doubt find very useful.

Near the center of the transportation building is the exhibit of the Lackawanna Railroad. This exhibit consists of a train of cars consisting of their standard passenger locomotives constructed by the Schenectady Locomotive Works, a passenger coach, a freight car and a coal car. The passenger coach contains one of the most magnificent exhibits of transparencies of American scenery ever collected. These are typical of the views which

Richmond Locomotive Works Exhibit.

may be seen along the line of the "Lackawanna" route. This car is representative of the passenger department of the road. The freight car contains a splendid collection of the thousands of articles manufactured in the territory of the Lackawanna Railroad, from the wonderful variety of raw materials found in the states of New

York, Pennsylvania and New Jersey. The coal car has on it a miniature coal breaker in operation, and presents

SCHENECTADY "CONSOLIDATION," 2342, FOR N. Y. C. & H. R. RY.

a splendid object lesson of the production of anthracite coal; also a collection of coal fossils, said to be the finest in existence. This collection the Lackawanna Railroad has been getting together during nearly half a century of coal mining.

The Delaware & Hudson road exhibits a railway mail car of the latest type. It is used to demonstrate the railway mail service, and a uniformed corps of the department conducts the sorting of mail in the presence of the visitor as is actually done on moving trains. All of the outgoing mail from the exposition grounds is handled here.

The Santa Fe Route is represented by two exhibits, one an electric diorama of the Grand Canyon of Arizona, the other a set of one hundred photographs for the

BROOKS PASSENGER LOCOMOTIVE, 660, FOR L. S. & M. S. RY.

United States Postal Exhibit. The exhibit in the Government building is illustrative of the railway mail service along the Santa Fe. The series begins with a letter written in the Chicago city office of the Santa Fe and ends with the same letter delivered to the representative of tha tcompany in San Francisco. The Grand Canyon diorama is located in a corner of the main gallery of the Agricultural building and similar to the one exhibited last winter in Chicago. The artist has produced in an illusory way what the traveler may see who stands on the southern rim of the Grand Canyon, near the head of Bright Angel Trail, looking across to the other rim, thirteen miles away, and gazing down more than six thousand feet into the granite gorge of the Colorado river.

The De Witt Clinton engine which was at the World's Fair at Chicago in 1893 is at Buffalo as part of the exhibit of the New York Central Railroad.

Many of the railroads running into Buffalo that did not exhibit have placed in service new equipment on account of the increased travel. Several roads have also gotten out unusually handsome and artistic folders descriptive of the Pan-American Exposition. Among these we notice the Cleveland, Cincinnati & St. Louis Ry., whose passenger department publishes the "Big Four Gazette," in which have recently appeared very handsome half tones illustrative of the exposition buildings and grounds.

BROOKS LOCOMOTIVE FOR C. R. R. OF N. J.

The Nickel Plate, the "Short Line to Buffalo," publishes a very neat folder fully describing and illustrating the principal points of interest.

The Lehigh Valley Railroad has issued a number of folders and one very handsome book referring to their lines in connection with the exposition. Their well-known "Black Diamond Express" is made the subject of one entire pamphlet most artistically gotten up.

The Gould Coupler Co. exhibited their improved freight coupler for fifty-ton cars, spring buffer blocks, and malleable iron draft rigging with twin draft springs; lateral swing pilot coupler and method of attaching to pilots of locomotives; lateral swing passenger coupler; medium, size freight coupler; narrow gage

BROOKS "CHAUTAUQUA" TYPE PASSENGER, FOR C., R. I. & P. RY.

freight and passenger coupler; and improved lateral swing tender coupler, for heavy equipment.

There is also an excellent series of models, including the following: A quarter size model of a steel platform applied, passenger coupler, wide vestibule, continuous platform buffer and a trap door attachment; a quarter-size model of improved malleable iron draft rigging applied, with malleable iron buffing beams, freight coupler and spring buffer blocks; a quarter-size model of a European goods wagon, showing automatic swing head coupler, with auxiliary draw gear applied in connection with the common hook coupling and side buffers of European practice.

Baldwin, Class 10-38-E, 322, for B. & S. Ry.

There is also shown improved M. C. B. journal boxes with flush lids and removable wedge stop keys, and freight and passenger brake slack adjusters, showing method of operation.

A feature of their exhibit is the Gould car lighting and ventilating system. The electric lighting and ventilating dynamo is suspended and arranged as in practice to the underside of a car framing, showing the method of adjusting the dynamo to increase or decrease its output; the relation of the dynamo to the car axle and its driving pulley; the type of belt used and the swinging action of the dynamo to allow for the curving of the car truck.

The car axle and the driving pulley are driven by a variable speed motor representing the car while in motion, and it will drive the axle at variable speeds up to 60 miles per hour, which is indicated by a speed indicator driven by the axle. The electric instruments on the board above the dynamo are for the purpose of showing the system electrically, and show the current from the dynamo, the dynamo voltage, the voltage of the lights, the charging and the discharging of the batteries and the amperes consumed by the lights, and the amperes generated by the dynamo.

The Gould improved storage batteries are also shown in connection with the system. A crown supported by columns extends around the exhibit, and is arranged with thirty-six 16-c. p. lights and fixtures and also two electric ventilating fans. The ventilating fans are on a separate circuit in connection with a small independent switch, arranged the same as their practice in service. The fans can be used in daylight service, as well as when the lights are being used, being controlled independently of the lights.

The exhibit clearly shows the dynamo operating in actual service, showing the stopping and starting of the train, the speed at which the dynamo goes into action, when it generates the current for the lights, and for recharging the storage batteries; also the stopping and reversing in the opposite direction, when the train runs in the reverse direction.

The action of the dynamo governor controlling the switch arm, battery reversing switch and the resistance switch can be seen; also how the switch reverses the batteries when the direction of the car is changed, and the resistance switch is cut out when the dynamo is in action, and returns to position, putting the batteries in multiple on the lights, when the dynamo goes out of action by the decreased speed or stopping of the train. A volt-meter, ammeter, battery switch, light switch and a small snap switch for controlling the ventilating fans are the only instruments placed in the car with this system, as shown by the glass covered case containing these instruments, on the board above the dynamo. All other electrical instruments shown on the board are for illustrating the system electrically.

Baldwin, Class 10-28-50-E, 55, for Lehigh Valley Railroad.

This exhibit has been skillfully planned and contains a great amount in a small space. There is also an exhibit of the Gould Storage Battery Company in the Electricity Building which is worthy of a visit.

The Gould coupler may also be seen on many of the cars and locomotives in the building.

The exhibit of the Simplex Railway Appliance Company shows truck and body bolsters which have come into such rapid use that there are now 180,000 of them in use on 62 railroads. The principles of its construction are therefore well known. The Susemihl roller side bearing for freight and passenger cars is also shown.

The Consolidated Electric Lighting & Equipment Company has no independent exhibit, but its equipment is on the passenger coach of the Delaware, Lackawanna & Western R. R. As its action is dependent on the motion of the axle, it is, of course, not in operation.

The Ashton Valve Company, of Boston, has no regular exhibit of their goods other than those that are entered for an award collectively, as applied to the engines exhibited by the several locomotive builders, of which we refer more especially to the L. S. & M. S., Pere Marquette, C., R. I. & P., and Illinois Central Rys.

McCord & Co.'s journal boxes are found upon the locomotives exhibited by the Brooks Locomotive Works and the steel cars exhibited by the Pressed Steel Car Co. are all equipped with their journal boxes.

Gould Coupler Company's Exhibit.

On the Training of Boilermakers

By W. H. Graves

"WHERE ignorance is bliss, it is folly to be wise." A proverb more applicable to the generality of boilermakers would be hard to find. Not that I make a plea for the higher technical education, but rather for a more general understanding of the common principles that govern boiler construction. I do not think that more than a very small proportion of boilermakers understand the simplest problems of laying out work—a frustum of a cone for instance. This is a deplorable condition of affairs, not that the journeyman is to be censured so much as the manner in which such matters are conducted in most shops. In a great many instances, especially in railroad practice, the foreman knows very little of the subject, and what little he does know, he makes no effort to impart to the apprentice. When a young man, therefore, is out of his apprenticeship, his knowledge consists almost solely of hammering and pounding. I use these terms advisedly, for I know of no other term which so exactly fits the case.

I make no plea for a system of education and advocate no special line of studies; but what I do believe in, is a classification of apprentices, so that those who show a marked aptitude for acquiring not only the practical, but the theoretical knowledge pertaining to their calling may have the opportunity afforded them. There is always a certain percentage of boys who are anxious to be taught, who have the intelligence necessary to grasp and assimilate what is taught them, and who take an interest in all that pertains to their trade. By applying the law of the survival of the fittest, managers could develop these more intelligent individuals for positions which call not only for mechanical skill, but for executive ability. The training of those who are not capable of greater things, can be limited to merely increasing their usefulness by confining them to that which they can do well. I believe in special callings for the individual—in ascertaining what each is best at, and then to teach him to do that better than the general run of workmen, or in other words, in making him a specialist. There are in all callings misfits, and an endeavor to make one of these proficient in the full details of a trade for which he is not adapted, would result in failure; but by confining such individuals to but one detail of the trade, they would become skillful in that one particular branch. The establishment of a merit system to govern promotion, would do much to correct many of the evils encountered in boiler practice. The foreman of the boiler shop, instead of securing the position on account of long service, should be selected for ability. There seems to be too little attention given to this matter and the consequence is misfits in control of many shops, who are wholly unfit for the position. Having neither executive ability nor special mechanical skill, instead of trying to surround themselves by men of superior merit, such men are governed by the principals advocated by Caesar —"surround me with thick headed men, yonder man knows too much, he is dangerous to me,—may supersede me in my position." The natural result is that men of merit are either soon discharged or conditions are made unpleasant, so that they are forced to resign. Of late years there has been a tendency to place men in position who are graduates of technical schools. The practice is one to be commended; if the man is one who will take an interest in the practical details of the particular branch in which he is to conduct. A great drawback, however, to this plan is that too many are hampered by the technicalities and find it difficult to reconcile actual practice with purely technical teachings. Where it is possible to combine theoretical with practical training, of course much may be done toward eliminating boiler shop evils. There is no mechanical trade that calls for more skill and inventive power than boilermaking. The type of steam generator has not materially changed in a decade and, excepting a few minor changes in details, boilers now are what they were twenty-five years ago. Critics may say that those who are willing have access to mechanical books on the subject, but a careful study of them throws little light on the subject to the average mind. Text books are either wholly technical or the phraseology is so obtuse, that only those who are conversant with the higher branches of mathematics can fully comprehend them. Nature has endowed us a certain amount of ability to acquire acknowledge, but few possess the special aptitude of imparting it to others.

Exhibit of Simplex Railway Appliance Company.

Second Vice-President Finley, of the Southern Railway, says of the southern situation: "Conditions in the south are very favorable just now from a railway point of view. Tonnage is very good, and there is a decided picking up in all branches of traffic. This is particularly notceable in cotton goods, and I gather from our reports that the Oriental trade, which suffered by reason of the Chinese troubles, is improving materially. Our local business is very good, and the new industries that are starting up along our line are helping to swell our tonnage. The industrial department of the Southern Railway is accomplishing much, and the new sidings that we have constructed are considerable and are constantly increasing. Our passenger business is also very satisfactory. The rate situation in the southeast is very good, and we are peacefully adjusting whatever differences exist. The very favorable conditions in the south make the outlook most gratifying, and I am satisfied that they are going to last for some time. The Southern Railway is just now engaged in a very important work—that of grade revision, following its policy of improving the property, and these improvements will, of course, be made out of the earnings. We are working along safe lines, and the outlook, generally speaking, is very encouraging."

New Parlor and Cafe Dining Cars on the Baltimore & Ohio

On May 1st the Baltimore & Ohio Railroad inaugurated their own parlor and cafe cars on trains Nos. 103 and 104 between Pittsburg, Columbus and Cincinnati. The three cars—"Schenley," "St. Nicholas" and "Grand"—are named from prominent hotels in Cincinnati and Pittsburg. They are complete in every detail;

seventy feet long, with six-wheel trucks, steel wheels, wide double windows, steel platforms, with all of the latest improvements for safety, convenience, comfort and durability.

New Parlor and Cafe Dining Cars Between Pittsburg and Cincinnati.

The parlor occupies one-half of the car and contains ten revolving plush chairs. The toilet-rooms are large and commodious. The generously proportioned smoking-room is upholstered in heavily padded leather. The cafe is furnished with two large tables accommodating eight people, and two small tables accommodating four. Cooking is done with Pintsch gas, making it possible to eliminate unnecessary heat and at the same time provide quick lunches on short notice. A la carte breakfast, luncheon and supper are served between Cincinnati and Pittsburg in each direction.

The Cafe.

The Parlor.

These cars were made at the Pullman shops, but the service will be operated entirely by the Baltimore & Ohio Railroad Co.

According to Prof. George D. Shepardson, in a recent issue of the Forum, when the electric berth lamp was introduced it met with instant success. A passenger who had enjoyed the luxury of a cool light at his shoulder, available at any time during the night, without any disturbance, always seeks a sleeping car with electric lights. The traveling public is satisfied with nothing less; and today no train can be called thoroughly modern and up to date unless it can advertise berth lights. The latter are electric, of course, for no other kind has appeared. Along with the berth lamp is the possibility of having electric fans to keep the air in circulation. Another advantage which appeals to ladies is the comfort of heating a curling iron without the nuisance of an alcohol lamp, so trying and dangerous in the cramped quarters usually allowed for ladies' dressing rooms. On trains equipped with storage batteries, each compartment and each dressing room may be furnished with electric heaters, always ready for use by simply inserting the tongs.

Exhibit at Saratoga of the Norton Ball Bearing Jacks

We were obliged to omit from our Snap Shots given in our July number a photograph of the Exhibit of Mr. A. O. Norton, the cut having been lost by the engravers at the time of our going to press. We reproduce herewith a view taken of the Norton Ball Bearing Jacks which were well exhibited in a prominent place by Mr. Norton, who had sample ball-bearing lifting jacks, journal, bridge and track jacks. Mr. Norton also had one of

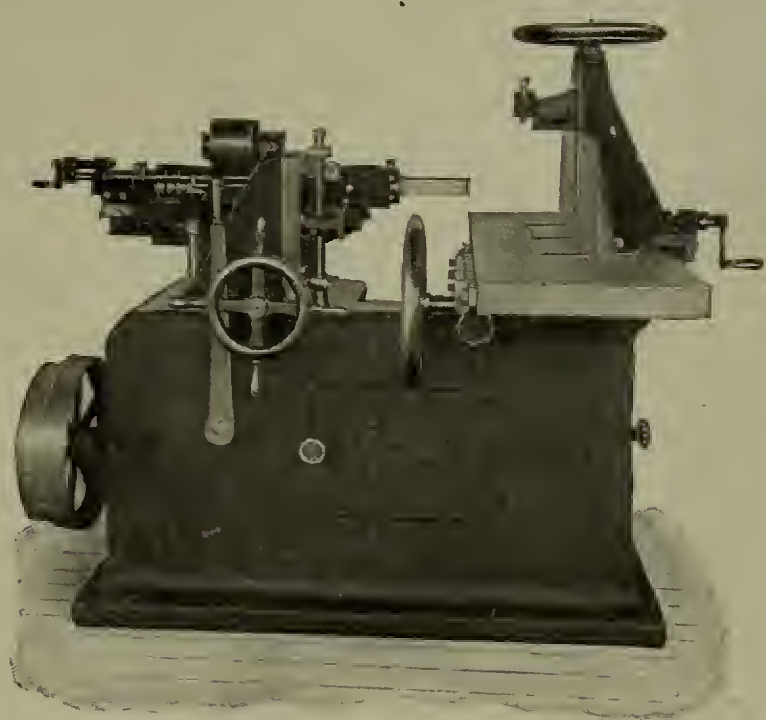
the two most striking advertisements at the convention, which was his own design and occupied the front cover space of the Railway Master Mechanic for the June issue.

A New Horizontal Hollow Chisel Mortise

CAR builders and wood workers in general should be interested in the description of the No. 6 Horizontal Hollow Chisel Mortiser, shown herewith. As a machine of medium weight and capacity, possessing all the advantages offered by this style of a mortiser, it is equipped in addition thereto with many superior features of convenience and accessibility which in connection with its superior design and construction, particularly adapt it to the requirements of Car and Railroad Shops, Carriage and Wagon Factories and other similar lines where the range of mortising or framing is such as to require it.

Particular attention is called to the superior design of the main frame of the machine, same being cast in a single piece and having a base of such dimension as to afford thoroughly efficient support for the table, a point in which it especially exceeds other machines of similar size. Unlike other mortisers of medium size the ram or chisel carriage has vertical adjustment instead of the table. This method insures more rigid support for the table, a point worthy of consideration. This new mortiser is said to be the handiest to operate and most powerful for its weight of any on the market, being superior in every paricular to any hollow chisel machine yet produced.

The following working dimensions will be of interest: Carriage has travel of 9½″ and will raise to 11″ above



S. A. Woods Machine Co.'s No. 6 Horizontal Hollow Chisel Mortiser.

the table. Table has horizontal travel of 18″ and is provided with patent stops for laying off double mortises. Timbers up to 12″ square may be clamped and chisels up to 1½" can be successfully used on hard wood. Weight of machine 4000 lbs.

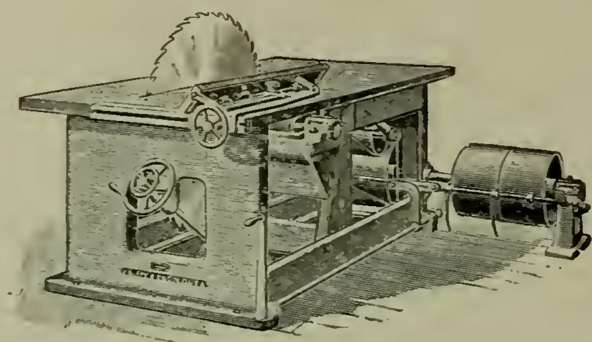
The Woods patent self-oiling loose and pneumatic pulleys are used in connection with this mortiser, which is manufactured by the S. A. Woods Machine Co., with car machinery department at No. 64 Wabash Avenue, Chicago, works at South Boston, Mass. Besides the above this concern manufactures a full line of high grade car building machinery such as borers, car sill planers, gainers, saw benches, flooring machines, cabinet planers and moulding machines, all illustrated and described in their new book "M" which will be mailed to any Master Car-Builder or interester wood worker upon request.

New Car Shop Wood Tool

FOR the special attention of Car Shop Mechanics who are desirous of getting an improved machine to rip heavy material, and one which will stand hard and heavy work, we are pleased to present cut of a Rip Saw, which should certainly be able to perform the work to advantage.

Its frame is massive and substantial, and has a large table fitted with an adjustable fence on the front end, which can be tilted to any angle up to 45 degrees, and moved to the right edge of the table, leaving a distance of 22 inches between the saw and fence.

The arbor, which is gibbed to heavy ways, carries a saw up to 42 inches in diameter, and will rip material up to 15 inches in thickness, and has its frame raised and lowered by hand-wheel and screw, with lock attachment for holding in position, which also insures uniform ten-



FAY AND EGAN CO. IMPROVED RIP SAW.

sion of the belt. The countershaft at the back of the machine is provided with a belt-shifting attachment, by which the machine can be started and stopped at the working end.

The makers of this machine, J. A. Fay & Egan Co., of Nos. 145 to 166 West Front St., Cincinnati, O., will cheerfully furnish any further particulars and lowest terms to those requesting same, and will also be pleased to send their large new Poster, showing this machine, and other car shop tools free on application.

Interesting New Railway Patents

ROGERS SIDE BEARING.

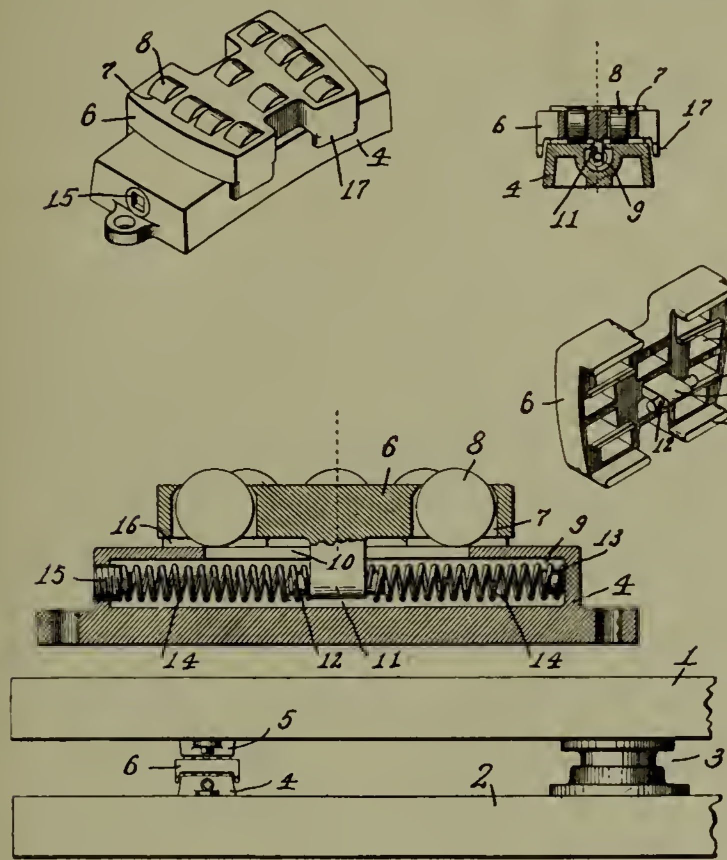
A SIDE bearing for cars has recently been patented by Winfield S. Rogers, of Boston, Mass. The invention pertains to improvements in that class of side bearings in which a roll-cage and a group of rollers are interposed between the body side bearing and the truck side bearing, the cage of rolls being held in neutral position of traverse by means of springs.

The truck side bearing and the body side bearing are secured as usual, except that the pair of side bearings instead of being disposed for direct contact are vertically separated so as to receive rolls between them.

Resting upon the truck side bearing and adapted to move along the same is a roll cage provided with a group of mortises extending vertically therethrough, their upper ends being contracted in the direction of length of the side bearings, these mortises being arranged in three groups, one group of two mortises at the longitudinal center of the cage and a group of four mortises near each end of the cage, the several mortises being so disposed that the mortises of the central group will break joint with those of the outer groups, and the two central mortises of each side group being disposed farther outwardly than the end mortises of the groups, and the axes of the groups transverse to the length of the side bearings instead of being parallel with each other being radial to the center of the center plates. A cylindrical roll is disposed in each mortise, the length of each roll being such as to loosely fill its mortise and the diameter of the roll being less than the general length of its mortise, but greater than the length of the contracted top of the mortise, the rolls resting upon the truck side bearing and projecting above the top of the roll-cage and adapted to be engaged by the under surface of the body side bearing.

A longitudinally disposed chamber is provided in the center of the truck side bearing and a lug carried by the roll-cage projects through a longitudinal slot in the roof of the chamber and is engaged by helical springs upon each side of and disposed within the chamber, which serve to centralize the roll-cage upon the truck side bearing while permitting the roll and cage to shift endwise of the side bearing.

When the body side bearing imposes its load vertically upon the truck side bearing, it does so through the medium of the rolls, and during the relative shifting of the two side bearings while thus co-operating the friction of shifting is that of rolling friction instead of sliding friction. The rolls have a trifle of diametrical freedom in the mortises of the cage, and consequently any individual roll may at times partake of a slight shifting of the body side bearing relative to the truck side bearing while the two are under the strain of co-operation, thus being possible without any shifting of the cage or of all of the rolls in case all of the rolls are not at the instant pinched between the two side bearings. The lug fits somewhat freely in the slot, thus permitting the cage to partake of more or less pivotal motion relative to the truck side bear-



ing. The mortised-cage arrangement permits of most any desired grouping of the rolls and also permits the axes of all of the rolls to be arranged radial to the axis of the center plates.

The Courtney Car Truck Bolster.

Daniel C. Courtney, of Elkins, West Virginia, has patented a car-truck bolster which can be constructed in the ordinary car-shop by the use of common and well-known appliances and tools, may be repaired when necessary under the same conditions and with equal facility, is adapted for use with any of the known types of truck-frames, is simple in construction and comparatively cheap in first cost, has the metal of the members so disposed as to most effectively withstand the strains to which they may be subjected, does not bend at the center and allow the side bearings to come in contact, and possesses other and desirable characteristics and features constituting the same a superior means for performing the requisite functions.

The invention consists of a bolster having the compression member formed of commercial rolled flanged beams or shapes of standard sizes united by any suitable means and a tension member consisting of a piece of metal bent to shape and with its ends secured to the bottom surface or top portion of the compression member, a separator and truss-stool in one or more pieces being interposed between the said compression and tension members at the center.

Rolled flanged beams of commercial sizes and weights such as can be purchased in open market, are used. These beams are arranged in pairs, spaced apart, with their webs in vertical planes, and constitute the compression member of the bolster.

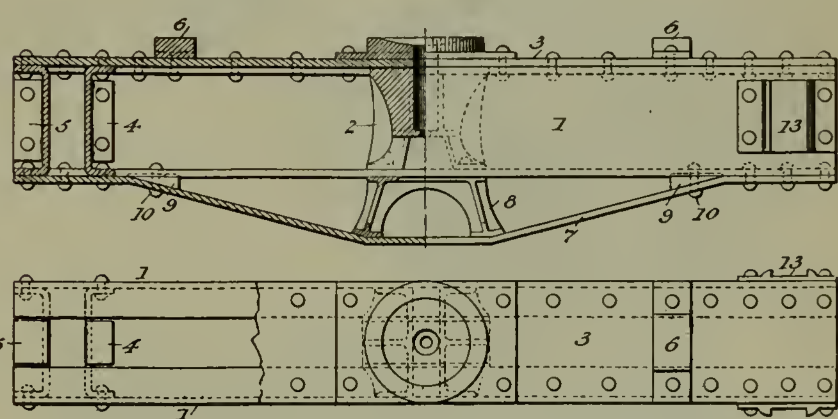
Cast or wrought iron separators of any desirable shape and size and each located between two flanged beams at their centers. They are preferably made of an irregular shape to secure the greatest strength with the least weight of metal. The top surface of each separator is on a level with the top flanges of the beams, and rivets conveniently placed secure the same in place.

Flat metallic plates are secured to the top flanges of the beams, and the plate in each example may extend the entire length of the bolster or to a convenient distance each side of the center of the beams. The plate at the center rests upon the top of the separator.

Inner spacing or distance pieces are made by casting or by cutting a plate to shape and bending the edges at right angles to form flanges by which they are secured to the webs of the rolled beams by rivets and outer or end-spacing-pieces are formed and secured in position in a manner similar to the inner spacing pieces.

The tension members consist of flat bars or plates of metal bent to the shape shown and having the ends riveted to the bottom surfaces or top part of the compression members.

Malleable-iron truss-stools are interposed between the compression and tension members at the center and secured in position by rivets or otherwise, and wedges are

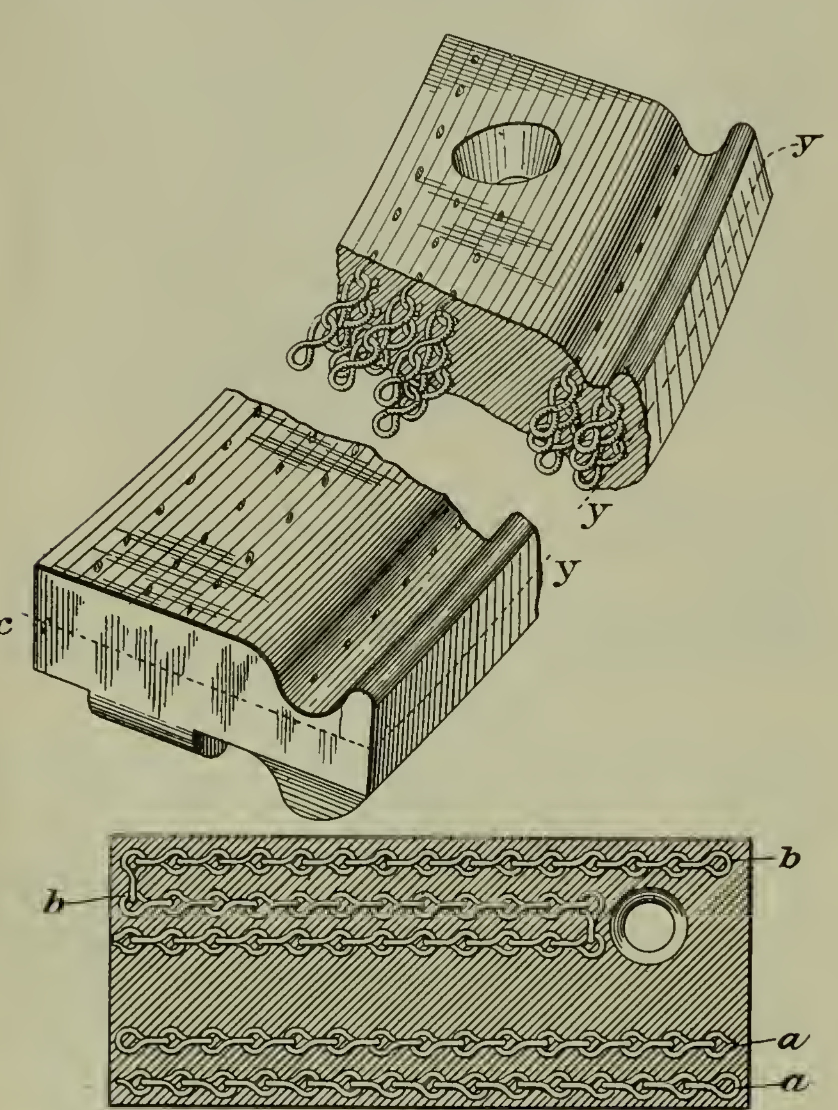


interposed between the flanges of the rolled beams and the tension members at the angles where the ends of the latter are riveted to the former. A rivet in each case is passed through the flange, the wedge, and the tension plate. Each wedge has a flange, which abuts against the flange of a rolled beam.

The Chapman Brake Shoe.

The object of an invention patented by William A. Chapman, of Suffern, New York, is to produce in combination with a cast filling, a more efficient, available and economical brake-shoe. This object is attained by using for inserts an aggregation of units each consisting of a portion of the desired insert metal of longitudinally-extended and more or less bent or twisted form and preferably, though not necessarily, connected and interlocked with each other in a flexible series either partially or completely, in which latter case the extended combination might be fitly described as a chain or as of chain shape, the aggregation of units of such shape retaining necessarily the desired foraminous character, whatever may be said of any one individual unit in which the twist or bend is not so complete as to bring together its two extremities. The manufacture or production of composite brake-shoes by the use of this improved type of foraminous insert is therefore particularly economical, owing to the numerous varieties of metals, sizes, and forms of such inserts constantly being produced under the name of "chain," and thus immediately available for the purposes of the invention, and for the same reason greater facility and certainty in adapting the resultant product to the nature of the work for which it is intended is attained by the use of this type of insert.

It is placed in position in the mold with great facility and accuracy, because the smallness of its subdivisions or units, and particularly where chain is utilized, results in great mobility and flexibility of the mass of the insert, and thus enables it to be correctly packed into the mold



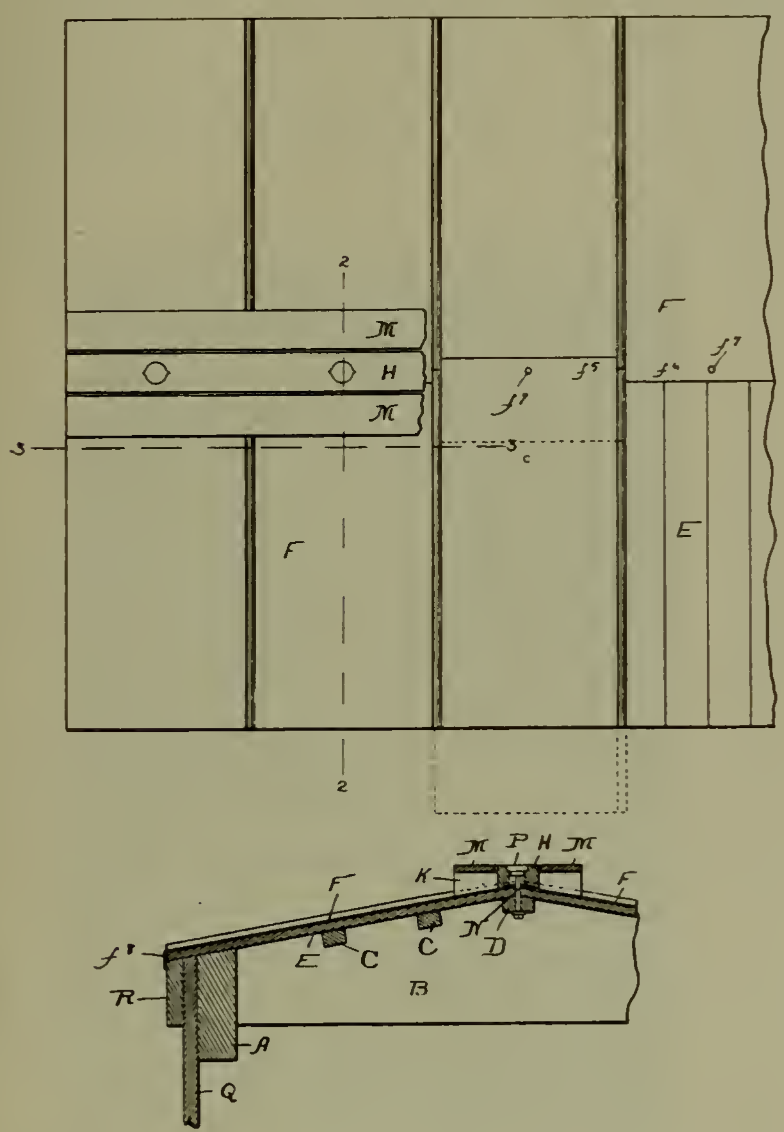
with very little forcing or strain of any kind. The improved insert may thus in any convenient manner be packed or positioned in the mold ready for the casting of the brake-shoe. When chain is used, it may either be cut into lengths fitting the mold, or it may be continuously packed into the mold by bending it back upon itself indefinitely.

It will be observed that the improvement enables the insert to be introduced throughout the brake-shoe in every conceivable variety of position relative to the axes of the constituent metal particles or units. This will serve, if required, to produce variation in the wearing of the ductile insert in different portions of the shoe. In brief, it may be said that among its numerous other advantages the improved insert conspicuously and unprecedentedly presents, in relation to the brake-shoe mold, a substantially continuous foraminous insert of ductile metal in masses sufficiently important to be individually inflexible and unaffected in temper by the temperature of molten metal, but nevertheless so mobile or flexible as to be inserted with the greatest ease and variation of location and position within the mold—capable, in fact, of being practically charged into it with approximately the same facility as the subsequently associated molten metal and also an insert of such quality as to be readily varied in mass and in detail wherever required in different portions of the brake-shoe.

Hutchins' Car Roof.

In an invention patented by Eugene R. Hutchins, of Chicago, Ill., there is produced an outside iron roof for railway-cars of such construction that the joints between the separate plates of the roof are effectually water-tight, so that the roof cannot leak, and which at the same time leaves the outside iron roof flexible, so that the strains will be taken by the wood framework and the layer of boards, and thus relieve the sheet metal, which requires to be water-tight, from strain and liability to injury. In this connection it will of course be understood by those skilled in the art that the wood framework of the roof possesses naturally, from its wood construction, a degree of flexibility that adapts it to yield under severe weaving or torsional strains sufficiently to prevent serious injury thereto, and in our invention we combine with the wood framework a flexible outside iron roof having water-tight joints, the flexibility of the iron roof being by our peculiar construction of the water-tight joints between the metal plates sufficiently yielding or flexible to prevent injurious strain on the sheet metal.

Metal plates composing the outside iron roof are laid upon the inner sheathing of boards which support and stiffen the same. The metal plates extend from the eaves of the roof to the ridge-pole, their meeting ends overlapping each other at the ridge. Adjacent metal plates are united together at their side edges by a water-tight loose flexible joint comprising several folds or flanges made open or loose, so that the separate sheets or plates will have sufficient play or movement to and from each other to give the necessary required flexibility to the sheet-metal roof as a whole to relieve it from strain, and although the joint thus formed between the adjacent sheets of the iron roof is a loose one, still the joint is completely and prefectly water-tight against the fiercest driving rain from whatever direction it may be driving or the wind blowing, because open folds form a hood over other folds or flanges, so that the rain driving from the side of the flange is simply carried over the joint and is deposited upon the adjacent plate, or else it is deposited in a gutter or trough formed by the flanges, and thus carried down to the eave and discharged. By this particular construction of joint there is produced a perfectly water-tight connection between the side edges of the roof-plates and at the same time the connection is so loose and free that the outside iron roof can readily accommodate itself to any yielding, weaving, or torsional movements that the wood frame of the car-roof may have or be subjected to. The outside water-tight metal roof is relieved from all injurious strains tending to crack, injure, or destroy it, and there is produced a thoroughly efficient and durable car-roof. As the metal plates are secured together at their side edges by loose free joints composed of open folds or flanges, there is furnished a roof of a very cheap construction, as the separate metal plates of the roof can be quickly put together by simply slipping or telescoping one upon another. This also enables the roof to be very easily and quickly repaired by simply slipping out an injured plate and replacing it by another.



At the ridge the meeting of the roof-plates overlap each other.

The ridge-pole is furnished with notches to receive saddles, and thus bring the upper surface of the ridge-pole flush with the running boards, which rest on the saddles, so that the ridge-pole itself serves as the middle running board. To secure a perfectly water-tight connection between the ridge-pole and the ridge-purlin, we provide the bolts, that pass through the two to secure the same together, with bung-shaped or bung-acting caps, having tapering or beveled flanges, so that they may be forced or driven water-tight into the openings formed to receive them in the ridge-pole.

The ridge-pole is provided at intervals with notches to receive the high-standing joints which unite the side edges of the separate plates forming the outside iron roof. The bolts, which connect the ridge-pole and ridge-purlin together, extend through portions of the iron roof plates or sheets, and thus hold the individual loose plates from slipping downward or toward the eaves. As the roof-plates lay over each other at the ridge, the roof is made thoroughly water-tight, and as the bolts, which alone extend through the roof-plates, are furnished with water-tight or bung caps there is no possibility of any leakage at the bolt-holes. The ridge-pole also adds to the water-tight character at the ridge

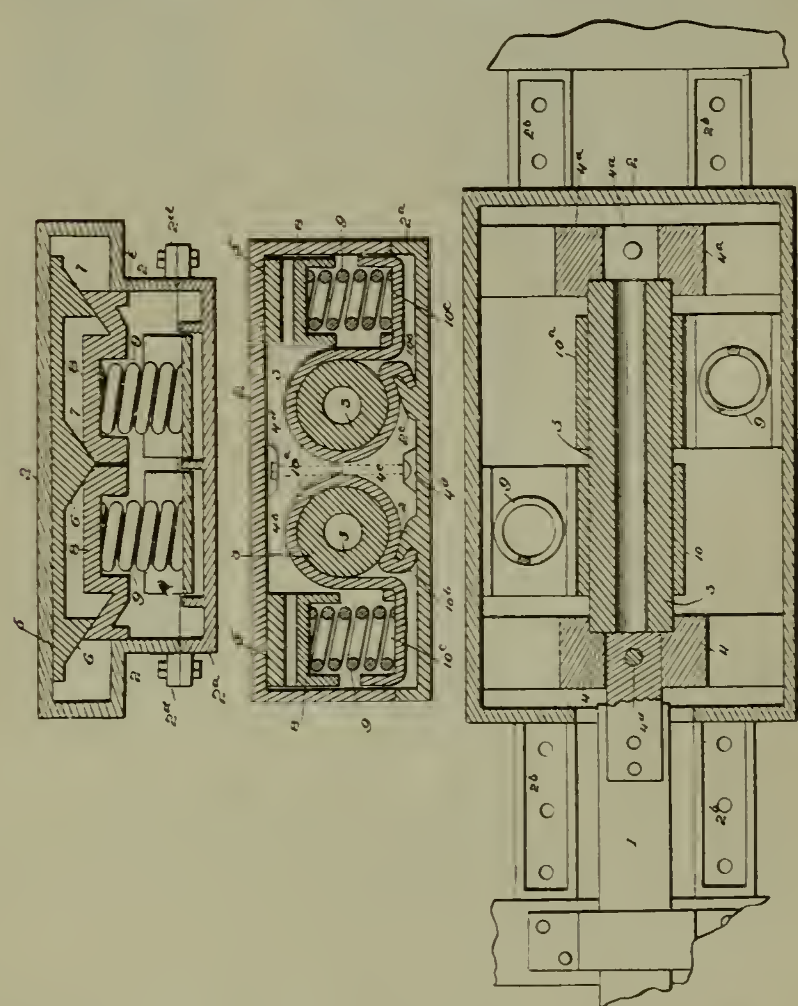
The Ritter Draft Rigging.

An invention patented by Gilbert P. Ritter, of Chicago, Ill., relates to that class of draft-rigging for railway-cars wherein resistance is added to spring resistance, so that the shock of draft or buffing is not only spring-resisted, but the action of the spring is so controlled as to counteract any shock incident to the reaction of the springs.

The main feature of the invention embraces the combination, with an endwise-movable draw-bar having a cylindrical friction-surface, of curved coacting friction-surfaces preferably in the form of split sleeves or straps or their equivalent saddles or curved sections and yielding means for gradually increasing the pressure between the coacting friction-surfaces.

It comprises a coupling of any well-known character, and a suitable casing or housing for enclosing the operative mechanism.

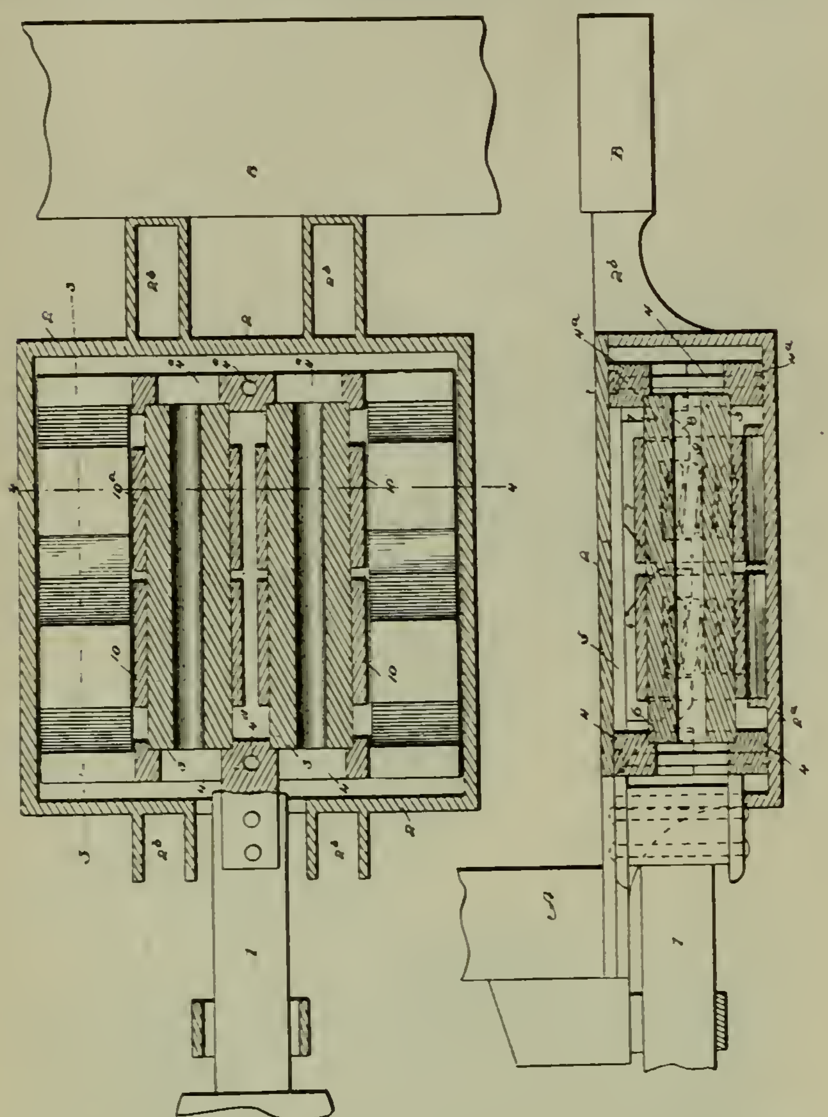
The draw-bar has an endwise movement within the casing or housing for draft and buffing purposes, is com-



posed of one or more sections, provided with friction-surfaces in planes parallel with the axis of the draw-bar, said sections being preferably cylinders in form for sake of lightness and strength, which cylinders or sections are carried by two cross-heads, that are connected at each side of and parallel to the cylinders or sections by bars, which move with the cross-heads and cylinders or sections, and said bars are provided on their under surfaces with two sets of inclines, which engage corresponding inclines on spring caps or covers.

Fixed friction-plates coact with the friction surfaces or sections on the endwise-movable draw-bar. These friction-surfaces correspond in form to the sections of the draw-bar, and in the present instance are therefore curved surfaces, the preferable form being a strap or what shall hereinafter be termed a "split sleeve," provided with a spring seat.

Each of the curved fixed friction-surfaces is provided with a coiled or equivalent spring so arranged as to be compressed by the incline or equivalent device movable with the draw-bar.



One end of the split sleeve or strap is secured or anchored to the casing, the opposite portion of the strap or split sleeve being bent to form a spring box or seat for the reception of a coiled or equivalent spring, whereby yielding pressure is to be applied to the split sleeve or strap to increase its friction-grip on the draw-bar sections or cylinders. Resting upon said springs are spring-caps, having upon their upper surfaces inclines corresponding and coacting with the inclines on the under sides of the bars, movable with the cross-heads and friction sections or cylinders.

In either draft or buffing one set of inclines, according to the direction of travel of the draw-bar, will operate upon the inclines of the corresponding spring-cap to force said spring-cap down, and thus compress the spring beneath the same, which will exert a gradually increasing though yielding pressure upon the free end of the split sleeve or strap by which said spring is supported and cause said split sleeve or strap to increase its friction-grip upon the draw cylinder or section in proportion to the applied force and the movement of the draw-bar, the cylinders being at that time moving endwise in the straps or split sleeves. While the compression of one set of springs (buffing or draft, as the case may be) is taking place, as before noted, the other set of springs is expanding, as the recession of the inclines, as the case may be, allows its spring cap to rise, so that the straps alternately grip and alternately release the traveling section of cylinder. As the inclines are reversely arranged on the bars, which connect the cross-heads, it is evident that in the change from draft to buffing, and vice versa, the application and reduction of the friction-grip on the draw-bar will be gradual toward and from the center of motion, so that all sudden and destructive shocks will be avoided.

Personal Mention

Mr. J. N. Sanborn has been appointed master mechanic the new Minnesota & International.

Mr. J. H. Stubbs, general foreman of the Union Pacific shops at Armstrong, has been appointed master mechanic, with headquarters at North Platte, Neb., with jurisdiction over the main line of the Union Pacific from Grand Island to Cheyenne.

Mr. P. M. Kilroy has been made general foreman of the car department of the Cotton Belt shops at Pine Bluff. He succeeds T. H. Osborne, who resigned to take a similar position with the Northern Pacific at Portland, Ore.

Mr. John Thompson, master mechanic of the Nashville, Chattanooga & St. Louis, has retired from the service of the company, and is succeeded by Nicholas Long, formerly traveling engineer.

Mr. J. B. Elliott, master mechanic of the Canadian Pacific at Carleton Junction, Ont., has been appointed master mechanic of the same road at Montreal.

Mr. W. Kennedy is appointed master mechanic of the middle and southern divisions of the Grand Trunk, with jurisdiction over all matters pertaining to the motive power department on these divisions, exclusive of the Stratford shops, with headquarters at Toronto, vice Mr. W. D. Robb, promoted.

Mr. W. D. Robb, master mechanic of the Grand Trunk at Toronto, has been appointed acting superintendent of motive power, with headquarters at Montreal, Que., vice Mr. Frank W. Morse, appointed third vice-president.

Mr. Frank W. Morse, superintendent of motive power, Grand Trunk, has been appointed third vice-president of that system, effective on July 15, with direct jurisdiction over the transportation, motive power and car departments. He will also act as assistant general manager from time to time. Mr. Morse went to the Grand Trunk as superintendent of motive power in April, 1896, having been previously for seven years master mechanic of the eastern division of the Wabash at Fort Wayne, Ind.

Mr. A. E. Mitchell, heretofore superintendent of motive power of the Erie, has been appointed mechanical superintendent, and the position of superintendent of motive power has been abolished.

Mr. John Thompson, master mechanic of the Nashville, Chattanooga & St. Louis, has retired from the service of the company, and is succeeded by Mr. Nicholas Long, formerly traveling engineer.

Mr. W. S. Haines, master mechanic of the Baltimore & Ohio at Newark, O., has been promoted to the position of assistant mechanical superintendent of the Baltimore & Ohio lines west of the Ohio river, to fill the vacancy caused by the death of Mr. F. W. Deibert. His successor as division master mechanic is Mr. H. M. Brennan, chief boiler inspector.

Mr F. A. Delano.

Mr. F. A. Delano, whose photograph we reproduce herewith, was recently made general manager of the Chicago, Burlington & Quincy R. R., being promoted from the position of superintendent of motive, in which position he has been succeeded by Mr. J. F. Deems.

Notes of the Month

One of the most handsome catalogues that has come to our attention is being issued by the Bettendorf Axle Company, 1590 Old Colony Building, Chicago, descriptive of their "Bettendorf I beam bolsters." The typographical appearance is excellent and the quality of paper is the best. The various handsome half-tones and line drawings illustrating the bolsters are unusually well arranged for convenience as well as for artistic effect.

The Cleveland Pneumatic Tool Company have opened a New York office at No. 15 Cortlandt street, in charge of W. F. McGuire, where samples of their complete line of chipping, beading and caulking hammers; the Cleveland Long Stroke riveting hammers, piston, rotary and breast drills can be seen.

Chas. L. Pullman, brother of the late George M. Pullman, has been experimenting recently with a new form of car ventilator which has been tried upon the cars on several roads, with, as it is reported, remarkable success. It is said that the ventilators keep the interior of the cars cool and the air pure and do not admit cinders or dust.

The Baldwin Locomotive Works have issued in very neat form a paper read by Mr. S. M. Vauclain before the February meeting of the New England Railroad Club, on "Locomotives of the Nineteenth and Twentieth Centuries." The illustrations are many and handsome, and following the paper the discussion of the paper is given.

The Watson-Stillman Co., of New York City, have issued their catalogue Number 62, which describes in detail the Atlas and Phoenix Tube Expanders, manufactured by them.

Mr. John Paterson, representing one of the largest shipbuilding plants in Scotland, is in this country inspecting the various ship yards and steel works, especially their equipment. On his visit to the various plants, where pneumatic tools and appliances are exteisively used, he was so favorably impressed with those manufactured by the Chicago Pneumatic Tool Company, that he honored their general office in Chicago with a call, and also visited their plant at Olney, Philadelphia, and the Boyer Machine Company, Ltd., at Detroit, Mich.

The Chicago Pneumatic Tool Company has just received, through its foreign office, the largest single order for pneumatic tools ever placed with them, and probably the largest ever placed in the world, consisting of fifteen hundred and twenty-five tools, as follows: 275 Boyer long-stroke hammers, 350 No. 1 Boyer chipping and calking hammers, 400 No. 2 Boyer chipping and calking hammers, 25 No. 000 Boyer extension riveters, 25 No. 000 Boyer yoke riveters, 25 1¾ x 6 in. Boyer yoke riveters, 150 No. 2 Boyer drills, 250 No. 3 Boyer drills, 25 No. 4 Chicago breast drills.

Friday, September 13th, 1901, has been designated by Director-General Buchanan as Railroad Day at the Pan-American Exposition, Buffalo. The arrangements for the occasion having been entrusted to the Central Railway Club, President West has appointed the following committee of arrangement: James Macbeth, M. M., N. Y. C. & H. R. R. R., Buffalo, chairman; W. H. Marshall, S. M. P., L. S. R. R., Cleveland; S. H. Jones, Magnus Metal Co., O. P. Letchworth, Pratt & Letchworth Company, and Pemberton Smith, N. Y. Car Wheel Works, Buffalo. These gentlemen will seek the co-operation of committees from other railroad organizations in Buffalo and form a joint committee. As the date named is the same as that of the next regular meeting of the Central club, it is proposed to hold the club in the morning, at the Hotel Iroquois, instead of the regular hour, reserving for the afternoon a brief programme of exercises in observance of the event of Railroad Day, in the Transportation Building on the Exposition grounds. Assurances have been received that the Exposition management will do its part in making the occasion an entire success. It is desired to make the attendance on the day in question sufficiently large to make a record in the history of the Exposition.

An official announcement makes the property of the American Locomotive Company owned in fee as follows: Schenectady Works, 43 acres, capacity 425 locomotives per annum; Brooks Works, 19 acres, 375 locomotives capacity; Pittsburg Works, 10 acres, 200 locomotives capacity; Cooke Works, 16 acres, 150 locomotives capacity; Rhode Island Works, nine acres, 150 locomotives capacity; Dickson Works, five acres, 100 locomotives capacity. The company own also all but 40 of the 18,890 shares authorized and outstanding of the Richmond Works, and all of the 3,000 shares of the Manchester Works. The Richmond Works occupy 24 acres of real estate, with capacity for 250 locomotives per annum, and the Manchester Works, eight acres, of 50 locomotives capacity. The American Locomotive Company has no bonded debt, and may not mortgage its property save to secure purchase money, except upon a two-thirds vote of the preferred stock. The bonds of the constituent companies amount to $1,302,500. The New York Stock Exchange has entered in the unlisted department the American Company's $24,100,000 of 7 per cent cumulative preferred stock and $25,000,000 of common stock. President Hoadley, of the International Power Company, is quoted in New York as saying that the company has $4,000,000 of securities at market prices in its treasury, all applicable to dividends, while the present earning power is excellent, so that dividends are to be declared on both classes of stock almost immediately.

Another record shipment left Pittsburg on July 20 from the works of the Pressed Steel Car Company, over the Baltimore & Ohio Railroad. The shipment made up a solid train of 32 cars and the ultimate destination was Aquiles, in southern Spain. The contents of the train were 70 large capacity pressed steel hopper ore cars for the Great Southern of Spain Railroad, not on their own wheels, but carefully packed in parts ready for shipment on the White Star Line steamer Georgic, which sails from New York July 23. An engineer from the Pressed Steel Car Company will superintend the erection of the cars on their arrival in Spain. The cars themselves are of 80,000 pounds capacity, and when in service will be the largest cars in use on any Spanish railroad. In some respects they differ materially from American cars. For instance, one car in ten is equipped with a shelter box for the brakeman or guard. These boxes are built of wood on the end of the car and are so constructed that the guard has an unobstructed view of the portion of the train under his care. Other minor portions of the car, such as the hand brake apparatus, etc., differ from American standards, but in the main the cars are similar to cars built for ore roads in this country by this company. The cars, when erected, will be 26 ft. 6¾ ins. long, 8 ft. wide, with a height, from top of rail to top of body of 9 ft. 9½ ins. The light weight is 29,180 lbs., and the ratio of paying load to total weight of car when loaded 75.09 per cent. The gauge of the Great Southern of Spain is considerably wider than our standard, being 5 ft. 6 ins. This order for cars was secured by the Pressed Steel Car Company through its foreign agents, the Transportation Development Company, Inc., of London. This company also recently secured an order for 250 cars for use by the government railroads of Australia, in New South Wales. This order has been increased within the last few days to 450 cars.

We quote from the forthcoming report of the Interstate Commerce Commission the following regarding the railway rolling stock of the United States: "There were 37,663 locomotives in the service of the railways on June 30, 1900, or 960 more than the year previous. Of the total number reported 9,863 are classed as passenger locomotives, 21,596 as freight locomotives, 5,621 as switching locomotives, and 583 are not classified. The total number of cars of all classes in the service of the railways on the same date was 1,450,838, an increase of 74,922 being shown in this item. Of the total number, 34,713 are assigned to the passenger service, 1,365,531 to the freight service, and 50,594 to the direct service of the railways. It should be understood, however, that cars owned by private companies and firms and used by railways are not included in the returns made to the commission. The report contains summaries which will indicate the density of equipment and the extent to which it is used. It appears that the railways of the United States used on an average 20 locomotives and 753 cars per 100 miles of line; that 58,488 passengers were carried, and 1,626,179 passenger miles accomplished per passenger locomotive; and that 51,013 tons of freight were carried and 6,556,731 ton miles accomplished per freight locomotive. All of these items show an increase when compared with corresponding figures for the year 1899. There was also a decrease in the number of passenger cars per 1,000,000 passengers carried, and a decrease in the number of freight cars per 1,000,000 tons of freight carried. Both locomotives and cars being embraced in the term equipment it appears that the total equipment of the railways on the date referred to was 1,488,501. Of this number 1,005,729 were fitted with train brakes, the increase in this item being 197,655, and 1,404,132 were fitted with automatic couplers, the increase being 266,413. Practically all locomotives and cars in the passenger service were fitted with train brakes, and of 9,863 locomotives assigned to that service 7,431 were fitted with automatic couplers. Nearly all passenger cars were fitted with automatic couplers. With respect to freight equipment, it is noted that nearly all freight locomotives were equipped with train brakes and 75 per cent of them with automatic couplers; the corresponding figure one year previous was 45 per cent. Of 1,365,531 cars in the freight service June 30, 1900, 920,465 were fitted with train brakes, and 1,307,559 with couplers."

The Car Foremen's Association of Chicago

July Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209 Masonic Temple, Chicago, Wednesday evening, July 10th. Pres. Sharp called the meeting to order at 8:00 p. m. Among those present were the following: Baaschm, H.; Buker, Jas.; Bourell, J. W.; Bossert, Chas.; Carter, W. A.; Cardwell, J. R.; Cather, C. C.; Depue, Jas.; Earle, Ralph; Evans, W. H.; Grieb, J. C.; Guthenberg, B.; Harkenrider, J.; Husband, E.; Jones, R. R.; Keebler, C. F.; Krump, M.; Kuhlman, H. V.; Kennedy, J. H.; Kroff, F. C.; Kline, Aaron; Morris, T. R.; Mullally, T. J.; Marsh, Hugh; Opie, Jos.; Olsen, L.; Prickett, Jas.; Pennington, B. C.; Stewart, H. A.; Schultz, F. C.; Sharp, W. E.; Wessel, W. W.; Wilcoxson, W. G.; Wolfe, Chas.

Secretary Kline: The following have made application for membership: W. W. Dye, car inspector, C. L. S. & E. Ry.; W. F. Friedman, Asst. Foreman, Armour Car Lines.

Pres. Sharp: These names have been passed upon by the Board of Directors and they will be enrolled as members.

Secretary Kline: I have here a letter from Mr. Mudge, general manager of the A., T. & S. F. Ry., with reference to a special train to take us down the drainage canal. Mr. Sharp took the matter up with them but Mr. Mudge advises that his company could not furnish a special train for this purpose, but would attach a car for our use, to their regular train leaving Chicago at 7:58 a. m. and take us to Joliet, bringing us back in the evening. Mr. Sharp has replied that he did not think the association could avail itself of this offer.

Pres. Sharp: My reason for taking it upon myself to reply to Mr. Mudge was the fact that the train leaves at 7:58 in the morning, making a continuous trip to Joliet, and I did not presume that you would care to take that trip. Unless there is some action desired by the association the communications will take the usual course. The matter of an excursion will be turned over to the committee for their further arrangements in the near future.

This brings us to the regular program of the evening. Subject No. 1 is the discussion of Mr. Grieb's paper presented at the last meeting, but as the Railway Master Mechanic has not yet been distributed, we will have to defer the discussion of this paper until our next meeting.

Subject No. 2 is the report of the committee on loose draft rigging and neglected bodies of cars. As the chairman of this committee is not present with the report we will have to defer that also.

We will then take up a subject that is not on the program for tonight, but I must say in explanation that last January I wrote to the committee on subjects, calling attention to the apparent negligence of parties stencilling light weight on cars, and they very kindly asked me if I would present a paper for the July meeting. I do not know what they had in mind, but I have turned the matter over to our master car painter, whose daily avocation brings him in closer touch with that class of work, and I have asked Mr. Mullaley to prepare a paper and read it to you this evening. The following paper was then presented by Mr. Mullaley:

"The subject assigned to me by the committee, namely: Proper Method for Stencilling the Capacity and Light Weight Upon Cars, has received due consideration, and I beg to submit the following report:

At the first this subject would not seem to be of any great importance, but after carefully inspecting a large number of freight cars I firmly believe that the matter is worthy of consideration, and would recommend that this association, after handling the subject thoroughly, adopt and recommend some uniform method of doing this class of work. This work does not always come under the jurisdiction of the master car builder or master painter, and is more frequently done at a freight yard, which is not always conveniently located to the shop yards, and for that reason is not under the eye of the master car builder.

The general practice seems to be to use paint of any color for blocking out the old numbers, and care is not always exercised in doing this work to make a neat appearing job of it, and for example I have before you a sketch showing the condition of one car which I inspected which is perhaps a bad case, but was the actual condition of the car.

You will see from this that there is no economy in methods now employed, and at the same time it spoils the general appearance of the cars, and I recommend that a panel for the capacity and weight as shown on the cut which I present herewith to be used as a standard practice. You will note that I have provided a blank space for stencilling the car after it has been reweighed. With a small brush the old figures can be blotted out, which provides a space for restencilling the car after the next weighing.

I believe that there is no better time at which to consider this subject than at the present, as the Master Car Builders' Association have adopted in the rules which go into effect next September, a rule which permits reweighing cars, and that such necessary work is chargeable to the car owners.

I believe that one of the principal objects for painting cars aside from preserving of the materials is that they may present a creditable appearance, and with this in view I offer you these suggestions in hopes that the discussion of the report will cause to be adopted some set of rules or practice along these lines." The illustrations shown herewith are from photographs taken of the cars referred to in the above paper.

Pres. Sharp: I might say that the sketch on our right looks like a pretty hard case, but I saw a photograph of the car that that sketch was made from, and it is not exaggerated. Of course this is new paint and perhaps shows up worse, but is a fair comparison with the actual car. This is a matter that has annoyed us quite considerable in the last year or two, and taking the matter up with the superintendents of motive power of the different roads I find that this re-stencilling of light weight on cars is not always under the jurisdiction of the mechanical men. Mr. Mullaley has suggested using a panel for stencilling the capacity and then the light weight, and putting on a second panel. When the car is reweighed all that is required at the scale is a set of figures for the new light weight, and then block out the old weight on the upper panel. That furnishes a blank space to re-stencil the car a second time. It appears to me a very complete way of doing the work. It will present at all times a better looking car and it will be more economical from the fact that you will only have to have a stencil of figures in order to change the light weight.

Mr. Morris (C., M. & St. P.): This seems to me rather an aggravated case, as you say, but if the master car builders have allowed in the new rules a charge for re-weighing and re-stencilling cars I think the owners would be perfectly justified in refusing to pay the bill for marring up a car in that way, especially if the painting of the car is made a point of to have it in good shape. Some of the cars are gotten up very elaborately, and as appearance goes a great ways, I think the owners would be justified in not paying the bill for a car that was marred up in that manner. I also think that Mr. Mullaley's idea of providing a blank panel is a very good one. It gives the party re-stencilling the car an opportunity to do a good job—doing it much better and quicker than by painting over the old weights and re-stencilling the new weights on. You all know that when trying to re-stencil a car, putting the new weights somewhere near where the old ones were, it is quite a job to make it look nice. The figures get blurred and there is not much time to do it in.

Mr. March (C. N. Y. & B. R. E. F. Co.): I think that Mr. Morris has covered the ground pretty fully. I think there should be some standard used—an extra panel provided—and I think that is a very good suggestion to always have a new panel for the new weight

Mr. Grieb (C., M. & St. P.): I think that Mr. Mullaley has presented a very nice solution of what is apparently a difficult problem which the members have to cope with, but I notice that the sketch provides a place for the weight only. We, for instance, in stencilling the new weight on cars, provide a place for the shop mark as well as the date at which the stencilling is done. We think this is of value in locating any errors that may creep in in re-weighing. We find it advisable to follow this matter up very closely from a traffic standpoint of view and would not like to see it done away with on that account. It occurs to me it might be well to elaborate on that sufficiently to provide a similar place for the stencilling of the date and the place. It may be that the private car lines or others are not sufficiently interested in the matter to make that an object to them, but if this scheme would be adopted by the association and become general I thought it well to direct attention to it to provoke discussion and criticism from other members.

Mr. Cather (I. C.): The remarks that Mr. Grieb just made are very pertinent, and I believe the practice is followed by all railroads to indicate the shop and date where the weight is changed. Even in the sample we have before us the location of the shop is shown, although the date does not appear. Possibly the car got away before he had time to change his colors to put on the new date.

Pres. Sharp: It may be that some of the members present know at what shops this work will be done. If so, I think it would be a good plan to state under whose jurisdiction it comes, also whether they charge for doing the work.

Mr. Kroff (P. F. W. & C.): We light weigh a good many cars. The weigh master brings the weights over to our shop and we send the painter out in the yard to re-stencil the cars. We handle them in the same manner that Mr. Grieb describes. We have a shop number designated for each shop on our line. We put this number on first, then weight, date and the year, but we do not make any jobs like that shown. We simply paint over the old weight with red paint, or whatever the color of the car is. I think the suggestion of having a blank space of a standard color is a very good one, as everybody could be supplied with that color and make a much neater job.

Mr. Cather: As I understand it, the matter was brought before the association for their recommendation, or to suggest some plan, such as has been offered here tonight. We cannot, of course, enforce anything, but if the matter is presented in the way of a recommendation from the association, with suitable sketches, I believe it will carry a good deal of weight without any regular rule, as it would be impossible to make a rule making it binding on any road to follow, but it would only be a matter of time when the prescribed manner would be uniform on all roads, to which there could be no objection.

Pres. Sharp: I think such action would be perfectly proper, in view of the fact that the master car builders at their last session, have formed a rule to go into effect Sept. 1st, providing for the re-weighing of cars and the stencilling of the light weight, and bills to be rendered against the car owner. I think a recommendation from this association proper. Perhaps it would be better to be referred back to a committee to elaborate on these sketches as it has been shown here tonight that some important points have been left out, and make a recommendation which could go to the different railroads and would no doubt meet with their approval.

Mr. Morris: I was about to make that recommendation, that this be referred to a committee, with your master painter as chairman, to elaborate and carry out the idea covering the points that have been brought out, and report at the next meeting.

Proper Method of Stencilling the Capacity and Light Weight Upon Cars.

Mr. Opie (C., M. & St. P.): It seems to me that a very important thing to be decided or recommended by this association is that we have a standard stencil for all freight cars, of that pattern or design, or something like it.

Mr. Morris' recommendation was adopted and Pres. Sharp appointed the following committee, to report at the next meeting: J. C. Grieb, V. C. Kroff, Ralph Earle, C. C. Cather, W. H. Evans, T. J. Mullaley, J Buker

Pres. Sharp: We will now take up question No. 3 on our program. A case is dispute.

Mr. Morris: I would like to ask if this question has been submitted by both parties interested. We have had a number of discussions here on subjects that have been presented by only one party to the dispute, and the other party would bring up some points that were not touched upon in the subject and the consequence was the discussion was all wrong. If this subject has not been presented by both parties, I would move that we do not consider it, or any other question, unless they are submitted by both parties.

Mr. Grieb: If Mr. Morris' remarks are to be considered in the shape of a motion I would like to second it. As a member of the committee on subjects I would like to state further that I do not know anything about this particular question being presented or passed upon by our committee. It seems to me the committee on subjects ought not accept any question involving a dispute of facts, unless a joint statement from both parties is furnished.

Pres. Sharp: There was a rule adopted by a majority of the members some time ago that we would not consider a subject not presented by both parties. I am informed by the secretary that he got this from the committee on subjects, but as there seems to be some question I think possibly it would be well to lay it over.

Pres. Sharp: We will now take up subject No. 4. Repairs are made consisting of the application of one draft sill and two draft timbers at one end of car. Labor charge of 39 hours is made. Objection is made, claiming that labor charge should be 37½ hours. Which is correct?

Mr. Stewart (A. C. L.): I think the rules allow six hours for one draft timber, nine hours for two, or an average of 4½ hours for each timber when two are replaced at the same end. We then have 32 hours for one center sill, one hour for its draft timber and 4½ hours for the other draft timber, or a total of 37½ hours.

Mr. Marsh: I think the rules provide 32 hours for a center sill and one hour for its draft timber. In putting up two draft timbers at the same end of the car you can charge six hours for the first one and three hours for the second one. Now I think a proper charge in this case would be 32 hours for the center sill, one hour for its draft timber and three hours for the second draft timbers applied to the same end, or a total of 36 hours.

Mr. Cather: If I remember right this question before us was presented to the committee on subjects a long while ago. It was brought up by me but was not a case in which we were involved, as the amount is too small—1½ hours—that ordinarily no objection would be made to such charge, yet there is a right and wrong charge in connection with this matter and some roads will object to such charges, particularly if there are other objections in the same bill which contain a charge such as this, and there can be two ways of looking at it. I am of the opinion that 37½ hours is the proper charge under the rules now in force. The rules provide 9 hours for two draft timbers at the same end. According to my idea the reason for nine hours for these two is that with two applied at the same time the draft rigging has to come down for one timber the same as for two. It involves no extra work on the draft rigging for the second timber. It is like other combination jobs, can be done in less time than one job alone. I think that 4½ hours is allowed for one timber, 32 hours for the center sill and one hour for its draft timber, a total of 37½ hours.

Mr. Marsh: In this case I would like to know why the rules say here "1 replaced, when its center sill has been replaced, 1 hour." And I would like to ask why they make a difference in labor charges for the draft timbers when only one is applied or when two are applied at the same end.

Mr. Cather: Nine hours for two, six hours for one when the timbers are applied at the same end, and when a draft timber is applied in connection with its center sill one hour is considered sufficient in excess of the regular provision for the sill itself. That is the only difference I can see in them.

Mr. Marsh: That is just the difference I want to bring before the association. This particular question starts out with the application of a new center sill. Now if we were charging for a pair of draft timbers applied at one end of a car we would charge six hours for the first and three hours for the second, so that we would have nine hours for the two timbers, yet the rules do not say that 4½ hours would be a fair equality for a pair of draft timbers put up at one end of a car. You must get to the foundation of the job in order to build up the price. That is what we have done in this case here, where the application of the center sill is the foundation of the work done, therefore its draft timber, under the rules, is only entitled to one hour and the second draft timber which is applied at the same time to the same end of the car is three hours, in the opinion of the committee who framed these rules. I do not see how you can figure more than 36 hours.

Improper Method of Stencilling the Capacity and Light Weight Upon Cars.

Mr. Cather: Which one of these timbers took six hours, the one on the sill not replaced took six hours and the other the one hour, or vice versa? It is merely a matter of opinion as to which one consumed six hours. The rules do not state that when nine hours is charged for two timbers that it is 4½ for each. It looks to me as if there should be some correct figures based on the rules.

Mr. Marsh: If six hours is allowed for one timber at one end of the car, in applying one timber it is necessary to take down the coupler and do the same general work that is necessary to apply two timbers. The second timber in this case only takes three hours simply because three hours has been put on the car in order to do the general work which must be done to apply a pair of timbers. That is the reason, in my opinion, that the committee formulating these prices, arranged it that way. Six hours for one timber to complete the job. In that job they have allowed three hours for taking down the coupler, taking the draw lugs off, etc., and putting it up, making six hours for the first timber. The center sill and the first timber was the foundation of the job and the second timber is put up, often, as a matter of convenience because it was easier to renew it at that time than to have the car come in again in a short time to have the timber renewed, and I believe that is why the committee arranged the prices in that way.

Mr. Evans (B. & O.): The discussion has been as to what is equity in the case, but it appears we have a law for this, from the fact that we are entitled to bill for 39 hours, and I do not see how you can get around that; 32 hours for the draft sill, one hour for the draft timber on that sill and six hours for the other timber. That is what the rules say. The argument of Mr. Marsh is counteracted in the rules because we are allowed but one hour for the draft timber on the new sill.

Mr. Marsh: I would like to say that this gentlemna got the draft timbers twisted. He is right about 32 hours for the center sill and one hour for the draft timber applied to that sill. Then he goes back to the two draft timbers applied at the same end of the car, the first draft timber six hours, and for two draft timbers nine hours, because we have disposed of the labor for the coupler, etc., with the first timber. Now then, when you come to consider the second draft timber put up at the same end of car you have got to consider it on the three-hour basis, because there is no extra work for the coupler parts.

Mr. Evans: If we carry the argument any further we cannot make any charge. We can charge nine hours for two new draft timbers on one end of the car, according to the rules and according to the argument of Mr. Marsh. The rules have provided one hour for renewing one draft timber, in connection with its draft sill, and six hours for the other draft timber.

Mr. Morris: I move that a charge of 36 hours would be correct in this case. Carried by a rising vote, 16 to 7.

Pres. Sharp: We now come to question No. 5; what is the practice relative to adjusting brakes of foreign freight cars passing through Chicago. Should any charge be made therefor, and what should be considered a proper charge?

Mr. Jones (B. & O.): We do not adjust many brakes on foreign cars. If we have the cars on the repair track and find the brakes need adjusting, we do it, but make no charge for it.

Mr. Kroff: I do not quite understand what is meant by adjusting brakes. Does it mean taking up the slack? The man who tests the trains before they go out, if any are found that needs it, he takes up the slack. I do not think there should be any charge made for this work.

Mr. Grieb: I dislike very much to say anything on this subject because I really do not know anything about it At the last master car builders' convention a good deal of stress was laid upon the maintenance of the air brake apparatus in a thoroughly efficient condition. It seems to me it would be well to encourage the practice of adjusting the brakes so as to get the maximum efficiency at all times. You can never tell when it will be needed. From my own experience there is only one road that makes a charge for work of this kind. They make a charge of 10 cents per car. We do not encourage that practice, although it might be fair to allow a small charge so as to have some return for the work done in order to make it an inducement to do the work, as the owner derives some benefit. It may be argued equally well that it will even up in the long run if we did a certain amount of adjusting other people's cars and made no charge, as in the case of oiling and packing cars.

Mr. Schultz (C., B. & Q.): On our line when foreign cars are placed in the train, the air brake man examines the brakes and adjusts those that require it. No charge should be made, as the operating road gets the benefit of it. Take the case of cars that are heavily loaded with the brakes hung from the body, it is necessary to again adjust the brake, when that car is unloaded in order to get the benefit of it.

Pres. Sharp: That is true of cars with brakes hung from the body. I remember some Streets Western Stable cars as loaded very heavily with coal. The brakes had been adjusted when the cars were loaded, and when they were empty the wheels would slide. It would hardly be fair to charge the owners of the car for such work.

Mr. Opie: I think myself it is a very important question, from this fact, that we shall soon have to adjust brakes, and it seems to me the matter should be brought before the association to get some limit of its adjustment. I do not think any one would agree that we should adjust the brakes on a car when it is loaded and readjust them when empty. We certainly have to overcome that in some way and it seems to me the duty of this association to consider that matter.

Pres. Sharp: It might be well to defer action on this for some little time for special reasons. At the M. C. B. convention, when the report was presented on air brakes, Mr. Rhodes made this suggestion: That when we went home we take up these reports and discuss them, and by September, when the rules go into effect, everybody will be familiar with them. I took it upon myself to take this matter up with Mr. Crandall on my return, and he advises me that most of the reports at the convention will be published in the Railway Master Mechanic, and the matter will be taken in hand by the Committee on Subjects, who will present it in due time. This air brake report is one the committee will surely consider very valuable to bring up in some future meeting, and unless there are some objections this will be laid over until the future. Upon motion this action was taken.

Pres. Sharp: We will now take up question No. 6: what credit is proper for an axle removed from a 50,-000-lb. capacity car, account of journal being worn below the limits specified by the M. C. B. Rules?

Mr. Morris: If a 50,000-lb. capacity axle is worn down so that it is suitable for a 40,000-lb. capacity car, it ought to be credited as a 40,000-lb. capacity second-hand axle. I do not think there is any road who would fail to use that axle under a 40,000-lb. capacity car if they needed it, and as a matter of equity and justice I believe the owner of the car ought to be given credit for just what it is. It would not be right to scrap that axle and then use it again and perhaps charge another road for a second-hand axle after having placed it under one of the cars belonging to a foreign road. If it were an axle that could not be used again, if they had no 40,000-lb. capacity cars, I think it right to scrap it, but as nearly every road in the country has 40,000-lb. capacity cars, I think they should give credit for them as second-hand because there is no doubt but that they will use them.

Mr. Jones: As there are no 40,000-lb. capacity cars built nowadays, we will get a surplus of old axles of that kind. We are tearing down 40,000-lb. capacity trucks and we will soon be getting a large supply of axles for this capacity of car in stock.

Mr. Opie: I do not know that I can very well agree with Mr. Morris on the credit for 50,000-lb. axle. It seems to me we should treat that question as an individual car and a distinct axle belonging to that car. I cannot see that we should take under consideration as to what use the question of that axle should be put into after condemned from service under the car. We had to go to the expense of putting in a new axle in order to retain that car in service at its capacity.

Mr. Stewart: I agree with the last gentleman that spoke. When a railroad applies a 40,000-lb. capacity axle to a foreign car of 50,000-lb. capacity, the owners of the car have no redress whatever. If they are compelled to give credit at second-hand value they would have to take the car back and apply 50,000-lb. capacity axle and the only thing they could do, even if they received a defect card, would be to charge labor. They would be trading a 50,000-lb. for a 40,000-lb. capacity axle which would be of no value except as scrap if they owned no cars of 40,000-lb. capacity.

Mr. Cather: The owner is not the only consideration in this subject. I think the manner in which Mr. Morris showed up this question is absolutely the only just one. If the party removing the axle from the car has no cars in his service that he can use that axle under, it is to him as scrap and credit should be given accordingly. If, however, we should remove an axle from a 50-000-lb. capacity car, and we have 40,000-lb. capacity cars under which we can use that axle I certainly consider it proper to give credit accordingly, or for a second-hand axle, because the credit value for a 50,000 and a 40,000-lb. capacity axle is the same. A new axle suitable for a 40,000-lb.

capacity car cannot be suitable for a 50,000-lb. capacity car. At all events the minimum dimensions are not the same, but to a company using 40,000-lb. capacity cars in their service, if they should be called upon to remove an axle from a 50,000-lb. capacity car, proper credit would be for a second-hand axle.

Mr. Grieb: I am not able to agree with Mr. Cather or Mr. Morris in the position they take and I would like to ask what they would do in case the same principle was involved under different circumstances. Suppose you get a car with standard M. C. B. oil box not suitable to the car to which it is applied, account of interfering with the strength of the car, I would like to ask if they would have any hesitation in giving credit for the old box as scrap and utilizing and charging for it out as new material when the opportunity presented itself? I would like to say further that we had the question as it is presented here, up some time ago with an eastern line who asked us for credit as second hand. This claim was not allowed and we did not hear anything more of it so I presume they finally agreed with our views. I prepared some notes at the time on this question which I would like to read.

"The principles underlying the code of rules are to regard each car individually, and I think, as a general proposition, it must be acknowledged that material which is removed as unsuitable for a particular car should not be considered second-hand when credit is allowed, even if there are circumstances by which this material can be made serviceable and used in other cars. This practice obtains in all kinds of material, and is not dependent upon the question of its intrinsic value.

The question is not specifically covered by any rule or Arbitration Decision, although Section 9 of Rule 5 directs that axles removed below the journal limit of 80,000 lbs. and 40,000 lbs. capacity shall be credited as scrap.

It is not evident why the 60 M and 50 M axles are not included, or whether this rule applies to M. C. B. axles only, although I would infer that it does not. I do not find that there was ever a standard M. C. B. axle designed for 50 M capacity cars.

In figuring the cost of service of axles per quarter-inch of journal wear, using the M. C. B. prices as value new and value scrap, and the limitations for diameter, we find that the cost for

60,000 lbs. axle is........................$4.57
50,000 lbs. axle is........................ 3.75

However, if the 50 M axle is credited as second-hand, when journals reach the limit of 3½ inches, it will make the cost $2.75.

It is not apparent why a special exception should be made among the axles for those of 50,000 lbs. capacity, nor of all the material used in car repairs, why an axle should be the only item excepted from the rule now in vogue, namely; that material unsuitable for the car from which removed shall be credited as scrap.

The axle in question has run the full gamut of its existence, and the owner has received his full return for the value of the axle in the service for which it was designed. On what basis can he consistently demand credit for more than scrap? There is no reciprocity in giving credit for more than scrap.

If this was not the intention of the framers of the rule, I cannot understand why the other axles were omitted, as I do not think that any one is in a position to use, in its existing condition, an axle of 60,000 lbs. capacity whose journal was originally 4¼ inches by 8 inches, after it is reduced to 3¾ inches."

Mr. Stewart: I would like to state a case to the association. Suppose one received a 50,000-lb. capacity car from some road, to which they had applied an axle with journals less than 3½ inches in diameter, and car bore their defect card for one 40,000-lb. capacity axle in place of one 50,000-lb. capacity axle, and we make proper repairs by applying a second-hand 50,000-lb. capacity axle. Would we merely charge labor for making the change? I think it proper in a case of this kind to charge for a second-hand axle and give credit for scrap.

Mr. Cather: If we removed an axle from a 50,000-lb. capacity car and it was suitable for a 40,000-lb. capacity car we would give credit for second-hand axle and charge labor only. The rules specify a minimum limit for journal center and wheel seat for 50,000-lb. capacity axle the same as for regular M. C. B. standards. We have removed axles from 60,000-lb. capacity cars which were worn below the limits for this class of car and given credit as scrap because they could not be used under another car by reason of the journal dimensions, etc.

Pres. Sharp: I might say from my own experience that we used to have quite a considerable correspondence with our neighbors on this subject. As you know, until recently all of our axles were 50,000-lb. capacity, but having recently acquired a few cars of 40,000-lb. capacity we have nothing to say. We always took the position, that when one of our cars came home with axles of less than 50,000 lbs. capacity that that axle was only scrap. A very large railroad replied to us that they were not building cars of 40,000-lb. capacity—on the contrary, were dismantling cars of that capacity, consequently had a very large stock of 40,000-lb. capacity axles (we having asked them to accept the axle we had removed and give us a defect card for one axle. It seems to me they should be considered as wrong repairs and to the individual car from which removed consequent delay and the switching charges, etc., in getting that car to the repair track to make standard repairs is sufficient for the owner to stand and the party repairing with the wrong material I think should be the one to suffer and credit should be for scrap only.

Mr. Grieb: I would make a motion that in the case of an axle removed from 50,000-lb. capacity car on account of journal being below the limit specified by the M. C. B. rules, it is the sense of this association that credit as scrap is proper.

Mr. Cather: In the case of applying a wrong axle to a car that an M. C. B. standard will not apply, take a 30,000 lb. M. C. B. axle to a car of 30,000-lb. capacity but to which an M. C. B. axle is improper. Now then there is a case of wrong repairs, there is a case of your particular car. The owner removes that axle. It is good. It is not affected in any way at all. Shall it be credited as scrap? The Arbitration Committee has decided that it is second-hand. It is good and can be used again. It is no good whatever to that particular car. Take the N. C. & St. L. cars that have 4¼x7½-inch journals. It is possible to apply 4¼x8-inch journals. The owning road is justified in removing them but they should be credited as second-hand..

Mr. Grieb: I judge Mr. Cather bases his argument for credit for more than scrap on the assumption that a 50,000-lb. axle is an M. C. B. axle. Has he anything to show that an M. C. B. standard 50,000-lb. axle was ever designed? The Arbitration Decision that he quotes simply applies to M. C. B. standard axles for 60,000-lb. cars. There never was an M. C. B. axle of 50,000-lb. capacity and therefore his argument does not apply.

Mr. Cather: It seems to me immaterial whether it is an M. C. B. standard axle or not. A 50,000-lb. capacity axle is provided for by the M. C. B. Association and limits as to wear furnished, and it is a fact that the 50,000-lb. capacity axle is suitable for an M. C. B. 40,000-lb. capacity car and are used under such.

Mr. Morris: The M. C. B. Rules recognize a 50,000-lb. capacity axle by giving a price for it and it seems to me when it comes to a recognized dimension for 40,000-lb. capacity cars we ought to regard it as second-hand if we have cars we can use it under. If we have no cars of 40,000-lb. capacity then we certainly should consider it as scrap.

Mr. Kroff: I had a case where an 8-inch journal on a 50,000-lb. axle was under a car where a 7-inch journal was standard and we had to allow second-hand credit for the 60,000-lb. axle and I think it is proper under the present rules. While I admit that 40,000-lb. axles are really scrap and should be scrapped, but under the present rules I do not see but we will have to give credit as second-hand for 40,000-lb. axles providing it fully covers the M. C. B. limits. What makes an M. C. B. standard axle? It is the center of that axle which denotes the length of that axle or any other axle. Now then an M. C. B. axle that has a 6 feet 3 inch center may be a 40,000 or 50,000-lbs. capacity, would be an M. C. B. axle. Now there may be journals 4x7. What harm is there in the journal being a little larger? An axle may have 4x7-inch journals and be 6 feet 11¼ inches over all and I would consider that an M. C. B. axle. If the journals were 3¾x7 and measured 6 feet 11¼ inches over all I would consider that an M. C. B. axle. It seems that most men are looking for little technical points. I think the right way to look at it is the centers of the axle which on a 7-inch M. C. B. axle is 6 feet 3 inches center, therefore I claim if an axle with 4x7-inch journal, with a 6 foot 3-inch center or an over-all length of 6 feet 11¼ inches is an M. C. B. axle making the journal a ¼ inch larger does not condemn it as an M. C. B. axle although the M. C. B. drawing does not show an axle with 4x7-inch journals.

Mr. Marsh: I see what Mr. Kroff is getting at. A 6 foot 3-inch axle can be an M. C. B. standard for 40,000 and 60,000-lb. capacity cars. The 60,000-lb. axle has a 4¼x8-inch journal and the 40,000-lb. axle a 3¾x7-inch journal, but what makes an M. C. B. axle is the sizes laid down by the M. C. B. Association. Common practice has adopted a 4x7-inch journal as a proper journal for a 50,000-lb. capacity car but the M. C. B. Association has never gone on record as saying that that size shall be accepted and maintained; 80,000 and 100,000-lb. axles of course are longer from the center of the axle to the center of the journal but that does not make an M. C. B. standard. The M. C. B. Association says this shall be standard. It is common practice that says that 4x7-inch journal is proper for a 50,000-lb. capacity car and not the M. C. B. Association rules.

Motion carried by a rising vote, 14 to 5.

Pres. Sharp: Question 7 is, When dead engines are transported in freight trains, should not damage to couplers and knuckles resulting in fair usage be charged to the owners of such engines?

Mr. Morris: I would say that the owners of the engines should pay for any damage that occurs in transportation. The implication is, if they are not responsible, the M. C. B. code of rules should govern. The rules say that they are "to govern the condition of and repairs to freight cars." They say nothing about engines and therefore I do not see that the rules could have anything to do with them at all.

Mr. Sharp: I do not see how a rule could be made to cover this question as it is given here. It is a matter to be settled with the road transporting the engine or the party making shipment or the party to whom delivered.

Mr. Grieb: I think as Mr. Morris says, it depends on whether the engine in transit is "freight" or what it is. I believe these engines are regarded as freight and billed out as freight. There is nothing in the rules authorizing charges against any one for damage to freight. I do not think any charge for damage to freight is proper under the rules as they are for the operation and maintenance of freight cars.

Mr. Evans: I do not exactly agree with Mr. Grieb and think dead engines hauled in freight trains are not freight. On several engines we have handled we found broken couplers and we had no trouble in collecting from the owners, citing the M. C. B. rules. I do not know the object of bringing this question up for discussion but I think if we pass this motion as it has been stated it will probably discourage some of the members from making bill. If the coupler is broken in ordinary service I think we are justified in billing the owners. Of course the M. C. B. Rules do not provide for them, but by citing the rules I think it would be accepted.

Mr. Baker (C. C. C. Co.) I do not know why couplers and knuckles on engines will not break as well in fair usage as on freight cars. I think the rules should govern, although engines are not mentioned. There may be a flaw in the knuckle or coupler and I do not see why charge would not be right.

Mr. Sharp: I do not know the object of the party who submitted this, but would infer that they were seeking information as to what was proper or common practice. However, I think Mr. Grieb's motion is in order, that the rules do not cover cases of this kind. It is a matter of freight and the cases cited by Mr. Evans it seems to me, should be left with the railroad company transporting the engine and the owner.

Mr. Evans: There is another question that enters into this that I had not thought of, that the coupler and knuckle is necessary under the Interstate Commerce law, and while the M. C. B. Rules do not affect them, at the same time I think they are good argument for bill against the owner of the engine if the coupler or knuckle is broken. I fully agree with Mr. Grieb's motion that the rules do not cover the case. Motion carried.

Pres. Sharp: We now come to question No. 8. In the case of tank line cars having hand rail posts at the corners, is it necessary to apply grab handles to these posts.

Mr. Cardwell: This is not a question of very much importance, but it seems several years ago the committee appointed by the Master Car Builders' Association on recommended practices, recommend that grab irons be applied to these corner posts. The corner posts of tank cars are only 3 inches in diameter and from a reasonable standpoint it makes a better handhold for the man handling the car than the grab iron would, and there are only two roads in the United States that I know anything about that require this, and they set back cars to delivering lines and will not accept them until grab irons are applied to these posts, and I would like an expression from the members as to whether they think it necessary.

Mr. Morris: So far as I know there has never been any objection to tank cars not equipped with grab irons on the posts. I do not think they are necessary. We have never rejected them and I never heard of any one rejecting them.

Mr. Marsh: I do not know anything about the recommendation of this committee which Mr. Cardwell speaks of, but if the Master Car Builders' Association appointed a committee and they have returned that report and it has been accepted by the association as correct, possibly people operating and owning tank cars will have to abide by it, but I do not believe one switchman in a thousand would attempt to take hold of the grab iron but will take hold of the post every time.

Mr. Jones: In the first place the corner post is too far away to grab anyhow and I think the grab iron would be more in the way than anything else.

Mr. Marsh: I would move that it is the sense of this association that grab irons on the corner posts of tank line cars are not necessary. Carried.

Meeting adjourned.

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Vol. XXV. CHICAGO, SEPTEMBER, 1901. No. 9.

A CORRESPONDENT connected with one of the private car lines which is noted for the excellence of its equipment, objects to our allusion to these lines in connection with the subject of brake shoes and the care of air-brake equipment. He is quite right. We should have qualified our statements by saying "some" private lines. We had in mind the inducement which there is for private lines to economize in these particulars; and some cars which have been brought to our attention by railway officers. Some of the railway companies are doubtless more guilty in these matters than many of the private lines. There are some short terminal tracks owned and controlled by large manufacturing interests, the initials of the road appearing on a large number of cars. There have been some notable instances among these of complete neglect of air-brake equipment.

THE strike of the Amalgamated Association still continues but there is every indication of an early settlement, and according to President Shaffer, "peace with honor." The strike has been anything but a success, the men at some of the mills refusing to strike and many of the mills being operated by non-union men. The strike of the car builders of the Delaware, Lackawanna & Western Railroad has been declared off and the men go back without gaining any concession. Without doubt the men who strike are many times in the right and organized labor is an aid to the advancement of the workingman. Often, however, a strike is ordered without just cause or reason, as in the case of the two strikes referred, and in such instances defeat is most certainly deserved. Strikes at the best are evils and work injury to both the employers and the employed. The arbitration of all differences existing between capital and labor is most economical and desirable.

WITH the first of the present month the new prices to be charged under the M. C. B. interchange rules for the cleaning of air brake valves go into effect. The RAILWAY MASTER MECHANIC, in a recent issue, made very plain its attitude in regard to this matter. Its importance we do not believe we have overrated and the interest shown in the subject by the railway press confirms our position. The Railway Review and the Railroad Gazette, in recent issue, give a careful detailed and minute description of the process of cleaning and testing air brake equipment on the Nashville, Chattanooga & St. Louis Railway, in an article written by Mr. Otto Best, general air brake inspector of that road.

Communications.

Chicago, Aug. 7th, 1901.

To the Editor of the Railway Master Mechanic:

I want to call attention to the editorials in the July issue of your paper as printed on page 207. The statement that private car lines purchase and use inferior brake shoes with no regard for frictional qualities is simply an error, as the company which I represent use as a standard the highest price steel back patent brake shoe in the market, while another one of the largest private car lines in the country uses as its standard the M. C. B. common gray iron shoe. I would also call attention to that editorial headed Neglected Air Brake Equipment, under which you state that private car lines as a rule have made no attempt to clean the cylinders and triples. I have taken the pains to investigate this matter and find that the rules governing this work at various shops coincide with general railroad practice, and the brakes on these cars are in good condition. I take the liberty of replying to these statements through the columns of your paper, as they are very misleading to the railroad man who is not familiar with the private line cars, and I have but to refer you to the mechanical men of our trunk lines operating these cars, who are familiar with the conditions of the brakes.

Very respectfully yours,

W. E. SHARP,
Supt. Armour Car Lines.

Chicago, Ill., Aug. 8, 1901.

To the Editor of the Railway Master Mechanic:

In the August Master Mechanic is a communication referring to the Mogul Trailer type of locomotive, as used in the latest heavy, fast passenger service of Lake Shore road as the original of the type. This is incorrect, inasmuch as Mr. F. A. Delano designed and had built similar engines, with wide fireboxes and 64-in. drivers, for the C., B. & Q. system, and which were illustrated April, 1900, in Railway Engineering and Review, and called "Prairie Type." This same engine, made heavier, has since been built by the Baldwin works for the Burlington, indicating approval of the design in service.

Mr. Delano is entitled to credit for the original design of this new type, which may become, with some possible change of firebox, a leading type for the purpose, simple or compound.

Mr. W. H. Marshall's development of this design into, perhaps, the best heavy fast engine of today, is entitled to all the praise your correspondent has bestowed upon it in article referred to, but it is yet, as originally named, "Prairie" type. Geo. W. Cushing.

Railway Test Car No. 17 of the University of Illinois and the Illinois Central Railroad.

By Edward C. Schmidt.

THE railway test car of the University of Illinois and the Illinois Central Railroad has been previously described in the issue of July, 1900, at which time there were also published drawings of the car and its apparatus.

The car was completed on July 1, 1900, and has been in operation since the first of September. It is thought that the accompanying photographs and some account of the performance of the test car during its nine months of service may prove of interest.

It will be recalled that the car is fitted primarily for train resistance tests and that it is equipped also with auxiliary apparatus for locomotive road tests and air-brake tests.

The dynamometer consists essentially of three tandem cylinders, in one or the other of which the pull of the engine is taken against oil, by means of which the pressure is transmitted to the recording apparatus. The pistons of these cylinders are ground to as perfect a fit as possible and are unpacked, as are also the stuffing boxes. This arrangement gives a dynamometer in which losses due to friction are reduced to a minimum.

MR. W. H. TRUESDALE.
President Delaware, Lackawanna and Western Railroad.

Mr. Truesdale entered railway service in 1869, in the auditing department of the Rockford, Rock Island and St. Louis, which is now a part of the Burlington System. From a position as clerk on this road Mr. Truesdale has risen to his present important position as president of one of the leading eastern railroads.

These cylinders are in communication with a recording hydraulic gauge, which traces the record of draw-bar pull.

Some slight changes in the apparatus have been made since the drawings were published, but the accompanying photographs show the car as it is now equipped.

Figure 1 is an exterior view of the car, which is 45 feet long and 9 feet in width.

Figure 2 is an interior view, looking toward the front end. The apparatus for the measurement of train resistance is placed on the table in the center. On it are the recording hydraulic gauge and the paper-driving apparatus, together with the Boyer speed gauge. On the gauge-board to the right of the table are placed the indicating hydraulic gauge (used to standardize the recorder), the clock which controls the electrically operated time pen, and a duplex air gauge.

To the left of the table is a gauge-board on which are placed the two indicating steam gauges and a recording steam gauge, which are used during locomotive tests to measure boiler pressure and steam chest pressure. In the foreground, on the right, are the pump, the oil and air pipes, and the valves, by means of which any one of the three dynamometer cylinders can be filled or emptied. Above the pump is a recording draft-gauge used in locomotive testing, and directly opposite it, on the other wall, is a recording air gauge which makes a record of the pressures in the train line of the air-brake system.

Figure 3 is a photograph taken from the front end of the car, just above the table and looking toward the rear end, in which are located the four berths, the lockers and cupboards, the oil reservoirs and the work bench.

Figures 4 and 5 show, in somewhat greater detail, the apparatus used in train resistance tests. Under the table is the gearing, driven from the car axle, from which motion is taken for the paper driving apparatus and for the speed gauge. Figure 4 shows the paper chart passing around the drum of the recorder. Upon this chart are drawn four lines: The datum line, the line of draw-bar pull, the location or position line (showing mile-posts, stations, indicator card positions, etc.), and the time line. The latter two lines are drawn at the top of the chart. To the rear of the recorder is seen the speed gauge, which is used simply to give a speed record auxiliary to that given by the time line.

Test Car No. 17, University of Illinois and Illinois Central R. R.
Fig. 1.

the positions of the mile-posts, stations and stops and also the points at which indicator cards are taken.

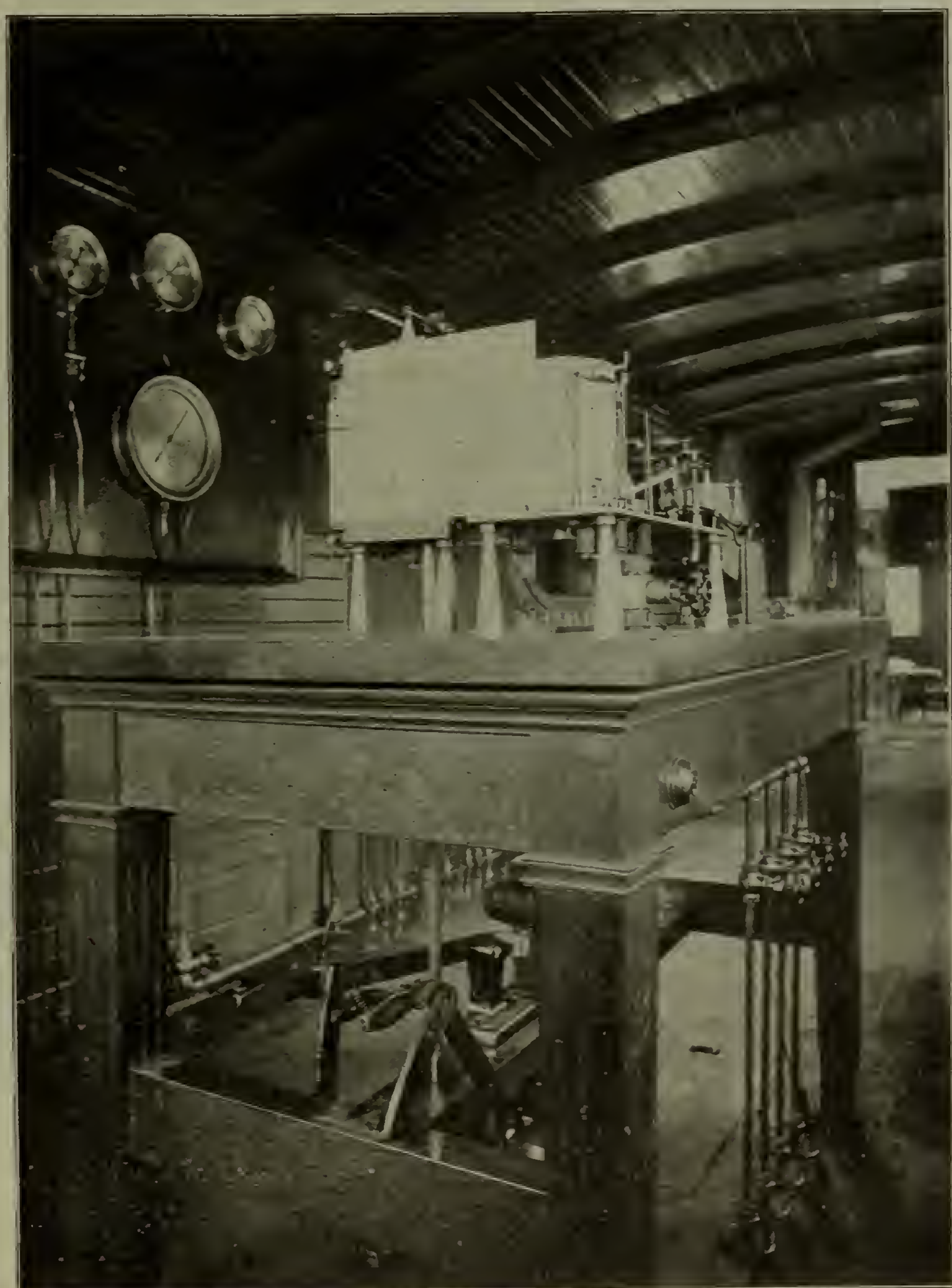
The pen which draws the line at the top of the chart is controlled by the clock, which makes electric contacts every five seconds. All calculations are based upon this time record, the record made by the speed gauge being used merely to give the general character of the speed curve and to aid in interpreting the time record. Below the charts in figures 6 and 7 are shown the profile of the road, which were redrawn and photographed with the dynamometer record.

In Figures 6 and 7 are shown photographs of portions of two dynamometer records. Figure 6 is from a record taken during a pulling test of an Illinois Central Railroad twelve-wheel locomotive, weighing 222,000 pounds, drawing a freight train of 48 cars and of 1839 tons' weight, over a grade of about 0.7 per cent. The area of the dynamometer cylinder used in this test is 60 square inches.

The scale of the original chart is 13.2 inches per mile or ¼-inch to 100 feet, which is the same as the ordinary profile scale. If necessary this paper travel can be increased by changing one pair of gears in the paper-driving apparatus. Each inch in vertical height of the record corresponds to 247.6 pounds per square inch in the dynamometer cylinder. The vibrations of the recording pen can be reduced, by throttling the opening into the recorder, without impairing the accuracy of the record. This pen is ordinarily allowed to vibrate so as to give a curve such as the one shown in Figure 6, the area under which can be very conveniently found by a planimeter.

The pen which draws the line just above the drawbar pull curve is operated electrically by push-buttons located in the observatory and in the small projecting windows at the front end of the car. By it are recorded

Figure 7 is a part of the record taken behind Engine 501 of the eoria & Eastern Railway (C., C., C. & St. L.



Test Car No. 17, Fig. 4.—Apparatus for Measuring Train Resistance.

Test Car No. 17, Fig. 3.—Interior View, Rear End.

lessee). The train weight in this case is 776 tons in 20 cars. This record was taken during a test for the calibration of Dynamometer Car 609, also owned by the University of Illinois and the Peoria & Eastern Railway. This dynamometer car is similar in essential arrangements to the railway test car, except that its single dynamometer cylinder has a cup leather piston packing and also a leather stuffing-box packing.

In this test both cars were coupled together and operated in the same train for the purpose of determining the frictional resistance in these leather packings of the dynamometer car.

In addition to various train resistance tests made with the test car, it has been in operation during October and November, in a series of tests made on the Illinois Central Railroad between Centralia, Ill., and Cairo, Ill., for the determination of the relation between indicated horse power and draw-bar horse power of four types of freight locomotives in use on that district. It is at present engaged in a series of exhaust nozzle tests between Champaign and Chicago, on the Illinois Central Railroad.

The operation of the unpacked dynamometer cylinder, about whose success much doubt was expressed, has proven entirely satisfactory. The leakage of oil from the cylinders, even under sustained pressures of 700 and 800 pounds per square inch, has been so slight that no inconvenience has been experienced in keeping the cylinder full of oil. This leakage ensures perfect lubrication and in no way prevents the full pressure in the dynamometer cylinder from being transmitted to the recorder, since the piston must instantly follow into the space vacated by the oil. Under continuous pressures of from 200 to 300 pounds per square inch in the cylinder, they will operate without refilling for two hours and a half, during which time the piston will move forward, on account of the escape of oil, only 1½ inches.

By its certainty of action and its convenience of operation the system of oil transmission of the draw-bar pull has again indicated its adoption in the railway test car as it did previously in Dynamometer Car 609.

Test Car No. 17, Fig. 2.—Interior View, Front End.

Increasing the Revenue Train Load.

By F. F. Gaines

Read before the May meeting of the New York Railroad Club.

THE recent designs of and improvements in rolling stock have resulted in the attainment of such a position that any future improvements for the increasing of revenue load are to be sought for in close attention to details, rather than radical changes in designs. It is not the object of this paper to propose new devices, but to review some of the causes of train resistance; by thus directing our attention, the importance of their sum will be more apparent and a thorough discussion may result in bringing out ways of ameliorating them. At least it may cause us to be on the lookout for remedies, where possibly some of the items have been so small as to escape attention or seem unworthy of further effort.

One of the greatest of the economies that have been recently introduced is the concentration of train load on a short total wheel base by the use of large capacity cars. While this is generally known and understood, it is not so universal that an analysis of the causes, and results attained, will not be of interest. A train of cars being hauled through a curve is somewhat analagous to checking the pull on a rope by taking a turn around a post and pulling on the free end. The resistance necessary to be overcome in hauling the rear of the train is similar to the pull on the free end of the rope, the curve (together with this pull) furnishes the restraining force in the form of flange friction. It is also probable that the rolling friction between rail and wheel is not altogether in proportion to the weight on the wheel, so that for two trains of equal weight on a straight and level track that which has the fewer number of wheels will offer the less resistance. From data secured in various tests on a number of roads I find that a train of average empty cars (each car averaging about 15 tons light weight) requires 30 per cent more power for the same tonnage, or the same engine can only handle 70 per cent of the weight of an average loaded train composed of 60,000-pound capacity cars. This would probably hold true on account of the foregoing reasons if a train were composed of loaded cars weighing (with contents) about 15 tons, it being a question of length of total wheel base of train, independent of the ratio of loading to total weight, but directly proportional to the gross weight of cars.

The accompanying tables give the data of a series of tests. The trains were hauled by the same engine and over the same divisions. From the actual test data (Table I) you will note that trains Nos. 1, 2 and 3 used about the same amount of coal per trip, while trains Nos. 4 and 5 varied somewhat. If we call the coal per trip used with trains Nos. 1, 2 and 3, 100 per cent, and deduct from trains 4 and 5 the percentage of train weight indicated by extra coal consumption, all trains may then be considered as having the same resistance, and the total weights and revenue loads are then comparable; the revised figures are shown in Table II. This is also shown graphically by the heavy line on the chart. The horizontal ordinates are the average gross weights of the cars in each train, and the vertical ordinates the percentage the gross weights of each train are of the gross weight of the train composed of 60,000 pounds capacity

TEST CAR NO. 17, FIG. 5.—APPARATUS FOR MEASURING TRAIN RESISTANCE.

cars. The latter train has been considered the average or normal in all comparisons. As the base of most tonnage rating systems is the loaded car of 60,000 pounds capacity, the chart indicates the percentage of addition to or reduction from the standard rating when cars are that in the train of 80,000 pounds capacity cars is 111.95 per cent; and that in the train of 100,000 pounds capacity cars is 133.7 per cent. Is not the gain of revenue load from this source sufficient to warrant the retirement of light capacity cars, say 20 tons and under?

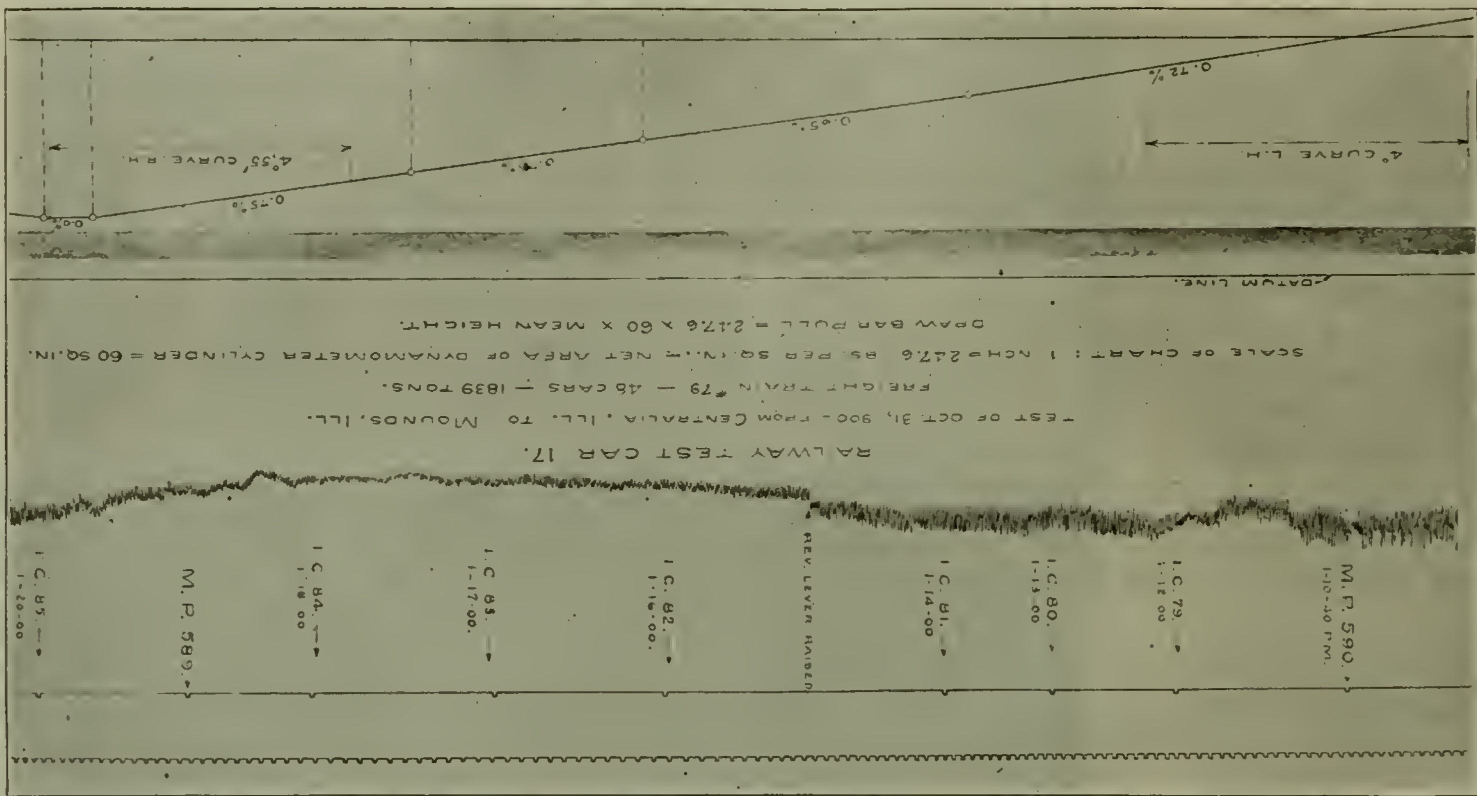


FIG. 6.—DYNAMOMETER RECORD, TEST CAR NO. 17.

empty, partly loaded or of varying capacities. In the same manner the broken line shows the percentage the revenue load in the various trains is of the revenue load in the 60,000 pounds capacity car train. Due to the decreased total wheel base and the decreased ratio of light weight to total weight, the revenue load in the large The tests and chart only apply to cars for handling heavy raw material in bulk, such as ore, coal and pig iron, and modifications due to heavy grades have been neglected. When we come to the box car where the loading may be anything from straw hats to pig lead, the proper size and capacity of car is still an unsettled ques-

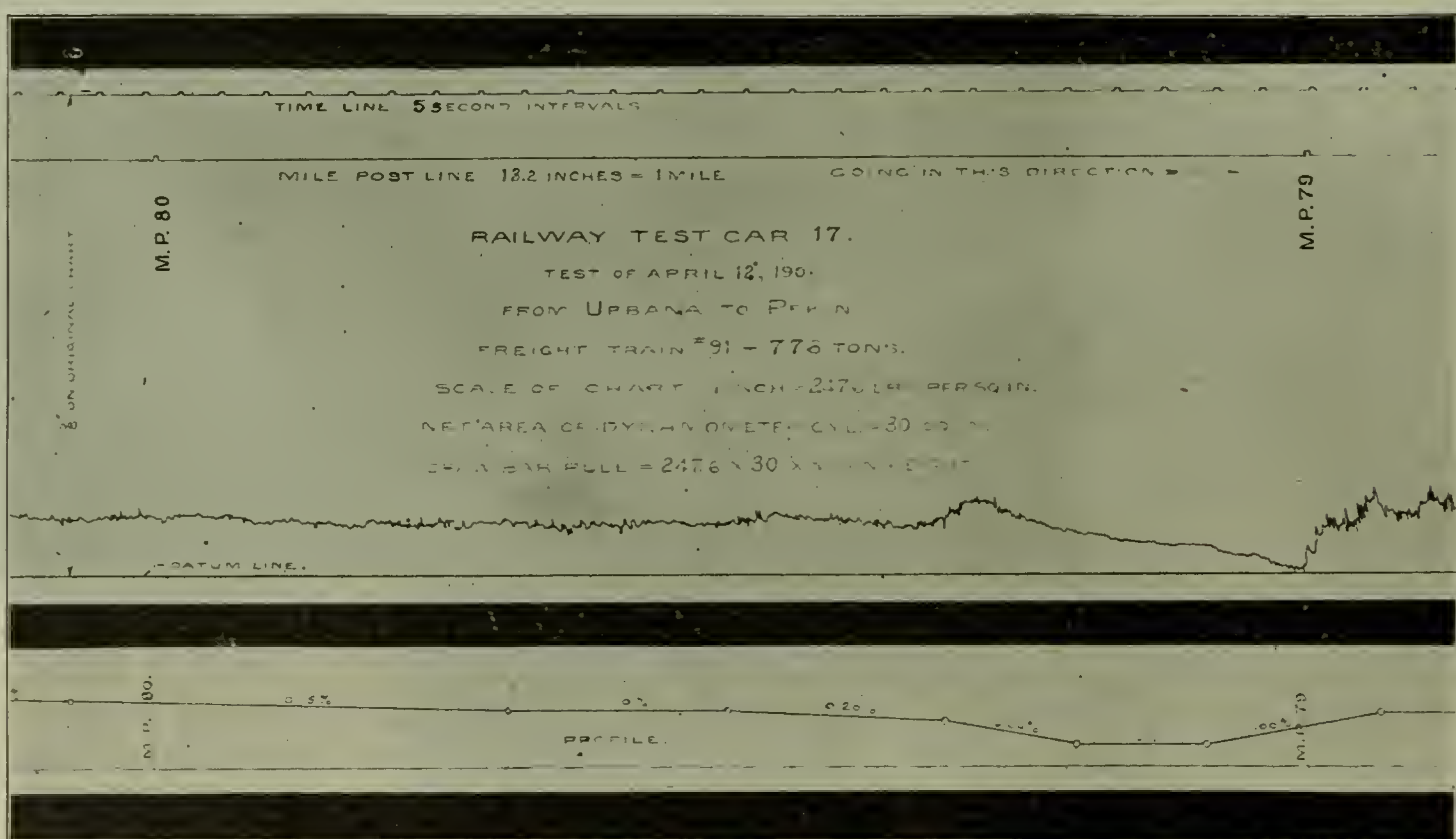


FIG. 7.—DYNAMOMETER RECORD, TEST CAR NO. 17.

capacity cars increases very rapidly. Considering the revenue load in the normal train as 100 per cent, that in the train of 40,000 pounds capacity car is 90.76 per cent; in the train of 50,000 pounds capacity cars is 92.82 per cent; tion. Except in isolated cases where there is a special line of business which affords a normal full load and where circumstances permit of keeping heavy capacity cars for this trade in their home territory, can the revenue load be increased by exceeding a box car of 80,000 pounds or even 60,000 pounds capacity for general use? Before leaving this part of the subject it is to be noted that there is an additional economy in the use of large capacity cars normally loaded, due to minimum track room occupied in sidings and yards and the smaller number of units to be handled in making up and dispersing trains.

Taking up some of the lesser items that have an influence on attaining the desired result, truck design is undoubtedly an important factor. The old archbar truck has much the same bringing up as "Topsy"—just grew. With flexible members that were rarely if ever strong enough and roughly put together, it was more accident than good design if the axes of the axles were parallel. When the axes were out of line we had as a result increase of wheel and journal friction and decrease of revenue load. The pressed or structural steel trucks, with solid side frame, absolutely rigid as regards the parallelism of the axles and squareness of frame, was a decided step in advance. Contemporaneous with the growing use of the solid side truck, rational methods of design were applied to the archbar type and the members made strong and rigid enough to prevent distortion; the members themselves, in some designs, were changed from merchant bars to structural and pressed steel sections. As a result we now have trucks of the archbar type strong enough to always retain the parallelism of axles and yet flexible enough to readily accommodate themselves to varying conditions of track. Is it not possible to have too much rigidity, and is not the well designed modern archbar truck at least as desirable as the more rigid solid-side type?

TABLE I.—Actual Results.

1	2	3	4	5	6	7	8	9	10	11	12
Test Train Number.	Number of Loaded Cars in Train	Nominal Capacity	Weight of One Car and Contents (Average)	Total Weight of all Cars and Contents (Gross Weight)	Light Weight of all Cars (Tare Weight)	Revenue Load	Coal Burned on Trip	Coal Burned per Trip in Per Cent	Total Train Length Excluding Engine and Caboose.	Gross Weight Per Cent (Gross Weight of Train 3=100)	Revenue Weight Per Cent (Revenue Weight of Train 3=100)
		Tons	Tons	Tons	Tons	Tons	Lbs	Per Cent	Feet	Per Cent	Per Cent
1	36	50	70	2,500	676	1.824	18.264	100	1,209	125	133 70
2	37	40	60	2,207	680	1.527	18.457	100	1,249	110.35	111 95
3	47	30	42 5	2,000	636	1,364	18,242	100	1.540	100	100 00
4	55	25	36 4	2,003	649	1.354	19.511	106 5	1,632	100 15	99 27
5	66	20	30 5	2,012	676	1.336	19.659	107 3	1.958	100 6	97.95

TABLE II.—Virtual Results.

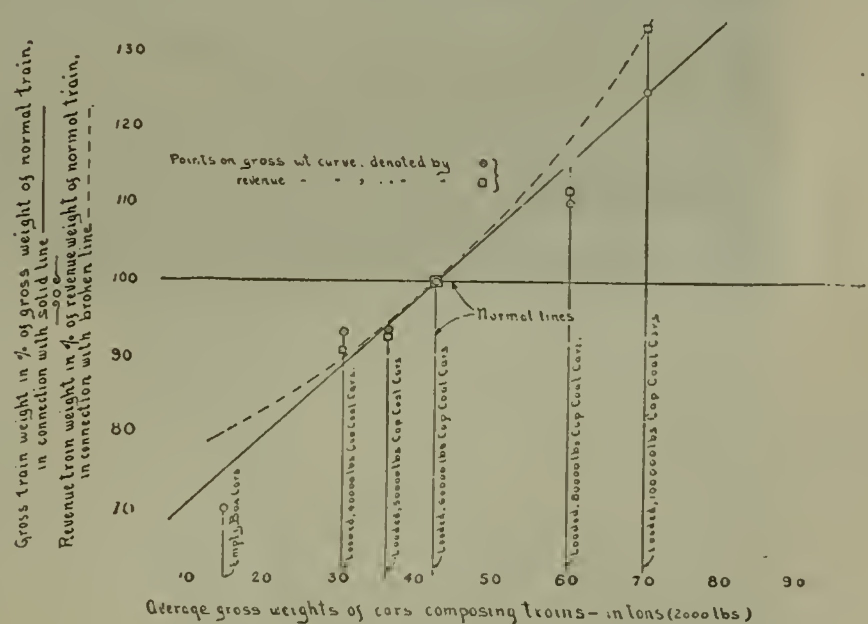
On Basis of Equal Coal Consumption

1	36	50	70	2,500	676	1,824	18,264	100	1,209	125	133 70
2	37	40	60	2,207	680	1,527	18.457	100	1,249	110.35	111 95
3	47	30	42 5	2,000	636	1.364	18 242	100	1.540	100	100
4	52	25	36 4	1,873	607	1,266	18.321	100	1 543	93 65	92 82
5	61	20	30 5	1,865	627	1,238	18,321	100	1.810	93 25	90 76

Lubrication is a matter that too often receives less attention than the best results warrant. So long as friction does not show itself openly in the form of a hot-box, it is assumed that further improvement is either visionary or at the best will not result in economy. As soon as the number of hot-boxes has been reduced an apparent chance for economy by reducing the number of car inspectors, exists. Is it advisable to take advantage of this apparent chance? As an instance that considerable friction may be present without manifesting itself in a hot-box, in hard winter weather when the oil has been congealed by the cold the friction is so great that it is sometimes impossible to start a train that has stood for any length of time. From laboratory tests it is known that a certain amount of friction can be taken care of by radiation without reaching a temperature which causes ignition of the lubricant.

The exclusion of all foreign substances from the journal boxes, such as dirt, dust, sand, water, etc., is very closely allied to lubrication. There are in existence many forms of dust guards which serve their purpose with a greater or less degree of perfection. A piece of wood with a hole in it (which is probably more largely used than any other form on freight equipment) is about at the bottom of the list. Does the M. C. B. pressed steel lid fulfill its function? If so, is its function that of a screen to prevent coarse articles entering? In its most perfect form is it not far from dust proof? There are patented devices which are much better, but like all good things they cost money. By more systematic attention to the lubrication of all cars and the use of dust proof guards and lids could not considerable friction be eliminated? And if one, two or more cars could be added to a train as a result would not the increase in revenue load more than offset the increased cost?

Whether it is advisable to use truck and body bolsters strong enough to carry the load and be center bearing, or to depend on some form of frictionless side bearing, if there be such a thing, is an open question. That there is warrant for one device or the other needs no proof. I have seen cars with weak bolsters and the average side bearings which, when run through a lead on a siding, would refuse to run on a fair grade with a good start. I have the data of two tests made on different roads to determine the amount of resistance, due to this factor, in trial trains over a division. In one test it required



8.5 per cent more power and the engine consumed 2½ tons more coal in hauling the non-center bearing train of equal weight. In the other test, the same engine being used for both trains, the coal consumption was 22.5 per cent less for the center bearing train. As both trains were handled by the same engine and crew, the total weight of train being the same, it requires 22.5 per cent more power to handle the non-center bearing train. For the same amount of power the engine could have hauled 22.5 per cent greater tonnage if the cars had been center bearing, and, as the proportion of net weight was

68.2 per cent of the gross weight, the revenue load would have been increased by 15.4 per cent. Frictionless side bearings may accomplish the same results, but that proposition is yet to be demonstrated. While the stiffer bolsters required for center bearing cars may be more expensive on account of first cost, would not this be more than offset by the necessary attention and care to properly maintain any form of frictionless side bearings? Is the increased load due to the use of free swiveling trucks sufficiently large to pay for putting in new body and truck bolsters or frictionless side bearings on cars that are not so equipped?

Interior of Parlor Car on the New Pan-American Train of the Big Four Railway.

Another item, which, while small, is not insignificant, is the center plate friction. Our car capacities have increased from 40,000 pounds to 100,0000 pounds. Has the bearing area been increased in proportion? The value of systematic lubrication of center plates is beginning to receive attention. Experiment shows that it is warranted. Mr. Squiers, in a paper before the April meeting of the Western Railroad Club, proved its value by the results of a series of tests. His conclusion are that the lubrication of center plates, if only when applied, greatly reduces flange friction and consequently increases the revenue load. The form of the center plate itself is an important factor in the maintenance of lubrication. If the bearing surface is on a level with the king pin hole, with no provision for the retention of the lubricant, only a heavy grease that will not run is of any value; while a form that allows of the bearing surface being lower than the pin opening will form a reservoir for the oil and only requires an additional supply at long intervals. It would also seem reasonable that there is a choice of the material to be used. Is malleable iron, cast iron or pressed steel the best adapted for good contact and reduction of friction? And, in view of the fact that the unlubricated center plate causes considerable rail friction, is the cost of providing permanent lubrication justifiable?

The proper adjustment of brake beams frequently receives less attention than it deserves. The scrap heap will reveal the fact that a great many shoes are removed on account of one end being worn down completely, with little or no wear on the other end. This can be almost wholly attributed to the manner in which the brake beams are hung—allowing one end of the shoe to drag on the wheel. Stand by the track as a train passes and you will hear the shoes rubbing on the wheels with surprising frequency—especially if the cars in the train are someone else's cars and not our own. Considering the small cost necessary to eliminate this source of friction, is it not worth attention? The The mismating of wheels also causes friction. This requires only a minimum expense to remedy and is largely a thing of the past.

In conclusion, is it not safe to say "that by taking heed to ourselves" we can increase our revenue train load in several ways? And how far is the first cost of refinements that contribute to this end justifiable?

The Pan-American Stamps

One of the most striking illustrations of the intimate relations existing between American railroads and all other commercial interests, is set forth in the "Pan-American Series" of postage stamps issued by the Postmaster-General May 1, 1901. This series also demonstrates the commanding position of the New York Central and the fact that it is in touch with and an integral part of the commerce of the world. The Pan-American series of postage stamps consists of six beautiful steel engravings printed in two colors, producing the effect of a framed picture. Each of these stamps represents what is styled an "aid to commerce," and curiously enough, and without any design on the part of those who planned the series, each subject is associated with the New York Central. The stamps are as follows:

The one-cent stamp represents "Fast Lake Navigation." Steamers of this character on each of the great lakes of America run in connection with the trains of the New York Central lines. The two-cent stamp is a picture of the New York Central's "Empire State Express," from a potograph by A. P. Yates of Syracuse, taken when the train was running sixty-four miles an hour—a very appropriate "aid to commerce." The four-cent stamp represents an automobile of the same style as those used in the New York Central Cab Service at Grand Central Station, New York. The five-cent stamp gives a beautiful picture of the steel arch bridge over the Niagara River at Niagara Falls. On one side of the Niagara River from Buffalo to Lake Ontario are the tracks of the New York Central, on the other side, those of the Michigan Central; the latter, which is a New York Central line, crosses the Niagara River on the new cantilever bridge just below the arch bridge shown in the stamp and in plain view of the falls. The eight-cent stamp shows the locks at Sault Ste. Marie. It is through these locks that the New York Central steamers pass on their trips between Buffalo and Duluth. The ten-cent stamp gives an illustration of a modern ocean steamship. It is with steamships of this charater on both the Atlantic and Pacific oceans that the New York Central lines run in connection, and over which the New York Central tickets passengers to every country on the globe.

New Pan-American Train on the Big Four

THE Cleveland, Cincinnati, Chicago & St. Louis Ry. Co. have had ten new passenger trains built at the Barney & Smith Car Co., at Dayton, Ohio, which were designed especially for the traffic connected with the Pan-American Exposition. These trains have recently been put into this service and through the courtesy of the railway officials and builders we are enabled to present the accompanying interior views of two of the very handsomely appointed cars which compose the train. Each train is composed of combination baggage and smoking cars, day passenger coaches and parlor cars—being essentially a day train. All cars are 78 ft. in length, are a little wider than ordinary coaches, have wide vestibules and are equipped with one more than the usual step.

The combination cars utilize 28 ft. of their length for baggage and the smoking compartment seats 50 people. The day coaches, one of which we illustrate herewith, are upholstered in heavy plushes of different colors and seat 87 people. These cars have separate toilet rooms for ladies and gentlemen, the toilet rooms being appointed with wash basins, etc. A glance at the illustration will show the clean, open, light effect in which the interior arrangement and decoration of these cars are

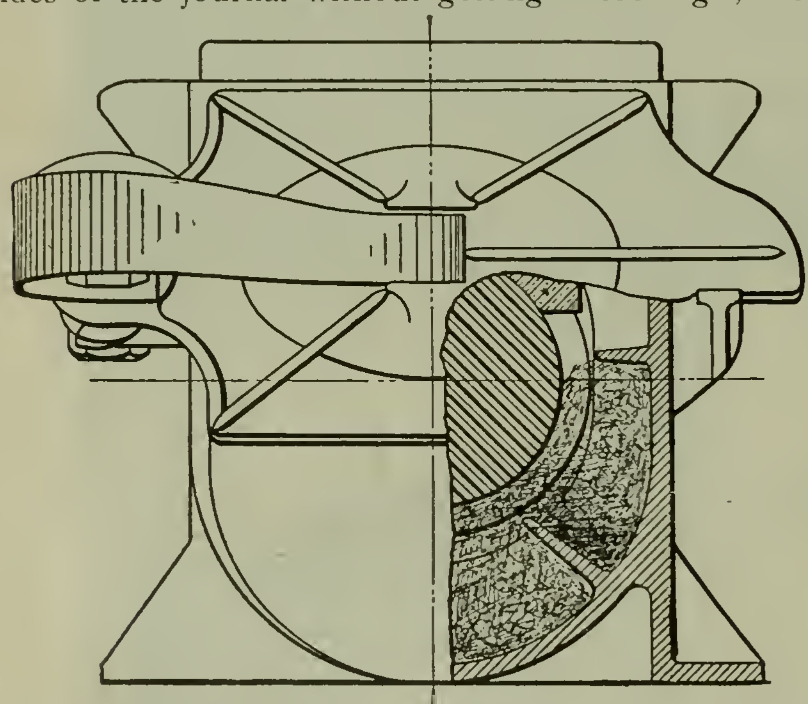
INTERIOR OF DAY COACH ON THE NEW PAN-AMERICAN TRAIN OF THE BIG FOUR RAILWAY.

made up. The racks have been made an ornament instead of a mere convenience, while the upper and lower decks have their head linings conform to curves which considerably enhance the open appearance of the car. while the deck sash break into headlining in such a manner as to relieve any monotony in the general effect.

The parlor cars, one of which we also illustrate, have two state rooms, a seating capacity for 37 people, a buffet and all modern conveniences and appointments. These cars have been made very beautiful inside. through the richness of the upholstering, carpeting and smooth-finished inlaid designs in the headlinings. The glazing of the deck sash and end paneling has been set in grills, so that the overhead effect is ornate and yet clean cut. A special endeavor has been made, which will be noted in the illustrations, to avoid fret work. carving, ledges, crevices, drapery or upholstering which may afford lodging places for dust and germs. This is in line with progressive ideas on railway sanitation and the result is really more pleasing to the artistic sense than the heavy gorgeousness of the very recent past. The trains are lighted throughout by Pintsch gas, heated by steam from the locomotives and all ventilators are protected by dust-proof screens.

The Symington Journal Box

A GREAT deal of trouble is experienced on some lines on account of the waste getting caught between the brass and the journal. In the Symington journal-box there have been added two ribs just above the center line of the journal, as shown in the cut attached. It is quite difficult to get the every-day inspector to pack boxes properly and get enough waste on the sides of the journal without getting it too high; these



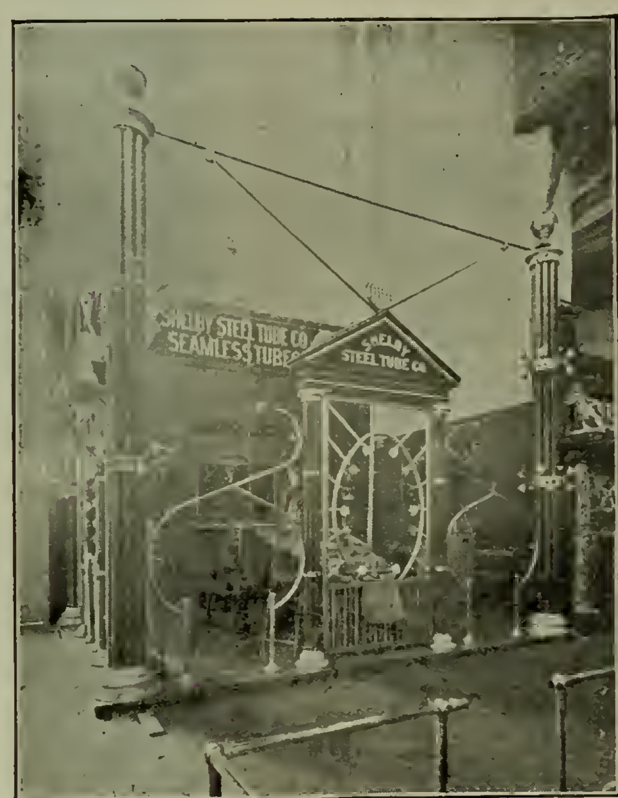
upper ribs in combination with the ribs for supporting the packing and oil on the sides enable the inspector to put the waste exactly where it is wanted and absolutely prevent his getting the waste too high on the sides. After the box is packed these ribs also prevent the waste on the sides of the journal from rolling up with the journal and getting caught beneath the brass, producing what is usually known as a waste grab.

In the discussion at the Master Car Builders' Convention on the subject of standards, Mr. Rhodes remarked that he thought the round-bottom box was wrong construction, as it was his experience that after a run of 100 to 150 miles the waste had all rolled up on one side in the direction in which the journal was revolving, and that what these boxes then needed was not oil, but attention. He further said that he thought we should have a standard box with the bottom so shaped that it would hold the waste in position.

Mr. Symington says: "I am quite satisfied from my own observation that the waste does not slide on the bottom of the box at all, it is simply the top part of the packing that is in contact with the journal that rolls on the bottom part of the packing, and the shape of the bottom of the box I believe has really nothing to do with it." The ribs, as shown in the cut attached, entirely prevent this movement of the packing in contact with the moving journal, and their use makes it impossible for an inspector to pack a box improperly.

Shelby Steel Tube Company's Pan-American Exhibit

THIS exhibit is situated in the western side of the Machinery and Transportation Building, adjoining entrance. It occupies a space of 18x22 ft., and is entirely constructed of seamless cold drawn steel tubes. The three main columns, as shown in cut, contain each eight 4-inch O. D. x 10 gauge Shelby boiler tubes, 18 ft. long. The side next to entrance is filled in between



columns with the same size tubes, except they show bend at each end. The small columns, forming sides to doors of the exhibit, are made from 2-inch O. D. x 11 gauge locomotive boiler tubes, filled in between with round, square and corrugated tubes of different diameters and formations, the top being made of square and rectangular tubes, surmounted by the celebrated Shelby seamless trolley pole. In the center of the exhibit, facing main aisle, is a stand top 18 inches square, composed entirely of square and round tubing telescoped together, and containing 1,256 pieces of Shelby cold drawn seamless tube. On the inside of booth are shown novelties made entirely of tubing, such as piano lamps, towel racks, invalid tables, easels, hat racks, etc.

There are also shown sections of boilers showing the manner of installing the Shelby tubes, and the general appearance after same has been formed or bent and installed. They show a large line of bicycle and automobile specialties, and mechanical tubing in both cold drawn and hot rolled, besides sample test pieces of all the above, showing the crushing, flattening, expending, bending and pin tests. The whole exhibit showing the latter-day methods of manufacturing and working of steel that is well worth going to see, and which but faintly indicates the great possibilities in the development of cold drawn seamless tubing, and its successful and economical application to all mechanical purposes.

*American Locomotives and Foreign Buyers.**

By Mr. S. R. Callaway, President of the American Locomotive Company, and former president of the New York Central and Lake Shore Railways.

THE value of the recent criticism in England of American-built locomotives is still to be demonstrated. So far, American builders have had an ever-increasing demand from abroad. This demand has within the last two years been limited by the willingness of the American shops to meet it. No general effort has been made within that period to secure foreign orders because the American manufacturers have been unable to keep up with the domestic demand. Foreign orders that have been filled have been practically unsolicited. They are based undoubtedly on the satisfaction that our machines gave in actual use in the past. This, it seems to me, is the best answer to any criticism.

Locomotive building is sharing with all the other industries of the country in the great business boom. Last year there were turned out of the American shops 3,153 engines, the largest number ever built in the history of the country. The production showed an increase of 680 locomotives, or 27.5 per cent over the production of 1899, when the building record was also broken. In that year 2,473 locomotives were turned out. In 1898 the American shops produced 1,875; in 1897, 1,251; in 1896, 1,175.

The export figures taken in connection with this American production, are most significant. Last year there were sent abroad 505 machines. In 1899 we sent 515 abroad; in 1898, 554; in 1897, 386; and in 1896, 309. It will be seen from these figures that up to the time when the great boom in American commerce and manufactures set in there was a steady growth in locomotives built for export. This was due to the fact that the American shops had not nearly so much work from the domestic roads as they could handle, and naturally they were eager to secure business abroad. All the locomotives delivered in 1898 were, of course, ordered in 1897, when the American railroads had not yet begun to feel the full force of the business revival and the consequent need of an increased equipment in rolling stock. The result of these conditions was that of our entire production in 1896, 26 per cent was exported. In 1897, 31 per cent was exported. In 1898, 30 per cent went abroad; in 1899, 21 per cent. Last year the export dropped to 16 per cent of the production. These figures show with reasonable clearness that the American manufacturer, within the last three years, has had very little inducement to go abroad for business. It pushed all his facilities to meet the domestic demand, and I believe it will be found that only enough work was taken on from foreign countries to hold customers and meet duplicate orders. During the present year practically the same state of affairs prevails among manufacturers as existed in 1900. The American railroads are all very prosperous. Their traffic is growing at a substantial rate and orders are flowing in for new locomotives to handle this increase. Therefore, the American demand will certainly be as great as it was in 1900, and probably greater, and the number of locomotives built for export will probably not be any greater in proportion than it was during the year ending last December, and for the same reasons.

With a let-up in the local demand, and the betterment in shop equipment that has come, in locomotive building, with the increased call for machines, we may expect by the end of this year to reach a condition where we will go seriously into the business of supplying American-built machines for foreign roads. When we do, it is reasonably safe to suppose that we shall get a considerable part of the foreign business, for we have in our favor two facts that are denied the foreign builder; one is economy, and the other is rapidity of construction. We can turn out a locomotive here in less than half the time that is required in the best-equipped shops of Europe, and, pound for pound of metal, at a very much lower cost. It is because of these two facts that we have been able to take business away in competition with England, France, Germany, Belgium, and other European manufacturers.

American-made locomotives are run today in England, Canada, France, Spain, Japan, Russia, India, Sweden, Finland, Mexico, Brazil, Costa Rica, Cuba,

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Ecuador, Peru, Guatemala, Egypt and Southern Africa, Newfoundland, Nova Scotia and elsewhere. With the exception of the recent complaint from England, I do not believe that fault has been found anywhere with the locomotives furnished from here, and I doubt very much whether such English criticism as there has been will have any influence in keeping American-built machines out of the foreign markets. The Englishmen have hardly had a fair opportunity to test the opportunities of our output. Forty locomotives only have been sent over there and they have been in use only two years. And they were all built under English specifications. That is to say, though they are American-built locomotives, they are not in the broad sense American locomotives. This is a very pronounced distinction. It holds good with almost all of the locomotives now in use in foreign countries, with the possible exception of those in South and Central America and Mexico. There the American-type locomotive is in use, in contradistinction to the American-built locomotive that has been sent to most of the other countries.

It is unfortunate that, owing to the existing conditions in Europe, the American-type locomotive has not found a place there. The system of railroading in Great Britain, France, and the other countries across the water is entirely different from our system here. There trains are light and facilities for handling freight are, comparatively speaking, small.

They have no such vast yards as we have in this country, and no manager would dream of making up freight trains of the length and weight that are common with us. Therefore the main advantage of the American locomotive, its immense power and its capacity for hard and continuous work, cannot be applied. In consequence, there can be no real competition between our machines and those made abroad. If there were, the foreign locomotive would stand no chance whatever, as our engines show an economy for each ton moved that is unapproached by any other type.

It is this fact that gives us, here, freight rates that are on an average of 40 per cent lower than those that prevail in Europe. It is the same in passenger rates. Both freight and passenger movements are effected in America at a figure that no European railroad has been able even to approximate, notwithstanding the much lower cost of labor abroad. It costs less in America to move a ton of freight from Chicago to New York, a distance of a thousand miles in round numbers, than it costs to move the same quantity three or four hundred miles in England or on the Continent. No other single item has done so much to give America her rising supremacy in the commerce of the world as this economical transportation.

In point of speed there is comparatively little difference between the American locomotive and some of the Europan-built locomotives, though even in this field the advantage has been with us. For a considerable period the fastest long-distance train in the world was the Empire State Express, running from Buffalo to New York, a distance of 440 miles, the running time being 8 hours and 15 minutes, with four full stops and 21 "slacks," made necessary by the fact that the train runs through crowded streets at many points and is checked by numerous level crossings and drawbridges. Recently the Southern Railway of France has put on a train from Paris to Bayonne, a distance of 486¼ miles, with six stops, but practically none of the difficulties in point of "slacks" made necessary by the conditions in New York. This train has an average speed of 54.13 miles an hour as against 53.33 for the American train. But the French train weighs only about one-half what the American train weighs; and in the near future, with certain improvements that are now contemplated, it is altogether likely that even with the handicap of a double weight the American train may regain its supremacy on long-distance running.

On short-distance running the record has for years been held in this country, where the Reading road makes the trip between Philadelphia and Atlantic City on continuous running at the rate of 66.6 miles per hour. The Midi of France, which makes the best showing in Europe on a short-distance run, has only been able to accomplish the run between Morceaux and Bordeaux, a distance of 67¾ miles, at an average speed of 61.6. Here again the weight is all in favor of the foreigner. The heaviest train made up in Europe for fast running would hardly be felt by our fast locomotives.

There have just been completed by the Schenectady Works 22 locomotives for the New York Central which, both in point of speed and power, are so far in advance of anything known in Europe that the foreigner can hardly be said to be in the same class. This is a new type of engine and, in a measure, it is a revolution even with us. One of these engines recently carried 13 heavy passenger coaches, weighing approximately 1,600,000 pounds, at a speed of 63 miles an hour. This locomotive developed 1,452 h. p. during the considerable part of the run. Another one of the engines carried a passenger train of 15 cars, including four heavy sleepers, and weighing approximately 1,800,000 pounds, at the rate of 60 miles an hour. On another run, with a train of ten heavy passenger cars, these engines made 111 miles in 109 minutes, running from St. Thomas to Windsor.

Such trains are, of course, unknown in Europe, and, therefore, the fast runs that they make over there are hardly to be compared with ours. Their high-speed express trains are generally made up of four coaches, which, together, would not weigh as much as two of our coaches. Their runs are straight for the most part, and their road-beds, being generally much older than ours and having had from the start ceaseless care, add materially to the advantage under which they operate.

The figures I have given show the great advantage of the American over the foreign locomotive where speed and power are combined requisites. For power alone the difference is even more pronounced in our favor. Actual experience with the new-type Schenectady locomotives has shown that one of these machines can pull about as many loaded freight cars as can be held together. Apparently, the only limit is the capacity of the couplings to stand the strain. Recently there was moved on the New York Central, by one of these engines, a train of 94 loaded freight cars at an average speed of from 15 to 35 miles an hour. This train was over two-thirds of a mile in length and weighed, exclusive of the engine and tender, between 7,000,000 and 8,000,000 pounds. It was the equivalent of eight or ten European trains in point of weight, and it was probably three or four times as long as the longest train ever hooked together abroad. There was not the slightest trouble in handling this load.

And with all their advantage, both in point of power and speed, the American locomotives are more economical in operation than the best type of the foreign-built machines. Their first cost is less, and they cost less for repairs, fuel and oil. With very much higher-priced men in the cab, they cost very much less for labor in proportion to the amount of work they perform. Their life is probably not so long as that of the foreign-built machine, but this is due to the fact that they are not coddled. It is the policy, and experience has shown it to be a profitable policy, of the American railroad manager to work his locomotives constantly. In Europe it is the general practice to work a locomotive with the same engineer year in and year out. If the engineer is sick, the locomotive is laid up until he gets better. If the locomotive is sick, the engineer is laid up until the locomotive gets better. The practice of letting two or three or four men run the same engine, as with us, is almost unknown there.

The hours of rest for a locomotive used abroad are more numerous than the hours of work, and there are long periods of absolute inactivity for repairs and general overhauling. The result is that the average locomotive abroad, though it is in service a longer number of years, has not to its credit anything like the number of miles when it is finally worn out that the American locomotive has.

There are a few exceptions to this rule, as, for example, the Charles Dickens, an English locomotive that holds the mileage record of the world. But these exceptions are inconspicuous and not numerous. The American railroad manager expects a locomotive to last about twenty years, and during that period he expects to keep it going constantly on the heaviest sort of traffic that it will bear. At the end of the twenty years he feels that the conditions on his road will have been so changed and improved that the engine will be antiquated. The machine then goes either on the scrap heap to be sold for old iron or, in some cases, into private use, or to an unimportant branch. For main-road service twenty years is the limit, but during that period the machine is made to earn its salt very thoroughly.

Owing to the difference in railroad methods, the American-type locomotive as a whole will probably never control the foreign field, but the American-built machine is bound to grow more and more numerous on the railroads of Europe and elsewhere. And, more than this, there will be, undoubtedly, a constant increase of American features, so that as the years pass we shall influence the foreign type more and more. Both here and abroad the engineers are constantly advancing the standard of work. No sooner have we perfected one development which seems to us pretty near the ultimate, when something else comes along that gives us a higher type in point of speed and power.

The latest feature in this line, the thing that has made possible the enormously high speed of the heavy trains, I have already spoken of, was the application of a comparatively simple principle, namely, the enlargement of the grate area.

Heretofore engines burning bituminous coal have had their fire boxes hung between the wheels. This necessarily restricted the burning area. In the new type the fire box extends out over the wheels. The change can best be appreciated by a comparison between the engine known as No. 999, which became famous as the first to haul the Empire State Express and which stood for years as the perfection of its type, and the new type of engine recently put in commission. No. 999 has a grate area of 27 ft. The new engines have an area of 50.3 ft. The heating surface in No. 999 is 1,900 ft.; in the new engine, 3,500 ft. This permits of a much more economical distribution of coal, the depth of the fire being very much less in the new engine, though the heating results are very much greater. Exact figures have not been compiled, but, roughly speaking, it has been shown that the new engine consumes probably a ton of coal less on the run over one division than did the old, and with this reduced consumption comes enormous increase of power. For the first time in the history of railroading firemen are now confronted, on a fast run, not with the problem of keeping up steam, but of keeping it down.

This new fire-box feature will no doubt form an important element in securing for American manufacturers foreign orders when the great domestic demand with which we are now struggling has been met, and we are able to go into the foreign field systematically.

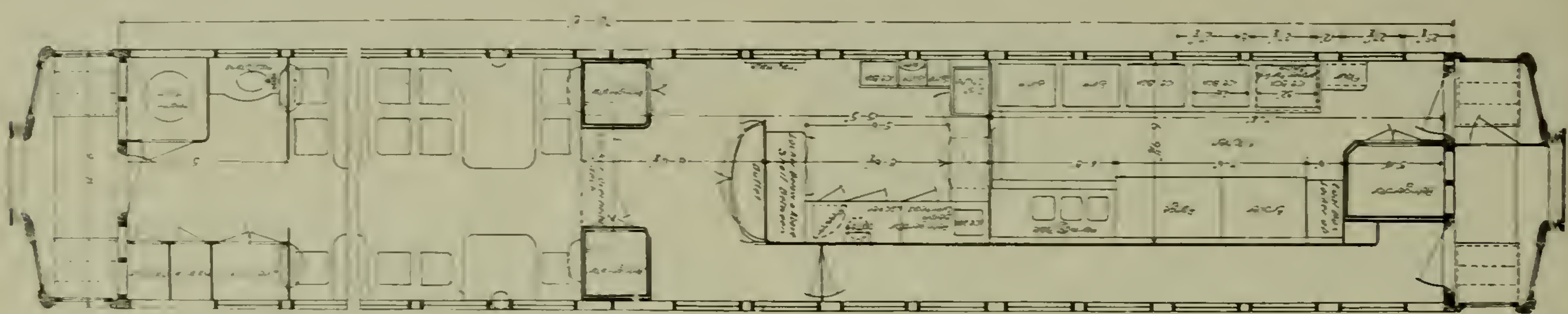
New Passenger Cars on the Wabash Railway

THE Wabash Ry. Co. has 55 passenger cars now under construction, divided as follows: 2 baggage, 8 combination baggage and day coach, 30 day coaches, 10 chair, 3 cafe and 2 dining cars. Four of the combination cars, 10 of the day coaches and all the chair, cafe and dining cars will be 70 ft. in length, while the rest will all be 63-ft. cars. All cars will have wide vestibules, except the baggage cars and baggage ends of the combination cars, which will be equipped with the Martin stationary vestibule. All cars will have the half Empire deck, and the day coaches and chair cars will be

Dining Car.—Wabash Railroad.

finished in quartered oak and selected mahogany, while the others will be finished in selected St. Jago mahogany. The baggage, combination and day coaches will have four wheel trucks and the others will have Wabash Ry. standard six wheel trucks. The cars will be lighted with Pintsch gas, with the exception of the cafe, dining and some of the chair cars, which will be lighted with electricity, in fixtures especially designed for these cars.

As the plans for the cafe and dining cars are the result of careful study and consideration by the management of the road, as well as by the mechanical department, and as we have recieved these plans through the courtesy of the road, we take this opportuninty of presenting the floor plans in the accompanying illustration. We think the cafe car especially will be regarded with interest as its arrangement differs considerably from the usual type of car. The library and smoking room in the observation end of the car has a seating capacity for 14 people. Next, is a private cafe with seating capacity for 8 persons, and then on one side is a large toilet room and on the other is placed a linen locker and the heater. Passing through a swinging door the cafe proper is entered. This has seating capacity for 18 persons and is provided with flower display recesses at the tables and cabinets for cut glass display at the ends of the apartment. The buffet for silver display, fronts the entrance to the passageways to the kitchen and through the car. The arrangement of the china room and of the kitchen is shown in the illustration, and is worthy of particular regard we think, as being the result of considerable study in the endeavor to make it as complete and convenient as possible, within the allowable space limitation. The car is finished in selected St. Jago mahogany, is lighted with electricity, upholstered in leather in the cafe, and with rich plush and Wilton carpet in the observation smoking room.



Floor Plan Cafe.—Wabash Railroad.

The full diner, which we show in the other illustration, has a seating capacity for 28 persons, and is arranged more on the usual plan, though, as with the cafe cars, every effort is being made to have them represent the most modern development in arrangement and completeness of appointment. The arrangement of the kitchen and china room is shown in the illustration, and the end of the china room, which faces the dining

Floor Plan Dining Car.—Wabash Railroad.

Cafe Car.—Wabash Railroad.

room, is provided with a display buffet. Fruit and wine closets on either side cover the passageways from the dining room, and passing these a space of 31 ft. 3 in. has been provided for the dining room. Niches, and at the windows and cabinets at the end, give space for flower and glassware displays. The dining room is left through a hallway, which has linen lockers on one side and a washstand and the heater on the other. The car is lighted with electricity and upholstered in leather, with a general effect in mahogany.

Railway Lighting by Acetylene Gas

DURING the last few years, Acetylene gas made from calcium carbide, a product of the electric furnace, has been applied to railway car lighting more or less successfully. Various systems are now on the market and the claims made by the companies controlling three acetylene gas systems are being thoroughly investigated by some, if not all of the railroads. One of the most interesting articles on this subject which has come to our attention was published in the issue of August 24, 1901, of The Railway and Engineering Review under the title of "Railway Lighting by Acetylene Gas," written by Mr. John S. Seymour, late U. S. Commissioner of Patents. On account of the unusual value of the article we reprint it in full, as follows:

"The ideal illuminant for a railway company is one that may be produced at a central station, admitting of the economies of wholesale production and of single headed management, which may be transported throughout the system by some simple means without loss or danger, and which may be used for all purposes.

There must be luminous intensity, simplicity in maintenance, an absolutely fixed light, exempt from atmospheric influences—wind, heat and cold—facility of being placed according to needs and wishes; no loss when the light is dimmed or when it is turned off, cleanliness, simplicity of maintenance, freedom from the dangers of fire and from explosion and reasonable cost.

To enumerate these qualities is at once to suggest acetylene, a gas of 240 candle power, giving pure white rays most nearly approaching sunlight, and being the most diffusive light known.

The method of storing acetylene in small bulk was discovered by Claude and Hess, French inventors, who ascertained that one volume of acetone under ordinary temperature and pressure dissolves 25 volumes of acetylene, and under 12 atmospheres 300 volumes, and who communicated their discovery to the French Academy of Sciences in 1897, Compt. Rend. 124,626.

Acetone is a mobile liquid related to the alcohols, of which the chemical formula is $(CH_3)_2CO$, and is procured on a large scale from the aqueous liquid obtained in the dry distillation of wood.

Dining Car Kitchen.—Wabash Railroad.

The solution of a gas in liquid is a phenomenon not so familiar as the solution of a solid in a liquid. Salt in water and sugar in water are matters of common knowledge, and yet all gases are soluble to some extent in water and other liquids, but just how, scientists are not agreed. Drinking water charged with carbonic acid gas has been mentioned in this connection, but at pressures of more than three atmospheres there is reason to believe that the analogy is not perfect. When the temperature is constant the weight dissolved of any gas is directly proportionate to the pressure.

The solubility of gases and liquids in water has not been exhaustively examined and the vast majority of determinations are of but little value owing to the neglect of conditions to insure accurate results; but it is certain that the diminution of volume undergone by the more soluble gases is extremely great and equal to that produced by pressures which are far beyond practical application. Thus Thorpe's Dictionary of Applied Chemistry gives it that a saturated solution of ammonia gas in water contains an amount of gas condensed into such a volume as would, if affected by pressure alone, require over 500 atmospheres or about 3½ tons per square inch. Of course the gas would be liquefied before this pressure would be reached.

The application of this principle to the storing and transporting of acetylene gas is at a single step to realize all the advantages of impossible pressures in reducing bulk and by the use of only moderate pressures of from 10 to 15 atmospheres. This part of the invention may be illustrated by a glass seltzer bottle holding, say, a quart and capable of withstanding the usual pressures under which the seltzer is dispensed. Into such a bottle one-third full of acetone, about 40 quarts of acetylene gas may be pumped without raising the pressure above 10 atmospheres or 150 pounds to the square inch, and upon connecting the jar with a gas meter and arranging acetylene burners beyond, the acetylene may be both measured and burned, so as to demonstrate that it is first dissolved in the acetylene and then given off on relieving the pressure. The solvent liquid is slightly heated in the process and increased in volume about a tenth.

Much was anticipated from this invention alone, but upon reflection it was seen that above the surface of the liquid of the acetone there would remain in such a cylinder acetylene under high pressure, and in that part of the apparatus, therefore, the same dangers would be present as would be found in a cylinder containing compressed acetylene alone. The fundamental discovery, therefore, of Claude and Hess required to be supplemented by another which would recognize and take care of this difficulty, and accordingly Edmund Fouche, of Paris, equipped a receptacle containing acetone and acetylene with porous bricks, the bricks having the property of eliminating all danger of explosion, and of localizing an explosion if one be produced intentionally in such a cylinder. The apparatus is extremely simple and altogether consists of a tank of any usual form such as is used on every car lighted with either compressed city gas, or compressed air as in the Frost Carbureter system, or in the Pintsch gas system. These cylinders made with one flanged head must be completely packed with porous bricks of 20 per cent volume, leaving four-fifths of the volume of the cylinder in interspace. Four-sevenths of the volume of the cylinder should be occupied with acetone, the liquid which dissolves the acetylene gas, and saturating the bricks as it does, it takes the form of a film of liquid lining the walls of the cells of the bricks. If, now, the acetylene be pumped into the cylinder, it is taken up by the acetone in the same manner as though the acetylene were pumped into the body of the liquid and allowed to bubble up through it.

Experience shows that when the acetylene is pumped in at a moderate rate and a half hour is taken to charge a cylinder the acetylene dissolves in the acetone as fast as it is pumped in. If there is need of charging the cylinder more rapidly it may be charged to a pressure of 15 atmospheres from which it subsides in a few minutes to 10 atmospheres; or the cylinders may be made removable and charged at a central plant, an empty cylinder being removed from a car and a full one substituted; or, tank cars may be provided with the bricks and acetone into which acetylene is forced under higher pressure, say 20 atmospheres or 300 pounds pressure to the square inch, and the car cylinders may be charged from such tank cars.

The piping may be in the ordinary form or smaller pipes may be used, as is most convenient. The volume of acetylene gas consumed is so small for a given amount of light that flexible metallic tubes may be led along the mouldings of a car or an apartment very much as electric light wiring is managed, and thus the lights may be placed over each seat or table. The heat is about one-eighth of the flat flame of city gas and the vitiation of the atmosphere about one-fifth.

When the pressure is relieved from the tanks containing acetone and acetylene, as described, the acetylene comes forth unaffected by the acetone, of which there is but a trifling loss. There remains, however, in the acetone an original charge of 25 volumes of acetylene at atmospheric pressure and at ordinary temperatures. When the apparatus is charged a second time all of the second and subsequent charges of the acetylene are recovered again on relieving the pressure.

While the great storing capacity of these inventions combined as a whole is at first the striking feature, the principal object sought was the perfect safety of the process and this has been demonstrated completely.

An electric spark has been produced within a cylinder and an explosion caused which the bricks had the effect to localize and confine to a small space immediately about the spark. The apparatus has been raised to the boiling point and retained there, the experiment occupying more than three hours without raising the pressure to more than 42 atmospheres. A small tube leading from the cylinder has been heated to a glow causing the acetylene to dissociate within the tube without producing an explosion which extended to the contents of the cylinder. Acetylene being a true gas $C^2 H^2$ its luminosity is not affected by cold weather.

A tank eleven feet long and 20 inches in diameter will contain approximately 25 cubic feet. One-fifth of this space is taken up by the walls of the bricks which convert the entire space into interspace; four-sevenths of the volume of the tank is taken up with acetone; yet it is found that at 10 atmospheres of pressure and at ordinary temperatures 100 volumes of acetylene may be pumped in. Thus a cylinder containing 25 cubic feet will contain at 10 atmospheres 2500 feet of acetylene gas. This furnishes 5000 light hours, or reckoning 20 lights to the car, the car with this supply would be lighted 250 hours. It is common to reckon four hours a day as the lighting period for a car and on this basis we have 62½ days or more than 2 months of lighting for each car without recharging the tank and the 20 flames of acetylene gas furnish a degree of illumination considerable in excess of that now provided by any system of car lighting.

In adopting this system there is no great displacement of plant,—tanks, piping and even lamps are not greatly different and may be cheaply converted from other systems into this.

The portability of this lighting is further illustrated by computing the capacity of a tank car, those provided for transporting petroleum commonly hold 150 barrels each or about 1500 cubic feet. It is not suggested that there cars as now made are sufficiently braced or have a sufficient thickness to endure the high pressures necessary for transporting acetylene gas, but the same volume could be obtained in four small cylinders aggregating the same capacity made without internal stays, and thus with 1500 feet of capacity 150,000 cubic feet of acetylene could be transported, conveying gas for 300,000 hours of lighting, or sufficient to maintain 20 lights 15,000 hours or at 4 hours a day, sufficient to maintain 20 lights for 3750 days. This would be sufficient to light 120 cars for a month or it would be sufficient to light a freight warehouse and switching station employing 100 lights 9 hours a night for a year without recharging. The system lends itself to portable lighting in all forms, from a single light for a few hours from an apparatus weighing a few pounds to a tank car which may serve as a moving gas plant.

Many railway stations have less than 50 lights and for those the railway is dependent upon the local lighting company, which in small towns provides gas at prices ranging from two to five dollars a thousand. This invention would free railway companies from such exactions and would give remote stations a perfect light.

Signal towers and the adjoining switches, perhaps twenty in number, furnish a special lighting problem. Tanks charged with acetylene dissolved in acetone can be transported throughout a railroad system by freight and the empty tanks exchanged for the full ones with no greater trouble than would be required to send direct the calcium carbide to the separate stations for generating the gas on the spot. All the acetylene that is produced by a hundred pounds of calcium carbide can be transported in a five foot tank.

It is computed that the cost of lighting by this system is less than by any other system.

This invention has a highly respectable origin and it has passed its experimental stage. It has been for more than two years last past in use in Paris on the cars of the Chemin de Fer de Funiculaire de Belleville and it has been pronounced a perfect success. It has, to some extent, been used in construction work by the City of Paris itself. It is used in more than three hundred houses and factories in and around Paris. It has been authorized by the insurance companies of Paris. It has been authorized and permitted by the eminent Engineer Vieille, having charge of explosives and illumination for the City of Paris, and his official permit is issued for its use within the city.

In England it comes under the Explosives Act of 1875, Chapter 17, a statute enacted before acetylene came into commercial importance, but which is sufficiently broad to cover it. Under the provisions of that act, orders of council are issued from time to time and one was issued on the 26th of November, 1897, under Section 104, which declared that acetylene, when liquefied or when subject to a certain degree of compression should be deemed an explosive within the meaning of the act.

But on the 10th day of April of the present year, 1901, the Honorable Charles T. Ritchie, one of his majesty's principal secretaries of state, having examined this invention, certified that it had been shown to his satisfaction that acetylene when compressed into these porous bricks with or without the acetone was not possessed of explosive properties and he thereupon issued his order under the act in question that it should not be deemed to be an explosive within the meaning of that act provided certain conditions were observed, such as that the cylinder should be tested and marked and that an inspector should have access to the cylinders.

In response to the personal request of the editor of the Railway Review this statement has been prepared for publication as the first authoritative word on the subject in this country. It was alluded to in the Engineering Magazine of August, 1897, in an interesting article by Mr. Henry Harrison Suplee on the "Possibilities of Acetylene," at page 794, but this notice was limited to the solution of acetylene in acetone, the Fouche invention of the porous bricks for safety being of much later origin. The solubility of acetylene and acetone is also treated at length and the work of Claude and Hess given favorable mention in Mr. Vivian B. Lewis' handbook on acetylene, but as a whole the invention has never been noticed in current literature in this country so far as we know. Among those familiar, however, with the subject it has not failed to attract attention. In the Acetylene Congress at the Paris exposition a year ago in the midst of numerous inventions in the way of acetylene generators and special devices for burning and using acetylene this marvelously simple device received the attention of scientists almost to the exclusion of every other exhibit.

A commercial company has been formed having its office at 80 Broadway, in the City of New York, of which Commodore E. C. Benedict is president, as a result of exhaustive independent tests made to determine the absolute safety of acetylene stored and transported in this manner, the economy of the process, and the commercial importance and value of the invention."

Jenkins Brothers' Exhibit at the Pan-American

THE exhibit of Jenkins Brothers is situated at the southwest entrance of Machinery Hall. Two 20-inch angle valves stand like sentinels at either side of the space, a dozen feet above the floor. Below and between them, on raised shelving, are displayed several hundred small valves, including globe, angle, check, corner radiator, offset, hose valves, and a set of new extra heavy high-pressure Jenkins Brothers globe valves. On a raised platform in front of the shelving stand large by-pass angle and globe valves, engine valves, piston and air-chamber noiseless back-pressure valves, indicator gate valves, and an Excelsior fullway back-pressure valve. Below and in front of one of the great 20 inch angle valves are piled rolls of the Jenkins '96 sheet packing, pump valves, and boxes of the Jenkins gasket tubing. In front of these sets a show case in which are displayed different creations of rubber for steam, water, etc., and a line of small brass valves, sec-

JENKINS BROTHERS' EXHIBIT AT PAN-AMERICAN EXPOSITION.

tion cut and highly polished. A pyramid of iron body valves occupies the opposite corner of the booth. The entire space is inclosed by a highly finished brass pipe railing and gate, polished brass valves being screwed on each post of railing and on corners of gate.

Pleasing as is the arrangement in general of the Jenkins Brothers' booth, the overshadowing feature of this exhibit to the practical visitor must be the quality and workmanship of the goods themselves. The valve bodies are castings clean from the mold without dipping or coloring and show the true composition of the metal itself. The stock in these valves is precisely the same as that in the regular Jenkins Brothers valve, care being exercised merely to select clean castings and of good color.

A New Tube Expander.

THe Watson-Stillman Co., of New York City, have placed on the market a new tube expander with which they have been experimenting for some time and have just perfected. This expander has gradually developed into a most excellent tool which has many points of improvement over the regular market expanders of the day.

The method of expanding tubes heretofore used has never been wholly satisfactory for several reasons, principal among which is the uneven point between the tube and head, the necessity of continued hammering upon the taper pin and the difficulty in forcing the rolls over lumpy welds. The Atlas expander shown in Fig. 1 and Fig. 2 has been specially designed to meet these and other defects, and the Watson-Stillman Co. are able, after much expense and experiment, to offer a perfect mechanical tool. Instead of revolving the taper pin and feeding it by continued hammering upon the head, they revolve the entire roller case with the ratchet lever. This increases the speed of the expander about three times, and likewise reduces the time necessary to expand the tube to one-third the time consumed with the regular expanders now on the market. Applying the power to the case instead of the taper pin also facilitates rolling imperfect interior tube surfaces, such as lumps or rough welds, etc., and eliminates the jerking motion so prevalent in the older style expanders when a lump is found.

The taper pin is fed with the screw feed nut shown at the top of the case, thus avoiding all hammering upon the pin and prolonging the life of the tool to a great degree. The rollers are made with the proper taper to bring the surface of the roll parallel with the interior surface of the tube. This insures a good joint throughout the thickness of the head, and expands the tube against the

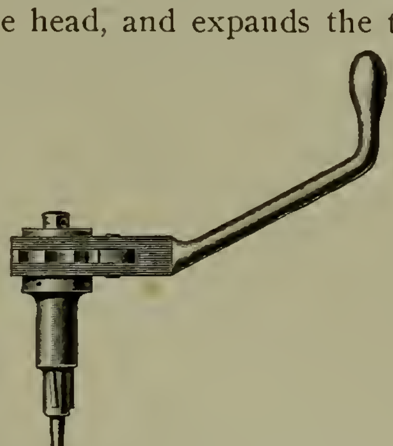


Fig. 3.—Phoenix Tube Expander for Special Conditions.

head equally as tight in the rear as in the front of the head sheet. At the bottom of the feed nut a thin hexagon nut is shown which acts as a depth gauge. This is advantageous where a number of tubes are to be expanded, for with this gauge nut the operator can feed the taper pin to the same depth for each tube, thus obtaining uniformity. In the best of adjustable expanders on the market, the scope is limited with one expander to, for example, $2\frac{3}{4}$ to 3 inch tubes, and even in this it is necessary to use different rolls. Attention is called to the fact that the scope of the Atlas expander is from $2\frac{3}{4}$ to $3\frac{1}{4}$ inches; thus in one Atlas tool is combined the entire range of any two tools in the market. Nor is it necessary to change the rolls or pin. The operation of changing the adjustment to suit various diameters of tubes is very simple and can be executed in less than one minute's time. The upper cap of the feed nut is unscrewed from the body and the interlocking ring which is split is then shifted from one double slot to another. These double suots are very carefully laid out on the taper pin in such a manner that not only do they suit the diameter, but any ordinary variation in gauge of tube is

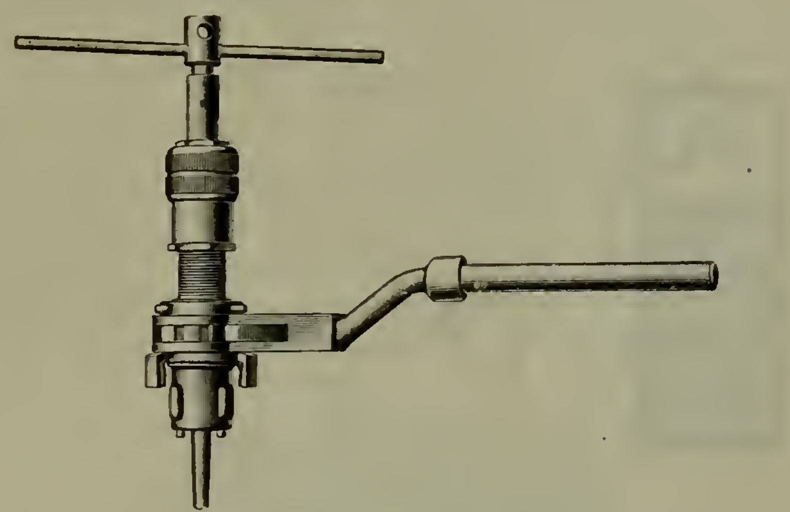


Fig. 1.—Atlas Tube Expander; Ratchet Type.

also compensated. All that is necessary to remove and renew the steel rolls is to loosen the set screw at the bottom of the case, when the roll will readily drop out.

In expanding large size tubes, that is from $3\frac{1}{4}$ inches and upwards, it has been found that a slower speed and reduction in weight is advantageous. Hence the so-called "plain type" shown in Fig. 2. It will be noticed

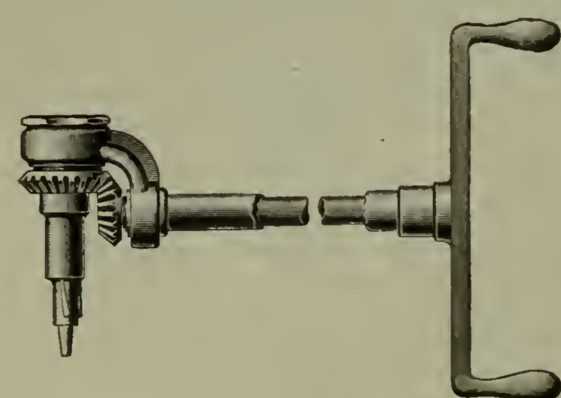


Fig. 4.—Phoenix Tube Expander; Geared Type.

that with the exception of the ratchet lever attached to the case, the plain tool is in all respects the same as the "ratchet type." In these heavier sizes the taper pin is revolved instead of the case, which reduces the speed and correspondingly increases the power, while at the same time lessens the weight. The feed mechanism is exactly the same, but the scope of the tool is much wider.

To suit special conditions and narrow limits of working space, the Phoenix expander shown in Fig. 3 has been designed. In power and speed it is very similar to the Atlas expander, but its feed mechanism, on account of the contracted working space, is changed from a feed nut to a threaded taper pin. Revolving the roller case with the ratchet lever shown in cut, feeds the taper pin through the case with a slow, steady motion. The rollers are made as in the Atlas expander, with the proper taper to maintain a parallel surface on the interior of the tube, insuring a tight joint both in front and rear of the tube sheet. The 1-inch tool can be operated easily in a 27-inch drum, and by making only a partial circumference with the ratchet lever, it can be used even in a still smaller space.

For very small working spaces, where the operator is obliged to work outside the shell, the Phoenix expander shown in Fig. 4 is used. The feed and roller mechanism is the same as in the expander shown in Fig. 3, but the

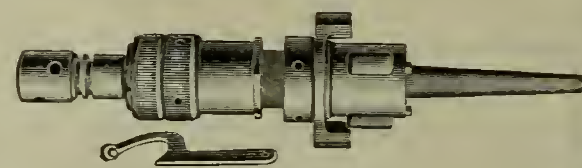


Fig. 2.—Atlas Tube Expander; Plain Type.

roller case in this type is driven by a bevel pinion on the taper pin and a shaft passing through a pipe support. Revolving the case instead of the pin, secures all the advantages of the Atlas expander in relation to speed, and makes this tool four times faster than the regular pin driven tools.

Interesting New Railway Patents.

TIMMS' DUST GUARD.

AN improved dust-guard for journal-boxes has been patented by Mr. James Timms,of Columbus, Ohio. The journal-box is provided in its inner end with the usual pocket for the reception, of the dust-guard, which comprises a lower member, grooved in its lower end to receive a strengthening-web and provided with vertical parallel arms, having tongues on their inner opposite faces, which are disposed in grooves in the opposite sides of the upper member, so that the two members may slide freely on each other, but always maintain the same relation to the axle. The arms are provided in their outer faces with grooves in which coiled springs are located, and said springs are secured at one end to the arms and their upper ends to a bar, which latter is of greater length than the width of the lower member and grooved or recessed to form a tongue, which fits snugly into the upper end of the pocket and entirely closes the same, thus preventing any possibility of the entrance of dust or grit therein. A bow-spring is secured to the under face of the bar, or rather to the tongue, and bears at its free ends against the top of the upper member to press the same downward onto the axle, while the coiled springs pull the lower member up against the axle. It will thus be seen that the members fit snugly all around the axle and prevent any dust or grit passing them and entering the box, and as the bar and tongue thereon completely close the entrance to the pocket there is no possibility of the dust finding its way into the box.

The coiled springs are of greater strength and power than the bow-spring, so as to hold the bar down snugly on the box and resist the tension of the bow-spring which would otherwise have a tendency to raise the bar from the box and permit dust and grit to enter the pocket between the wall thereof and the guard.

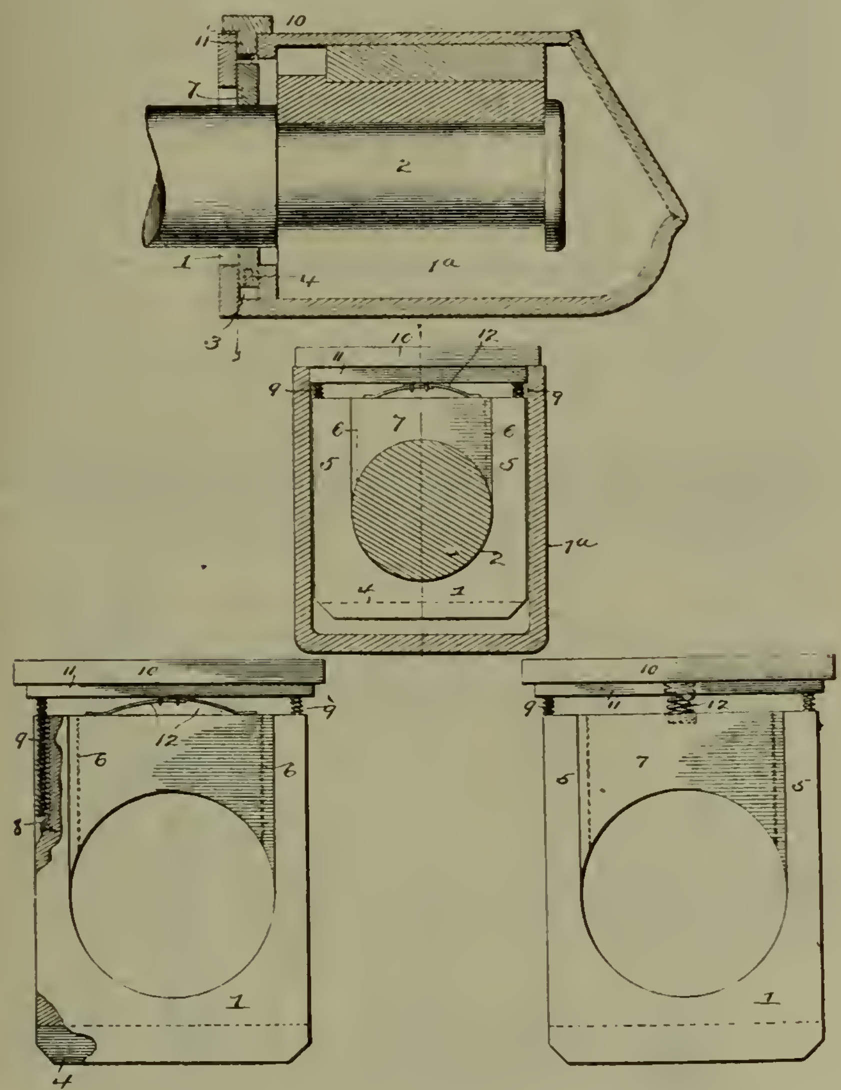
When the guard is in position in the pocket, the upper ends of the arms are disposed practically parallel with the bar and are located some distance from the bar, so as to allow for the wear of the lower member equal to the space between the upper ends of the arms and the bar.

SPEAR BRAKE SHOE.

Mr. Frank R. Spear, of Chicago, has patented a composition for the wearing face of a brake-shoe. The chief ingredient of the composition is the residuum of destructive distillation of coal, for example, in the production of coke and coal-gas—which residuum is a thick viscid substance commonly known as "coal-tar." This coal-tar is employed in the more refined condition, which is brought about by removing therefrom some of its constituents, such as the analin colors, in which more refined condition it is known as "coal-tar" pitch. It has been found that either of these substances, or, in other words, this substance in either condition above described, when mixed with some of a number of well-known ingredients commonly used for this purpose, will give a superior composition for use in brake-shoes. The other ingredients employed are asbestos and iron-borings or iron-filings.

This composition does not disintegrate under any heat produced by the friction of the shoe upon the car-wheel. Coal-tar or coal-tar pitch not only acts as a binder in mixing the composition, but under the action of the heat due to frictoin it apparently is not affected throughout the mass, but only upon the surface, and such surface under the influence of the heat and pressure becomes hard and glossy, but to the touch appears to possess in low degree the quality of lubrication. It does not under heat and pressure become fluid or even plastic, but particles in the form of soot may be removed from the surface after it has been subjected to use. Tests have shown that the mass of the composition does not become heated throughout, and it is to this characteristic that the lasting quality of the material is attributed, since the major portion of the mass apparently is unaffected by service and is only worn as the wear on the face of the shoe progresses.

One result of the wear of the composition due to the friction, which is highly important, is the coating of the wheel-surface with a skin of the material of the composition itself, and as the composition wears down the surface of the mass gives off a fine substance in a form which is most nearly described by the term "soot," being



a fine powder having an adhesive quality, and this fine adhesive powder will coat the metal surface of the shoe and the wheel-rim, and this coating protects the wheel and shoe in their contact with each other, and also protects the wheel in its contact with the rail and minimizes the wear of the wheel to an appreciable extent.

The lubricating quality does not detract from the efficiency of the shoe to produce braking friction upon the wheel, but, on the contrary, it materially adds thereto. The lubricating quality of the composition is also such as to prevent the locking of the shoe to the wheel under excessive pressure, as in making an emergency stop. It is well known that brake-shoes are sometimes forced into contact with the wheel under such pressure as to positively lock the surfaces together, thereby causing the sliding of the wheels, which is destructive to the wheel and to the rail. This composition reduces the danger of the occurrence of this interlocking of the shoe and wheel to a minimum.

RAWLES DRAFT RIGGING.

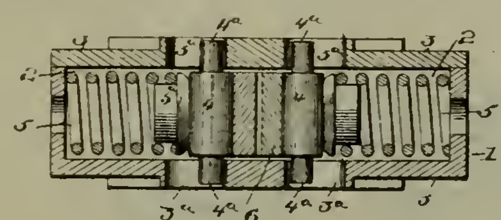
In standard construction of draft riggings the entire movement of the draw-bar to compress the springs occurs lengthwise of the car, which causes a corresponding slack or lost motion in the train, productive of severe shocks and strains until such time as the draw-bars come to a rest or assume the normal position.

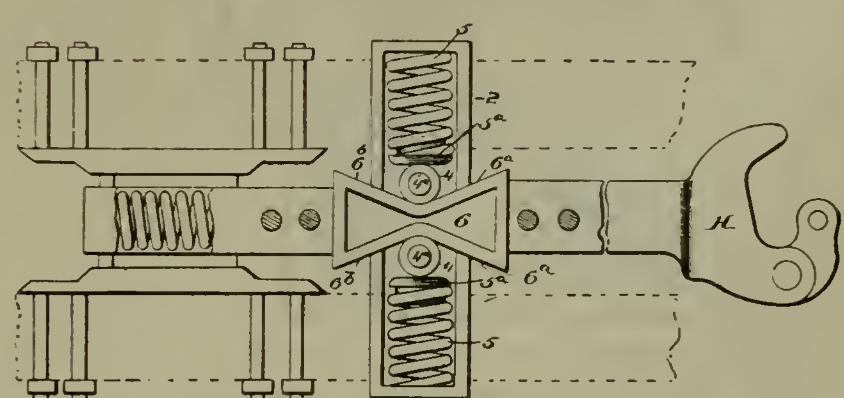
To overcome these objections, Mr. John Rawles, of East Galesburg, Ill., combines with the shank of the draft-bar a series of oppositely-located converging inclines and oppositely-placed yieldingly-supported rollers, which maintain a constant bearing upon and regulated support of the draft-bar, whereby any slack or lost motion of the draw-bar with relation to its supports is obviated and any jumping of the draw-bar prevented.

The casing in which the shank of the draw-bar is housed is formed on its exterior with a series of spring-pockets, corresponding in number with the rollers employed to coact with the shank of the draft-bar, and with suitable covers or a top and a bottom plate, provided with elongated guide-slots in line with the axial center of the spring pockets and at right angles to the travel of the draw-bar for the reception and travel of journals on the ends of rollers, which coact with the shank of the draft-bar. The covers are secured to the housing by suitable bolts, and provision is also made for bolting or otherwise securing the housing to the draft-timbers of car.

The rollers are each provided with journals, which enter and travel in the elongated guide-slots of the covers or top and bottom plates of the housing.

Within the spring-pockets of the casing are springs, interposed between the bottom of said pockets and the



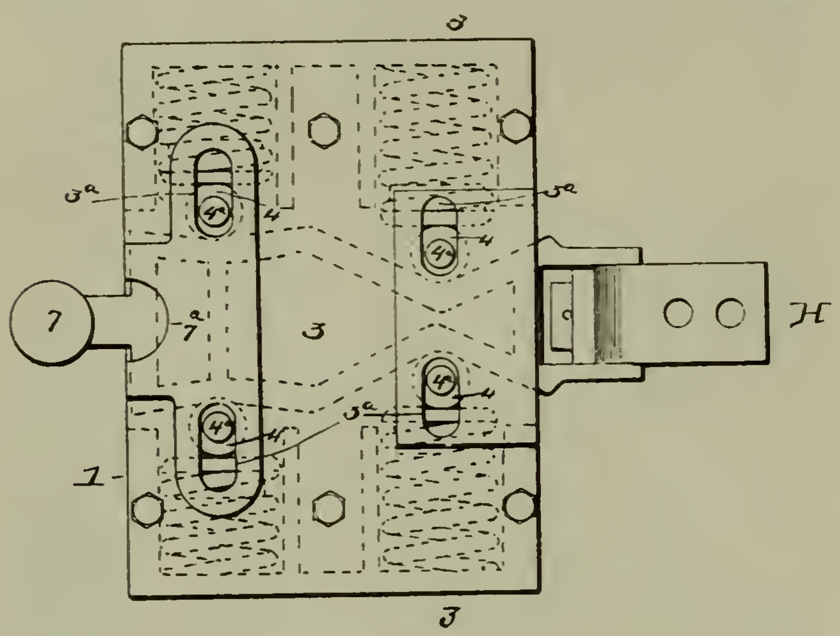


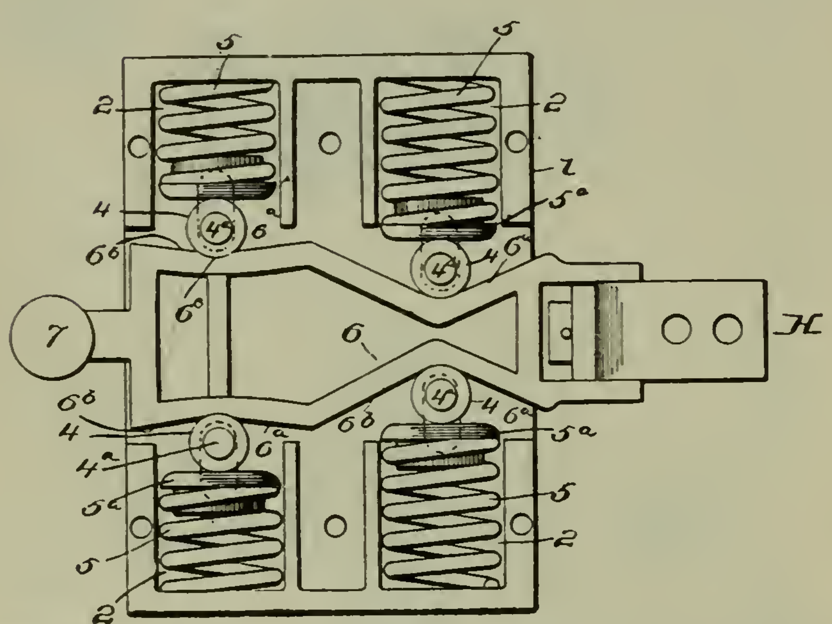
rollers and provided with caps or bearing plates where they contact with the rollers, and said plates may have beveled or rounded faces to accommodate the movement of the rollers and the side swing of the draw-bar on curves. The springs afford constant spring resistance to the endwise movement of the draw-bar either in or out.

The shank of the draw-bar is provided with a series of converging inclines, which meet at a point opposite the rollers when the draw-bar is at rest or in its normal position.

Where the spring-pressure is entirely lateral, the tail of the draw-bar shank may terminate in a post or equivalent projections adapted to engage a seat in the housing.

When the draw-bar is drawn forward, as in pulling, the rear inclines on the shank of the draw-bar will be drawn beneath the rollers, forcing them apart and compressing the springs, which will resist the movement of the draw-bar until the post has come to a bearing in the seat of the housing and the parts will so remain until the motion of the train is arrested, whereupon the rollers will travel down the inclines with the inward movement of the draw-bar, being constantly maintained in contact therewith by the springs, so that no jumping of the draw-bar can occur. If the force which moves the draw-bar





inward is sufficient to carry it past its normal position, (as in case of emergency stops or in buffing,) the forward inclines will enter between the rollers, gradually forcing them apart and increasing the spring resistance. to the inward movement of the draw-bar.

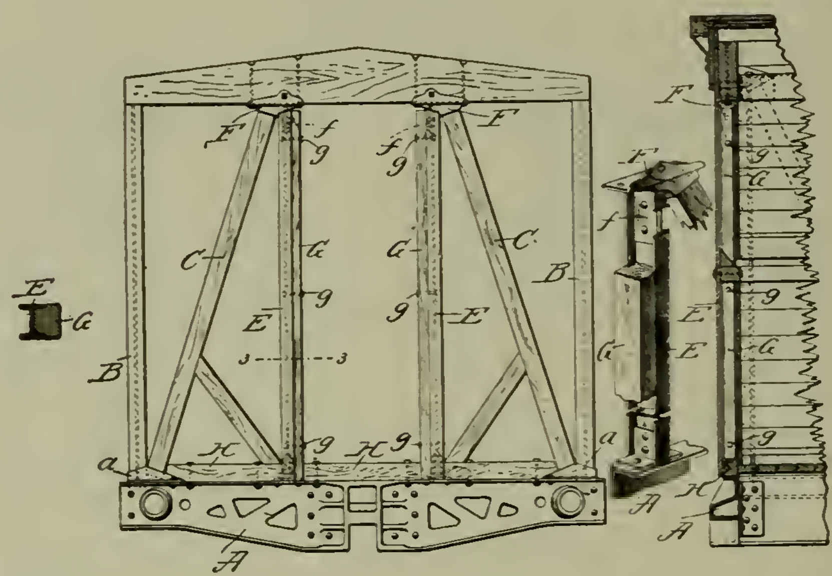
KING END BRACING FOR BOX CARS.

Box-cars as commonly constructed with wooden sills and end posts are liable, when the car is being switched and subjected to shocks and jars, to bulge the end walls, the connections between the wooden posts and end sills not being strong enough to withstand the severe strains to which they are subjected under the impaction of loose loads. Sometimes the end walls of box-cars are forced out under the above conditions, so that the load contained in the car finds an exit through which it may escape. Especially is this true when the car is loaded with wheat or other granular material.

The object of the present invention patented by George I. King, of Detroit, Michigan, is to make the end framing of the car sufficiently strong to withstand such pressures which are usually suddenly applied, and to accomplish this in a simple and economical way he employs metallic end sills and metallic end posts, riveted together, the upper ends of the end posts having castings riveted thereto, which castings are strongly bolted or otherwise secured to the end plate.

The end sill carries pockets at its ends, in which are seated the corner-posts and end diagonals. These corner-posts and diagonals are preferably of wood, the end walls of the car being nailed thereto.

The metallic end posts are I-shaped in section and are riveted to the metallic end sill by the use of connection-plates. A casting formed to provide a pocket in which the upper end of the diagonal is seated, has an upwardly-extending flange, which is bolted to the end plate by the



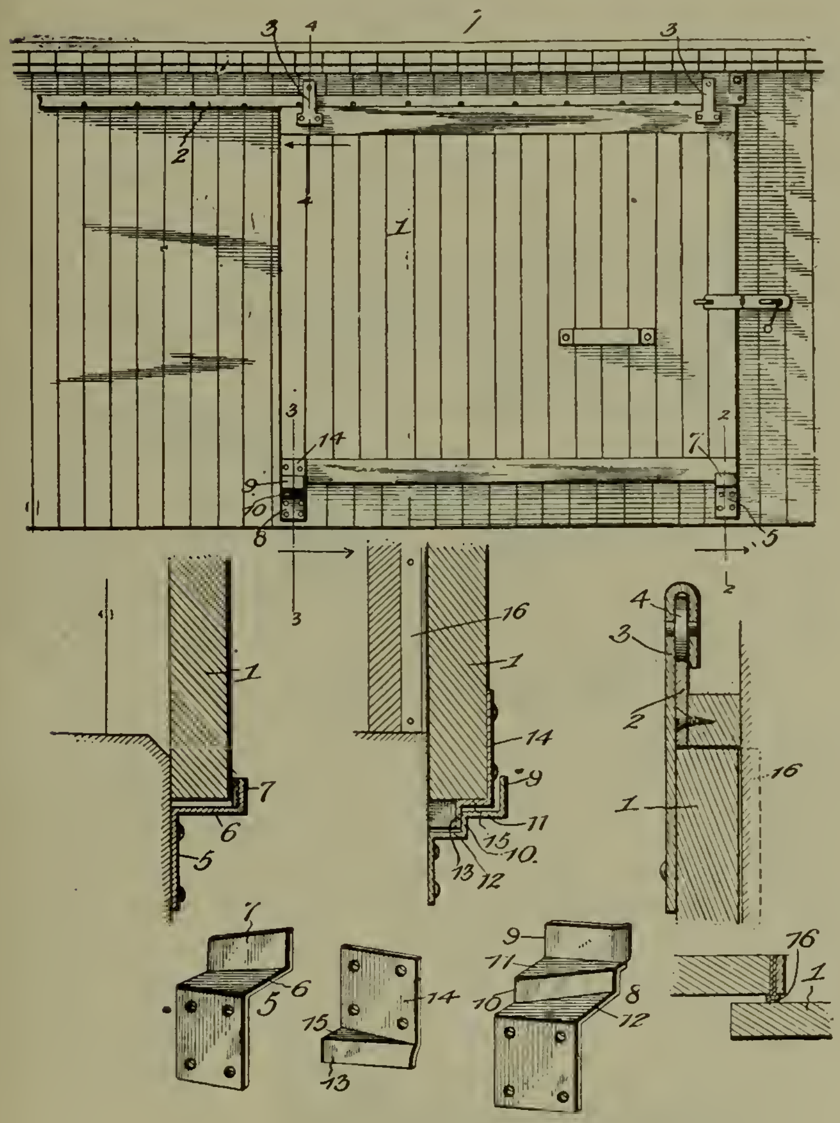
use of horizontally-disposed bolts. Vertical bolts secure the casting to the under face of the end plate and hold it in position thereon. The casting has a depending web or flange, to which is riveted the upper end of the metallic end post. A wooden furring-strip is seated in one of the channels of the end post, being held therein by the employment of suitable bolts. The bottom nailing-strips for the floor may be bolted directly to the upper face of the end sill.

HOYT CAR DOOR.

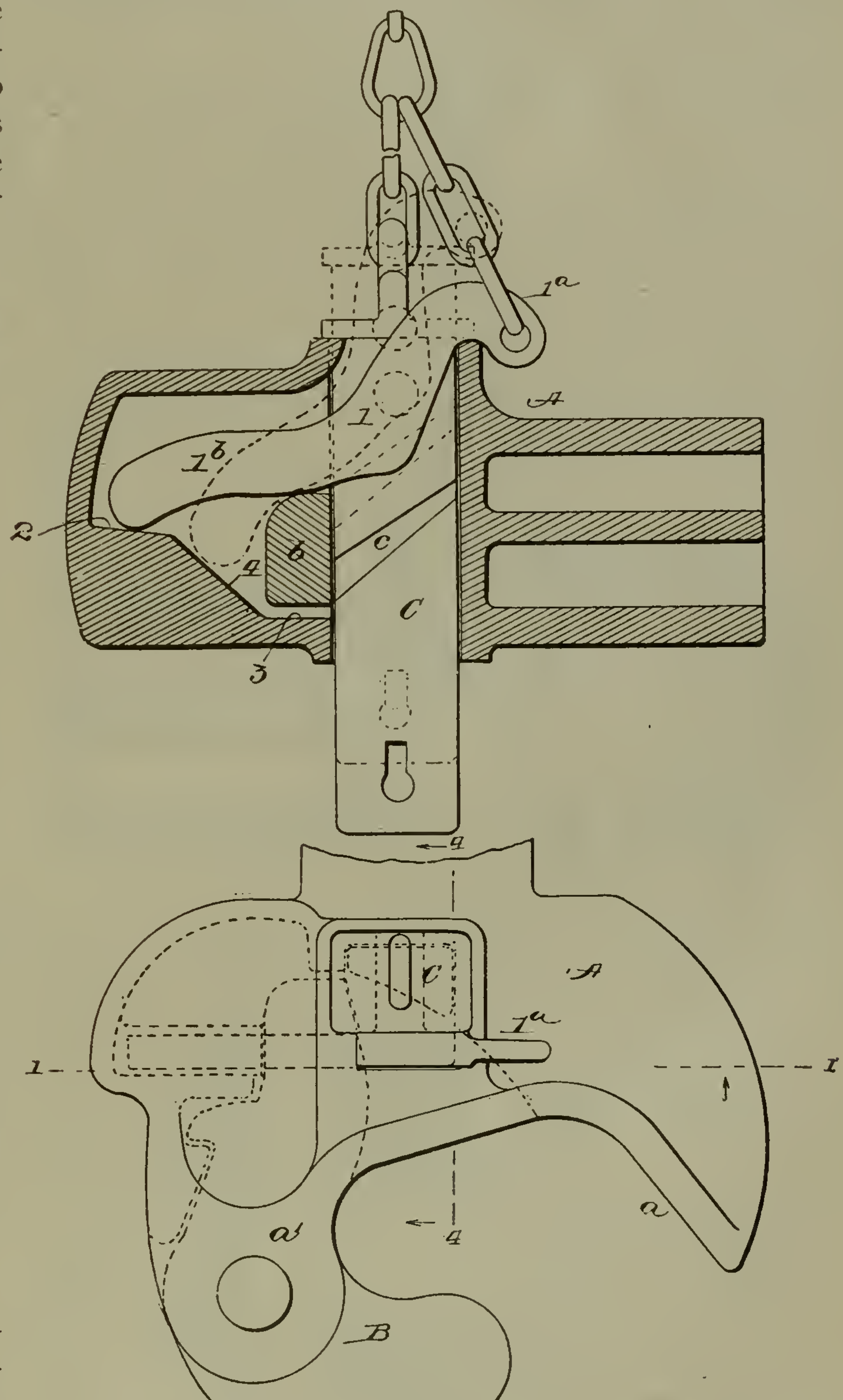
An improved means for guiding a freight-car door in its movement has been patented by Wm. E. Hoyt, of Ravenswood, West Virginia.

The door is suspended in the usual manner and its front end is, when closed, supported at the bottom by a keeper consisting of a vertical attachment-plate, a horizontal portion extending from the upper part of the attachment-plate which is perforated to receive the fastening device, and an inwardly disposed inclined flange located at the outer edge of the inclined portion.

The lower edge of the door is guided in its backward-and-forward movement solely by a guide, located at the back of the door-opening of the car and adapted to serve also as a keeper for holding the rear end of the door tightly against the car when the said door is closed. In this way the use of a lower rail as commonly employed on freight-car doors is obviated. This combined guide and keeper consists of a bracket having an attachment portion provided with two distinct angular bends or offsets, forming upper and lower shoulders or flanges, connected with each other and with the attachment-plate by horizontal portions. The upper shoulder or flange, which is disposed parallel with the adjacent face of the car, forms a guide for the car-door and is located a sufficient distance from the car-body to enable the door to slide freely without binding. The performance of this guiding function by the upper flange is facilitated by the rearward extension and outward deflection of its rear



end, which feature is highly desirable, as the door is supported solely from above and is therefore capable of considerable lateral movement. If in closing the door it should swing outwardly to a slight extent, the lower front corner of the door will strike the deflected or outwardly-curved end of the upper guide-flange and will be thrown back toward the car for guidance between the flange and the car-body to insure a close fit of the door. The fact that the deflected end of the upper flange is extended slightly beyond the rear edge of the upper horizontal face facilitates the operation just described, for the reason that said end will thus be rendered more or less resilient and will have a reactive tendency to jar the door back into position under the conditions just described. The lower shoulder is arranged to an angle to the adjacent face of the car-body similar to the shoulder or flange of the front keeper and is adapted to be engaged by a diagonally-disposed guide flange or projection, depending from the bottom of the car-door, at the rear end thereof, and connected with the same by a plate. The plate, which is secured to the car-door by suitable fastening devices, is provided with a horizontal portion, arranged on the lower edge of the door and connecting the plate with the depending flange or projection. The diag-

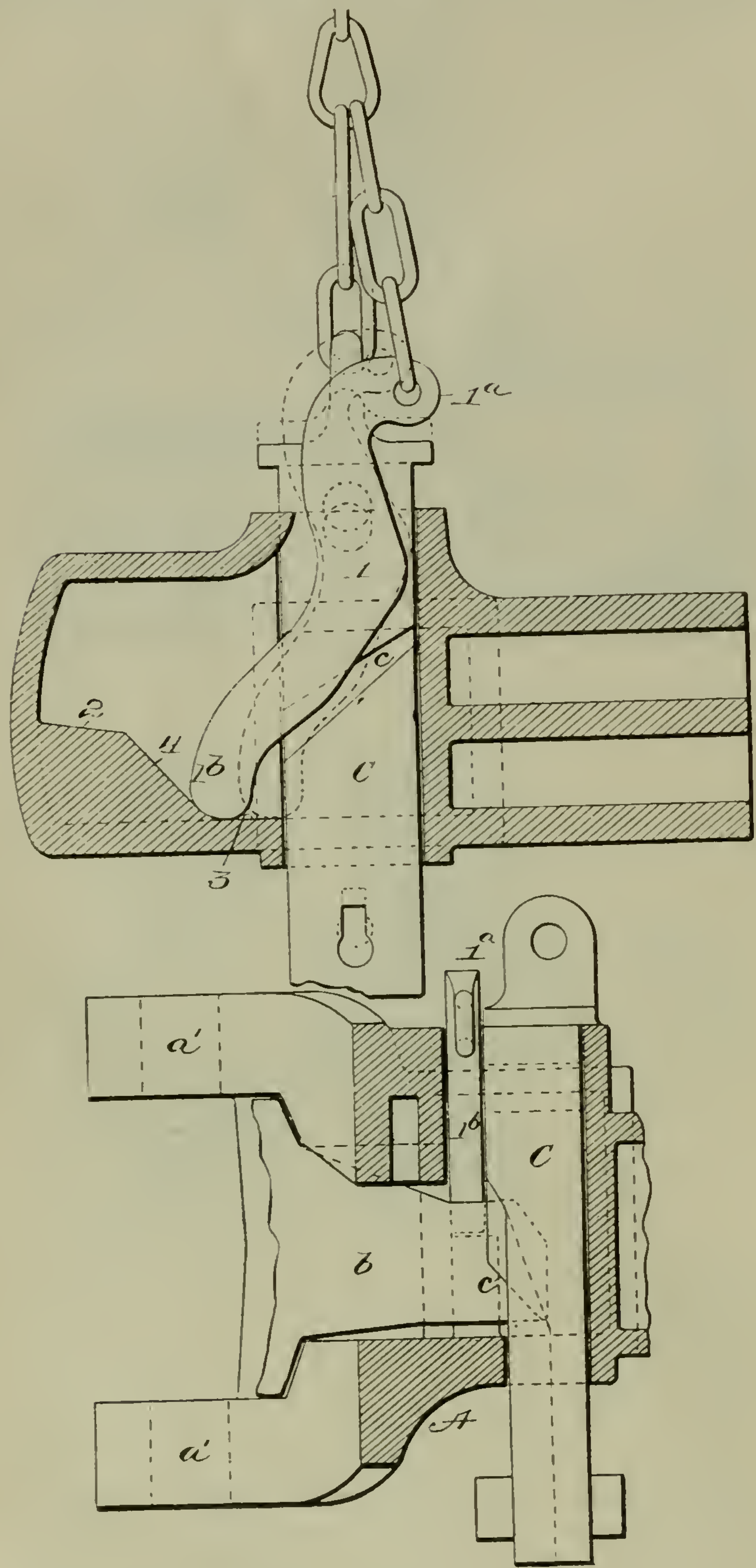


onally-disposed flange or projection engages the wall or shoulder of the combined guide and keeper just before the door reaches the limit of its closing movement, so that as such closing movement is completed the rear edge of the door will be forced tightly against the car-body.

BUHOUP CAR COUPLING.

Heretofore in the vertical or "Janney" type coupler wherever a pivoted lever or latch has been combined with the locking-pin for the purpose of setting the lock or throwing out the knuckle, the lever or latch has been operated from or by the locking-pin, and when set the latch or lever has rested upon the tailpiece of the knuckle, and thus supported the locking-pin in the set position, as a consequence of which any movement or even a limited vibration of the knuckle arising from the jarring or moving of the car served to drop the pin and lock the coupler.

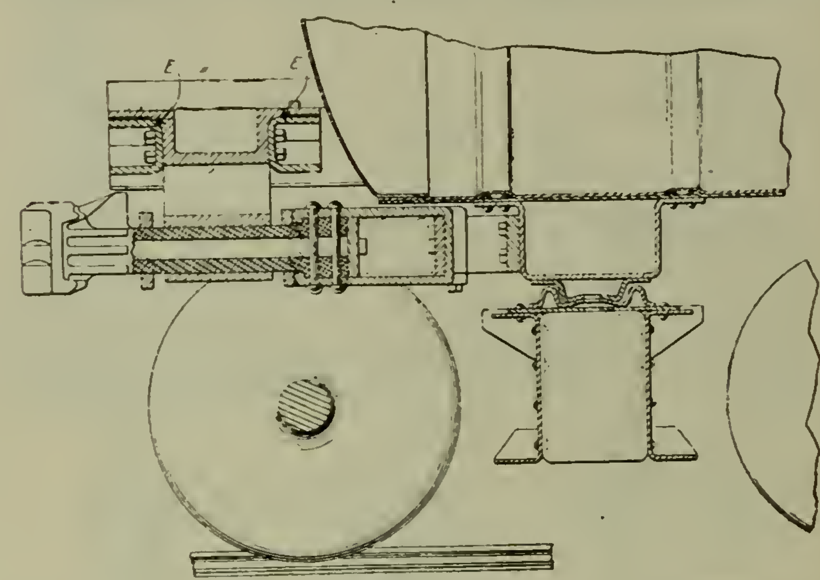
To overcome the objections to the present form of lock-sets for couplers, Harry C. Buhoup, of Chicago, Illinois, assignor to the McConway and Torley Company,



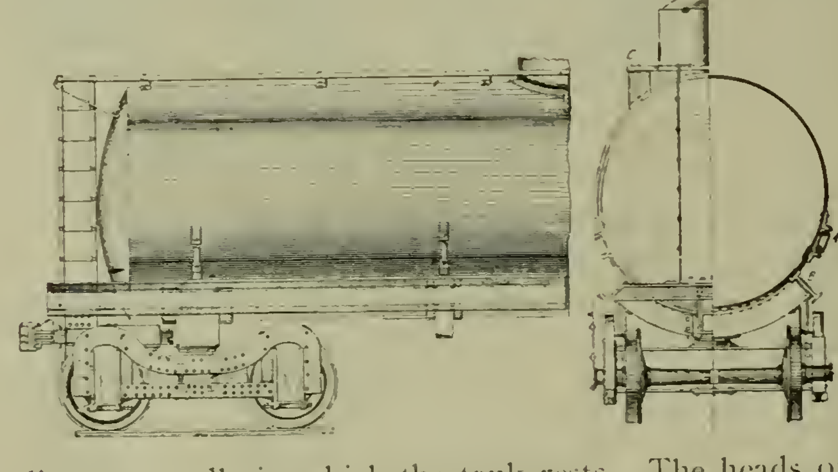
of Pittsburg, Pennsylvania, has combined with the locking-pin a pin-lever pivoted thereon, by means of which lever the locking-pin may be raised, said lever having a fulcrum, a support upon the coupler-head, whereby the locking-pin is held in a set position independent of the knuckle, and such a combination embodies one feature of the invention. Preferably the fulcrum of the pin-lever within the coupler-head is in part an incline on which the supported end of the lever may travel back and forth to allow of a limited vibration of the tailpiece of the knuckle without dropping the locking-pin, the locking-pin returning to its set position automatically, and such an incline and seat within the coupler-head in combination with the locking-pin and pin-lever embodies a further feature of the invention.

VANDERBILT TANK CAR, DRAFT RIGGING AND PEDESTAL TRUCK.

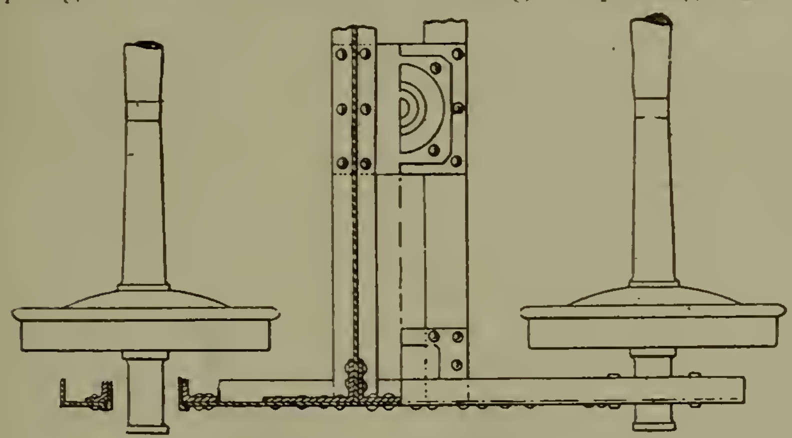
The tank car is designed for carrying oil, grain or any other material for which the form is suitable; the tank being of the ordinary cylindrical form with a central dome for loading and unloading. The object aimed at is to bring down the center of gravity by allowing the tank to come down as near as possible to the transom of the truck. As will be seen by the end plan and transverse section, the tank is not carried upon longitudinal sills, but directly upon body bolsters resting upon the center plates.

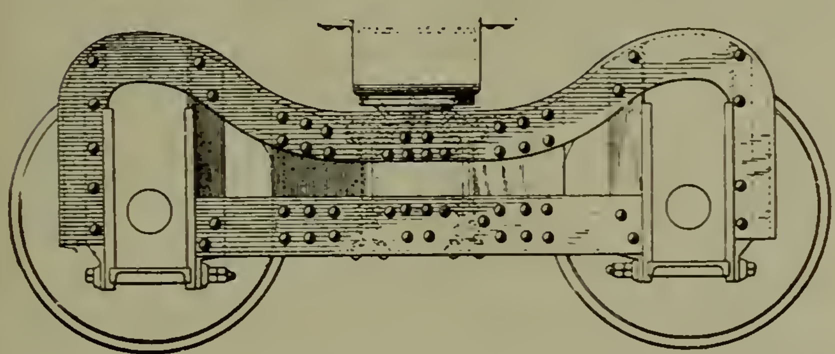


The body bolster is of U-shaped steel plate in its cross section; or what is commonly known as the dished or trough form. It is arcuate in shape longitudinally, conforming to the shape of the tank. Upon these bolsters and riveted securely to them is a dished or concave steel plate extending the full length of the tank and forming



a liner or cradle in which the tank rests. The heads of the rivets on the concave surface of this liner are countersunk; or grooves are provided for them in the surface of the tank. In this cradle the tank lies, but movement either lateral or longitudinal is prevented, as shown in the cut at A by turnbuckles attached above to brackets on the tank and below to brackets on the cradle. The side sills are I-beams riveted by their upper flanges to the cradle and by the web to the ends of the body bolster. There are two lighter intermediate body bolsters of the same form as the main bolsters; but designed simply to bind the structure together. A steel running board extends the full length of the top of the car, passing around the dome. This running board extends beyond the ends of the tank, so that a trainman may easily pass from one car to another; and a ladder connects it with the end platform of the car. The end sill consists of two U-shape plates or channels laid on their sides back to back, and connected to the side sills. As there are no center sills, the draft-rigging is attached direct to the body bolster, which sustains the initial shock to the springs. The full shock of buffing or pulling is, how-





ever, prevented from coming upon the body bolster by stops which come into play before the springs have closed and transfer the shock to the end sills and framing.

The truck frame is of the pedestal type and is constructed of standard commercial shapes of steel. The transoms are I-beams, and the side frames are made of angles. The construction is shown very clearly by the drawings, and is so simple as to need no explanation to those who are familiar with the general type of trucks.

Personal Mention.

Mr. H. H. Harrington has been appointed general foreman of the Santa Fe at Newton, Kan., to succeed Mr. Dunlop.

Mr. E. T. Whalen, of the Omaha shops, has been appointed general foreman of the Missouri Pacific shops at Kansas City.

Mr. W. S. Lawless has been appointed general foreman of the Atchison, Topeka & Santa Fe shops at Topeka, Kan.

Mr. George H. Bussing has been appointed master car builder of the Evansville & Terre Haute, with headquarters at Evansville, Ind.

Mr. J. E. Muhlfield has resigned as master mechanic of the Grand Trunk at Montreal to accept a position with the American Locomotive Company.

Mr. P. T. Dunlop, heretofore general foreman of the Santa Fe at Newton, Kan., has been appointed master mechanic of the Gulf, Colorado & Santa Fe at Temple, Tex.

Mr. Phillip Hess, formerly a machinist in the shops of the Pennsylvania company at Ft. Wayne, has been appointed master mechanic of the St. Louis, Iron Mountain & Southern railroad.

Mr. F. W. Johnstone has resigned as superintendent of motive power and machinery of the Mexican Central. Mr. Johnstone will open an office in the City of Mexico as consulting engineer.

Mr. T. P. Hickey, late general shop foreman of the Atchison, Topeka & Santa Fe, at Topeka, Kan., has accepted the position of foreman of the shops of the Seaboard Air Line at Portsmouth, Va.

Mr. Grant Hall has been appointed master mechanic of the Pacific division of the Canadian Pacific railroad, with headquarters at Revelstokem, succeeding Mr. F. E. Hobbs, transferred as general foreman of the Vancouver shops, which will hereafter be operated under the supervision of the master mechanic.

Mr. M. Monkhouse has resigned as superintendent of motive power of the Chicago, Indianapolis & Louisville, to accept a position with the Compressed Air Company of New York. He will be succeeded by Mr. John Gill, master mechanic of the Chicago, Rock Island & Pacific, with headquarters at Lafayette, Ind.

Notes of the Month.

C. B. Hutchins & Sons, Detroit, Mich., manufacturers of car roofs, have opened an office in Chicago at 827 Monadnock building, in charge of S. D. Anderson as general sales agent.

The Southern Pacific Co. is building at El Paso, Tex., a tank 90 ft. in diameter and 30 ft. high to hold oil fuel for locomotives. Similar reservoirs are being established also at Tucson, Ariz., and Lordsburg, Cal.

McClure's Magazine for August is a "midsummer fiction number" containing an unusual number of entertaining stories. An account of the work of Professor Ernst Haeckel is wonderfully interesting and is one of the few articles that is well worth a second reading.

Mr. A. C. Stites, formerly resident engineer of The Phoenix Bridge Company and The Phoenix Iron Company in Chicago, resigned his position to accept an engagement August 1st with Joseph T. Ryerson & Son, No. 18 Milwaukee Avenue, Chicago. Mr. Stites opened the Chicago office of the Phoenix Companies and has had charge of it since its inception nine years ago.

The Cincinnati, Hamilton & Dayton R. R. is experimenting with coke for fuel on the locomotive of one of its passenger trains. According to newspaper reports a firm in Hamilton, O., has assured the railroad company that a supply of coke can be provided at a satisfactory price in case the company should find it desirable to use such fuel. The object in a change of fuel is of course to avoid smoke produced by the use of soft coal.

A. J. Pitkin, first vice-president, and J. E. Sague, mechanical engineer of the American Locomotive Company, and Managing Director Bryan recently made a tour of inspection of the Richmond Locomotive Works, and it is said that improvements amounting to $100,000 have been ordered. The work will include mostly electrical appliances and new machinery, which will increase the capacity of the plant from five or six locomotives a week to eight or ten. No additions will be made to the buildings, as those recently completed are ample.

Another foreign shipment of steel cars left Pittsburg in August from the works of the Pressed Steel Car Company. This time the destination of the cars is Durban, Natal, South Africa, where they will be turned over to the Zululand Railway. The shipment consists of 10 flat cars of 50,000 pounds capacity, and is an exact duplicate of a shipment made some time ago to the same railroad. The cars are 32 ft. long, 8 ft. wide and 3 ft. 3¼ in. high. This is the third shipment of cars to South Africa made by the Pressed Steel Car Company within the last six months.

Our readers who read the account of the Pan-American Exposition as given in the August issue of the Railway Master Mechanic will probably be interested in the article on the exposition which appears in the September number of the Cosmopolitan. The most famous writers of the country have been invited to take part in the preparation of this issue. After many days' careful study of all the wonderful scenes of the exposition, more than a hundred photographs have been prepared, which, taken as a whole, give a thorough conception of the marvels of this exposition.

Nowhere else in America, if indeed, in the world can be found an inland water route to compare with that of the Great Lakes and the St. Lawrence and Saguenay rivers. So changeable is the scenery that it combines many different varieties, each perfect in itself, the whole making an ideal trip long to be remembered. The most pleasant and picturesque route to the Saguenay is on the fine steamers run by the Richelieu and Ontario Navigation Company. These steamers are large, splendidly equipped and run via Niagara Falls and the River St. Lawrence, across Lake Ontario, winding through the channels of the Thousand Islands, shooting the series of rapids of the St. Lawrence, thence through to Quebec, and up the beautiful Saguenay.

The Baldwin Locomotive Works have just issued their pamphlet No. 26, which contains illustrations and descriptions of a few of the locomotives recently constructed by them. As they say in their introduction, recent years have shown such rapid advances in locomotive practice, both by the adoption of larger locomotives and by improvements in details of construction, that it has been difficult to prepare a general illustrated catalogue which would not become obsolete almost as soon as issued. It has, therefore, been deemed desirable by the Baldwin Works to publish particulars of current construction, without attempting to formulate a complete scheme of types and sizes of locomotives. The pamphlet contains information pertaining to a great variety of locomotives, of different gauges, and for different kinds of service representing current requirements.

The industrial department of the Lackawanna Railroad, in charge of William B. Hunter, and having its headquarters at 26 Exchange Place, New York City, has just issued a 300-page booklet under the caption, "Industrial Opportunities." This book treats of every town on the line, showing its population, its distance from New York and from Buffalo, its railroad facilities, its leading industries, its leading shipments, its rate of taxation, cost of labor, rent of houses, how lighted, whether it has water works, principal power, approximate cost of steam coal, approximate value of lands and describing vacant lands or factories available for manufacturing purposes. In the introduction the aim of the Lackawanna Railroad is set forth as follows: To give assistance to manufacturers in the selection of the most favorable site for their industrial enterprises. To help cities, towns and villages along the line to expand and broaden through the location of new industries. Advantages of this line in the mining regions of New Jersey and Pennsylvania and the agricultural districts in the state of New York are fully set forth. Copies of the book will be forwarded on application to the industrial department.

The ninth annual convention of The Traveling Engineers' Association will be held at the Continental Hotel, corner of Ninth and Chestnut streets, Philadelphia, Pa., commencing at 9 a. m., September 10th, 1901. Reports will be presented on the following subjects:

What benefits have been derived from the use of the indicator by the traveling engineers? G. W. Wildin, chairman.

Methods of firing locomotives to obtain best results, all conditions to be taken into consideration. E. R. Webb, chairman.

Locomotive lights, their care and operation. W. E. Widgeon, chairman.

The best method of taking care of and handling the compound locomotive. P. H. Stack, chairman.

Is it a good practice to use grease to lubricate locomotive crankpins? W. G. Wallace, chairman.

The proper and improper handling of the brake by the engineer at the brake valve. H. C. Ettinger, chairman.

On change of constitution and by-laws. J. C. McCullough, chairman.

Subjects for discussion in 1902. F. O. Miller, chairman.

Committee of arrangements for the next annual meeting. H. J. Beck, chairman.

The ninth annual convention of the National Railroad Master Blacksmiths' Association was held at Denver, Colo., beginning on Tuesday, the 20th inst. The programme, comprising the following subjects, was carried out in full and the meeting was a most successful one:

Apprenticeship System—S. Uren, chairman.

Manipulation of Tool Steel—G. F. Hinkens, chairman.

Track Tools—Ben. Burgess, chairman.

Flue Welding—J. G. Jordon, chairman.

Waste of Coal at Blacksmith's Forge—J. F. Pfeifer, chairman.

Furnaces and Fuel for Same—Jos. Northend, chairman.

Methods of Manufacturing Crank Pins and Piston Rods, both Steel and Iron—D. B. Swinton, chiarman.

Case Hardening—G. H. Judy, chairman.

Improvements in Locomotive Forgings—F. Norris, chairman.

Repairs of Locomotive Frames—L. P. Barnes, chairman.

Tools and Formers—D. Fitzgerald, chairman.

The following officers were elected:

President—W. D. Savage, Gulf, California & Santa Fe, Palestine, Tex.

First Vice-President—John McNally, Chicago & Northwestern, Chicago.

Second Vice-President—George Lindsey, Evansville & Terre Haute, Evansville, Ind.

Secretary and Treasurer—A. L. Woodworth, Cincinnati, Hamilton & Dayton, Lima, O.

Executive Committee—R. A. Mould, Omaha, Neb., chairman; John Buckley, Chicago; Benjamin Burgess, Danville, Ill.; W. M. Hodgetts, Bloomington, Ill.; J. W. Russell, Kenova, Pa.

The thirty-second annual convention of the Master Car and Locomotive Painters' Association will be held at Buffalo, N. Y., Sept. 10, 11, 12 and 13, 1901, convening at 9 o'clock a. m., on Tuesday, the 10th. The official headquarters will be at the Columbian hotel, where a meeting room in which to hold the daily sessions has been secured. This hotel is on the European plan. The rates are from $1.00 to $3.00 per day for each person, according to location and size of room. Rooms may be engaged by writing to the hotel. A cordial invitation has been extended to foremen car and locomotive painters throughout the States and Canada to meet in convention and receive the benefit of the discussions on the several subjects on the program.

The following program with the committees appointed on the several subjects will be introduced:

1st. Is there a method of successfully treating passenger cars (going through shops for re-varnishing) which are more or less cracked and which have recently been cleaned at terminals with emulsion or other cleaners containing mineral or non-drying oils?—W. J. Russell, G. R. & I. Ry., Grand Rapids, Mich.; C. B. Harwood, C. & O. Ry., Huntington, W. Va.

2d. In a material sense, what progress has been made in terminal car cleaning?—Wm. Vogel, Missouri Pacific Ry., St. Louis, Mo.; S. H. McCracken, L. H. & St. L. R. R., Cloverport, Ky.

3d. Practical suggestions regarding interior decoration of passenger cars.—Geo. Schumpp, L. & N. R. R., Louisville, Ky.; A. T. Winchell, Am. Car & Foundry Co., St. Charles, Mo.; Frank Taylor, late of Barney & Smith Mfg. Co., Dayton, O.

4th. Is it practical and to the interest of the railroad companies to adopt a piece price for all classes of painting repairs in the car paint shop without employing a certain percentage of day men?—W. H. Truman, Southern Ry., Columbia, S. C.

5th. The relations which should exist between the railway company's purchasing powers and the master painter.—J. A. Gohen, C. C. C. & St. L. Ry., Indianapolis, Ind.

6th. What is the best paint material to use for the protection of iron and steel tanks on locomotives after the same has been prepared to receive it?—C. I. Eagle, L. S. & M. S. Ry., Cleveland, O.; Eugene Daly, C., C., C. & St. L. Ry., Bellefontaine, O.; R. B. Pebbles, L. S. & M. S. Ry., Elkhart, Ind.

7th. Has the painting of freight cars with the spraying machine shown that there is any economy in its use? Is it not rather an additional cost over brush painting, and does it not produce work of an inferior quality?—T. J. Mullally, the Armour Car Lines, Chicago, Ill.; M. W. Stevens, L. S. & S. R. R., Drifton, Pa.; J. G. Ginther, Wabash Ry., Moberly, Mo.

8th. What is the best method of preparing steel freight cars for paint, and what is the best material to use?—B. F. Seisler, P. & W. R. R., Allegheny, Pa.; B. T. Wynn, Pennsylvania R. R., Pitcairn, Pa.; Eugene Laing, N. C. R. R., Elmira, N. Y.

9th. Report of Committee on Tests.—W. O. Quest, P. & L. E. R., McKees Rocks, Pa.; T. J. Rodabaugh, P., Ft. W. & C. Ry., Ft. Wayne, Ind.; Frank Crocker, K. C., Ft. S. & M. R. R. Car cleaning tests to be reported at the convention by W. C. Fitch, Southern Pacific Ry., Sacramento, Cal.; J. A. Gohen, C., C., C. & St. L. Ry., Indianapolis, Ind.; C. E. Copp, B. & M. Ry., Lawrence, Mass.; John Rattenbury, C., R. I. & P. R. R., Chicago, Ill.; J. A. Putz, W. C. R. R., Stevens Point, Wis.; J. A. P. Glass, Y. & M. V. R. R., Vicksburg, Miss.; W. L. Marsh, W. Ry. of Ala., Montgomery, Ala.; C. D. Beyer, L. & N. R. R., Pensacola, Fla.; T. R. Cowan, C. P. Ry., Montreal, P. Q.

The following list of queries will be presented:

1. Can a paint be made that will dry from the bottom up?

2. What is the best method of making illuminated numbers for locomotive head lights?

3. What is the best method of treating front ends of locomotives with a view of keeping them in good condition

4. Is it advisable to add wax to varnish in order to deaden the luster in imitation of a rubbed surface?

5. Can a sand blast be operated successfully in a railway car and locomotive paint shop?

6. What is the best oil for rubbing the varnish inside of passenger cars to reduce the surface to a dead finish?

7. What is the cause of varnish turning white on locomotive tanks, and how to prevent it?

The Car Foremen's Association of Chicago

August Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 209, Masonic Temple, Wednesday evening, Aug. 14th. Meeting called to order at 8 p. m. by President Sharp. Among those present were the following: Jno. Ackerman, Theo. Blohm, Chas. Bossert, A. Bannes, G. M. Bates, Roy J. Cook, I. N. Clark, C. C. Cather, A. B. Chadwick, Jas. Depue, Ralph Earle, Jos. Flanagan, J. C. Grieb, Elias Hedrick, A. P. Hansen, W. Hagge, A. G. Johnson, H. A. Joseph, A. Johannes, Aaron Kline, H. LaRue, M. Mercatoris, Hugh Marsh, T. J. Mullally, W. H. Miner, Chas. Nordquist, Jas. Prickett, C. R. Powell, W. E. Sharp, H. A. Stewart, Aug. Schultz, C. S. Stagg, J. K. Skilling, Chas. Schramm, F. C. Schultz, R. H. Snyder, O. N. Terry, W. W. Wessell, W. H. Wensley.

Pres. Sharp: The first order of business is the reading of the minutes of the previous meeting. As they have been printed in the Railway Master Mechanic and distributed, if there are no objections they will be approved as printed. Secretary Kline: The following have made application for membership: J. G. Robinson, Repr. Sargent & Co., Chicago; J. H. Kennedy, foreman, Ill. Northern R. R., Chicago; A. C. Bowen, foreman C. & N. W. Ry., De Kalb, Ill. Pres. Sharp: These names have been submitted to the regular committee and approved, and they will be enrolled as members. Secretary Kline here read a communication from the Joint Car Inspectors' Association, inviting each of the members to attend their next annual meeting, which is to be held at the Great Northern Hotel, Chicago, Sept. 19, 1901.

Pres. Sharp: The members will please take note of this. I trust it will be convenient for a great many of you to attend that meeting.

The first subject on our program for this evening is the discussion of Mr. Grieb's paper on passing cars at interchange points with defects for which defect cards are subsequently requested.

Mr. Grieb: I do not know that I have anything special to add to the remarks made in the paper. I believe that quite fully covered the ground and it also seems to me we ought to hear first from those who see some objections to the feasibility of carrying out the plans as outlined in those remarks.

Mr. Cather (I. C.): I am sorry to say that I have not considered very closely Mr. Grieb's ideas as outlined in the paper, but I heard part of his talk on this subject on a previous occasion and have discussed the matter a little with some of the representatives of other roads and I think that the idea is not only feasible but a very good one. It certainly is one that will be welcomed by all clerks and those who have to do with car tracing with a view of determining whether or not repairs have been made and trying to get some information to justify a bill on the defect card that comes his way. The idea is to get the defect card on the car having the defects, so that when repaired the card may be turned in with notice of repairs and the matter handled as it should be. When the car is repaired bill is made. It is a fact that a great many defect cards are procured where the expense in tracing car with a view of making repairs or to see that they have been made and where made, really offsets the amount of repairs and it is a fact that an inspector noting these defects when the car comes on his line, if he has a defect card that he can apply, all this tracing and correspondence incidental to it can be dispensed with. Personally I think the idea as presented by Mr. Grieb is a good one, and I think it only remains for him, or some one else interested in the matter, to properly present it to the heads of the different roads to have the matter adopted.

Mr. Prickett (C. & E. I.): I will have to disagree with Mr. Cather, because getting rebuttal cards from foreign lines, I think, will overbalance the trouble he has of tracing with the defect card. If every road centering in Chicago would issue their cards promptly on a notice or request for a defect card, you would do away with a great deal of trouble. If a C. & E. I. car, or any of its system cars, goes to a foreign road, with defects, and they ask us for defect cards, they will get one inside of three or four days, or as soon as I can get around to write it out. If a Northwestern or Milwaukee or Great Western car is delivered to us with defects that call for a defect card, how long does it take us get the card from those roads? We get all of our cars through the Belt people. They have record of these defects. I have to make my request on the Belt people and they ask these roads and how long does it take to get a card. From 30 to 60 days and make two or three requests. Now then, if these cars were received from the L. & N. or E. & T. H. and all southern points with defects that have to be carded for, they are received at those points with these defects. They pass through four or five different inspectors who have record of the defects on those cars. You can pass out these cards from each road at Chicago. A man receives a car, puts a card on. He is justified in doing so. Now you have to trace through those inspectors and look for rebuttal card to offset the one that was issued. How long will it take you to get it? Probably 11 or 12 months. I do not approve it. Let every road when they have to card for a car, issue the card promptly and it will follow the car very quickly.

Mr. Wensley (C. & E.): I think I will have to back Mr Prickett up, as most of our cars are handled through the Belt. We have requests a year old, and most of them are on western roads.

Mr. Mercatoris (C. & E.): I have had considerable dealing with the Belt Ry. and must say that we have the least trouble with them of anybody in Chicago. I go to Mr. Peck or Mr. Wentsel and present my request and if the other road is a little delinquent they issue their own card nine times out of ten.

Pres. Shar: The point Mr. Grieb makes in his paper is that the car is not always empty and do not always go to the shop. I infer that even if the card is issued promptly by the delivering line the car is many miles on its way before the card is received. It is therefore a necessity to trace that car with your car accountant, which means an unnecessary amount of office work he intends to cut out if the card is issued at the time car is interchanged. There would therefore be no tracing in the matter.

Mr. Prickett: I would like to ask if there would not be some tracing if it was a foreign car to your line.

Pres. Sharp. None except for rebuttal card.

Mr. Marsh (C. N. Y. & B. R. Co.): As I understand the matter I think he is pretty nearly right in his paper as set forth, providing for a defect card to be issued to cover defects on a car at the time it is delivered from one road to another. I believe that that will do away with an unnecessary amount of correspondence and tracing and possibly reduce the clerical force, but I believe that then and there is the time to settle for defects on a car, when they are first discovered to exist. This would prevent holding the car and would settle for the defects, the car could go out with this defect card attached and if another road wishes to make the repairs they can use the card as authority to bill for the same. This, I believe, is the proper way to handle it.

Mr. Bates (C. B. & Q.): I agree with Mr. Grieb. We are having considerable trouble tracing for cars after we receive the card. Take a loaded car that is going out on the line; we have no defect card of the delivering line on hand and have to let the car go and make a request. Some people speak of dishonesty, but I cannot see any difference whether you issue the card there or ask for a card. They have to depend on your word anyway, and it seems to me the proper way is to attend to it when you receive the car. I note that the paper says cards should not be issued for old defects, but I do not think that it would be done even if it were not prohibited. Also, cards should not be issued for empty cars; I would not be in favor of that. If the defects are new you are going to ask for a card for just what you would issue a card. Of course it is not obligatory for every road to go into it, but such roads as do not do business through the Belt line can join. If the others do not see their way clear to come in they can stay out, but quite a number of roads adopted this system before and I think they will go into it again if the matter is brought to the attention of the officers of the different roads.

Mr. Schultz (C. B. & Q.): I think it is a good idea, just to do away with tracing, and as long as you have got to depend on the car inspector's record anyway I do not see that it makes any material difference whether he applies the card or makes request. As far as empty cars are concerned, I do not think there should be any exception made for them. Personally I know we often have to send cards after the car and miss connections and the consequence is we sometimes fail to locate the car. I think it but justice to the receiving road to issue card at once.

Mr. Wensley: I think we are trying to get back to the old way of holding cars. One inspector says he wants a card and the other one says he won't give it and they hold the car while they fight it out.

Mr. Schultz: I think the gentleman does not understand the question. It is not to delay the cars, but to keep them moving. The inspector of the receiving road will issue the card, so there will be no chance for a dispute.

Mr. Powell (I. C.): I think the idea of card being applied at the time car is interchanged a good one, and that if such a rule is arranged it should be carried out in full force.

Mr. Nordquist (C. & E.): I understand that you are going to use the same cards as we called the "triple stub" cards?

Mr. Grieb: The idea was to provide a card with a duplicate stub, each company furnishing its cards to every other company it interchanges cars with, and receiving in exchange the cards of the other company and using the other company's cards for such cars that were delivered by it with defects that were cardable subject to some limitations that I suggested, which are as follows: Restrictions on issuing defect cards: No cards to be issued except for items duly on record in the office of the receiving line, which record shall at all times be accessible to the delivering line. Cards to be issued strictly according to the M. C. B. Rules, and only for new defects or missing material. Cards not to be issued on cars property of the receiving line when empty. Cards not to be issued for cars of delivering line, if the conditions are such as to insure the return of cars to point of receipt. Cards not to be issued under any circumstances after car has left receiving station.

Now, in order to make this discussion a little more pointed and interesting, it might be well to consider the benefits that were to be attained by this course of procedure, which are:

Benefits to be derived from issuing cards. Reduction in deadhead mileage now made necessary by moving cars towards repair point simply because defect card is to be issued and bill thereby authorized. Loss of service of equipment while engaged as above. Avoiding the correspondence now made necessary by requesting cards for cars that have passed receiving station. Avoiding correspondence and tracing for location of cars after cards are received. Saving in expense by reason of repairs which are made simply because card was secured.

I do not know whether I entirely misunderstood the gentleman, but what I have heard simply argues in favor of putting these recommendations into effect. I think Mr. Prickett, although he started off with the evident idea of throwing cold water on the plan, gives it the best send off. The only point I would take him to task for is that he seems to labor under the supposition that his cards would be the only ones issued. Now I suppose the Belt does issue defect cards, and if my recollection serves me right I have seen some of them. I do not understand why Mr. Prickett should not protect his own cards by officiating in the same capacity with his neighbor's defect cards as the party to whom those cars are delivered. If he delivers a car to a connecting line and they issue a C. & E. I. defect card, it simply works back to the last man without difficulty to intermediate and the final receiving line. He puts on the card and the car moves steadily on. Anybody familiar with trying to connect the defect card with the car after it passes through Chicago and out over the line, can readily appreciate how that correspondence and telegrams multiply. Then I think there should be somebody here that can appreciate this question from a transportation point of view, and the saving in equipment and dead head mileage. I know we have had to file defect cards without making any bills, simply because we found that when we located the car the repairs had been made. We do not know who made the repairs but possibly our money went on that car to make repairs, but we did not find it out, therefore we were out the amount of money expended for repairs.

Mr. Prickett: In answer to Mr. Grieb, I would like to ask how he knows that those repairs were made on his line.

Mr. Grieb: We located the car at some distant date and found that the repairs had been made.

Mr. Prickett: I am very sorry that Mr. Grieb states I am the only man that opposes this. I do oppose it simply because we are not the delivering line. If we were the delivering road it would be a different thing with me, but we are not directly the delivering road.

Mr. Schultz: Referring to the restrictions noted by Mr. Grieb, I believe the only restrictions that should govern are those laid down by the M. C. B. Rules. In repeating them we find—"No cards to be issued except for items duly on record in the office of the receiving line, which record shall at all times be accessible to the delivering line." I do not think any one will attempt to do this. "Cards to be issued strictly according to the M. C. B. Rules, and only for new defects and missing material." This is also very plain. "Cards not to be issued on cars property of receiving line when empty." As long as they are cardable defects they should be carded at the time so that no matter where the car goes to, anyone will know what the delivering line is responsible for. "Cards not to be issued for cars property of delivering line if the conditions are such as to insure the return of cars to point of receipt." We have no control over the operating department to compel them to return cars to delivering line when empty. If the cars are empty they may be loaded and sent back at any point. "Cards not to be issued under any circumstances after car has left receiving station." It would not be necessary to issue card unless to do so at the time of receiving them, therefore that circumstance would not arise.

Mr. Grieb: I would very much like to get an expression from our worthy Secretary, as I believe he has had a good deal of experience from an office standpoint of view on the Milwaukee Road, and could say if the remedy proposed is practical. The saving to be effected in avoiding the present practice of moving cars towards repair points simply because a defect card is issued, I think more than counterbalances any objections that have been raised this evening.

Secretary Kline (C. M. & St. P.): I have four defect cards in my desk now that I am going to send to our car accountant again tomorrow to have the cars located and cards applied or repairs made. All these cards have been out once and the correspondence is already pretty thick on some of them, yet they have missed connections and it will be necessary to trace further before the cards will do us any good. In regard to Mr. Prickett's objections to furnishing his cards to other roads, I can partly understand this, as there might be cases when we would issue his card for defects for which the Belt Railway is responsible, yet this is not likely to happen often, and if it should I am sure a little note to the Belt Ry. explaining the circumstances, will bring him an offset card. In regard to the extra labor he speaks of in tracing for rebuttal card, will say that this will be no more than he would do if a request was sent him for card. If he had a record of car coming on his road from a foreign line he would ask that line for a card and the car would be traced back to the point of damage before a defect card would be issued, so that the labor of tracing would be the same in either case. In regard to issuing cards promptly on request,—this would not help us out of the present difficulty at all. Three or four days would not help us out any, and even three or four hours would not do. The cards must the issued at once,—before the car leaves the yard, because after the car once leaves the card may be at hand one hour, one day or one month later and the labor of tracing will be the same in either case. With the defect card on the car it can go where it pleases and when it pleases and when it turns up at some repair point it can be repaired, bill rendered and the matter ended. Our inspectors have their shanty up in the yard where the trains are being made up, and if a car is delivered to us with defects for which the delivering company is responsible, a defect card of the company delivering the car, could be made out and attached to the car and nothing further need be done. It seems to me the plan outlined by Mr. Grieb is entirely feasible and if put into practice will result in a great saving of labor, correspondence, deadhead mileage, etc.

Mr. Marsh: I move you that we adopt the paper as presented by Mr. Grieb. Seconded.

Mr. Cather: The one point on which there seems to be a little controversy, and I think properly so, is that of making an exception of empty cars in the matter of issuing cards. I do not think there is any occasion to make such an exception. If the defects are cardable there certainly can be no harm in attaching a card to the car and the company making repairs can then bill the company responsible for the defects. If the car comes back to the responsible road they simply remove the card and make the repairs and that ends the transaction. I would like to ask Mr. Grieb if he could see his way clear to withdraw that part of the recommendation as made by him and I believe there will be no further trouble at all.

Mr. Grieb: I am willing to accede to Mr. Cather's suggestion, as I think that that would simply broaden the field of utility of this scheme, although it is a comparatively easy matter to control the movements of an empty car in order to get repairs made and collect for the same.

My idea in including it was to enter some restrictions so that nobody would find fault with having his cards applied possibly too liberally. We could work the scheme on basis proposed for some time and see that it panned out in practice, and then with the light of our experience possibly broaden it out or retrench it as may be found necessary, but in order to get the thing started I will offer no objection to withdrawing it. Motion put and carried.

Pres. Sharp: We will now take up Question No. 2. A car has long continuous draft timbers running the whole length of the car, broken on one end. In order to remove them it is necessary to take down the transoms, cross ties and air brakes. What labor charge should be made in replacing the draft timbers?

Mr. Wensley: I would like to ask what cars are equipped with timbers the full length of the car.

Pres. Sharp: As this is a subject submitted by an outside association, I cannot answer that.

Mr. Bates: I can say for the information of Mr. Wensley that the C. B. & Q. has cars where the timbers run all the way through.

Mr. Deone (Belt): I would like to inquire if the M. C. B. Rules make any provision for making an extra charge for removing draft timbers of that description?

Mr. Cather: I do not think there is any provision made for these long timbers. They all go alike, long and short. I have never had my attention brought to such a charge that the question would indicate. I think if we had a case of that kind we would endeavor to charge the actual time consumed.

Mr. Bates: We have a lot of those cars and of course it is always the other fellow who does the charging. I do not recall any case where anybody made bill against us for one of those sills or draft timbers, but as I look at it I think that it would be proper to charge the same as for draft sills, because they are practically draft sills. Of course there is a sub-sill above this timber but it is simply there to fill out the space between this long continuous draft timber and the floor and I think the proper charge would be the same as the charge for a draft sill. The subject was taken from the discussion of the Cleveland Car Foremen's Association, and they seemed to think that the proper charge would be for the actual time consumed.

Mr. Marsh: I do not think the charge should be the same as for draft sills. I do not think there would be as much labor required to renew a continuous draft timber as there would in replacing a draft sill, for this reason,—in replacing sills it is always necessary to open up one end of the car, unless it is done as someone repaired one of ours recently that had the tenon cut off at one end. I believe some time ago we had a committee appointed to look into the matter of proper charge for draft timbers, long and short, and I believe that that committee recommended that nine hours would be a reasonable charge for a long draft timber, that is a draft timber that runs past the transom, no matter whether it runs through an iron transom or around a wooden one. That would bring us to two draft timbers, 18 hours; then the extra charge to be made for removing cross ties and for removing the air apparatus. I believe an hour and a half would cover the charge on each cross tie and two hours would cover the removal and replacement of the air brake. That would bring us to 23 hours for the work, and I believe that that would be a reasonable charge. I do not believe it would take as much labor to remove a continuous draft timber as it does a draft sill.

Mr. Bates. I do not agree with Mr. Marsh. He says that it is not necessary to take out the end sill. I will say for his information that the draft timbers have on tenon and it is necessary to slack out the end sill and go through the same work as for a draft sill. You have to take down the transom, cross tie, air brake and everything else, and there is practically no difference that I can see.

Mr. Marsh: If that continuous draft timber is used as a draft sill then there is no difference. If that draft timber is tenoned into the end sill it is virtually a draft sill, over which there is a sub-sill to spike the floor to. I think it can properly be called a draft sill more than a draft timber, and charged the same.

Mr. Powell: I would like to inquire whether these cars that are spoken of have center or draft sills in addition to the draft timbers.

Mr. Bates: These take the place of draft timbers. There is a sub-sill above them, 5 x 5 inches. The sub-sill has one tenon and the draft sill catches the end sill just enough to have a tenon and that is all.

Mr. Powell: Under those circumstances, then, I should say the draft timber was a substitute for the center sill and labor charge the same as for applying center sill, with the additional labor charge of 75 cents for cars equipped with air brakes.

Mr. LaRue (C. R. I. & P.): I think the charge ought to be even more than that, for this reason,—you will have to go through the framing at both ends of the draft timbers and there is so much more than on the regular center sill that there ought to be a charge for that in addition.

Mr. Marsh: I do not think so. I think that the extra labor of removing and replacing the draft timbers in addition to the center sill, will offset the extra framing that there is on this draft timber, which virtually takes the place of the center sill. Neither do I think there should be any extra charge for removing and replacing the air brake, simply because the price of renewing a center sill covers the removal and replacement of the air brake.

Mr. Bates: I beg to differ with Mr. Marsh on that point. The rules provide a labor charge of 75 cents for removing the air brake, in addition to the labor charge for the sill.

Mr. Prickett: As I understand it, this sub-sill or draft timber is only used in low freight cars, such as furniture cars, where there would not be room enough to get the height of your coupler with the additional draft timbers. Now these lug castings are bolted on the long draft timbers, or center sills, and the end sills are cut out the size for your coupler to go through. This sub-sill is put above, about 6 or 8 inches higher, leaving room only to get the bolts in that fasten the lugs on and I think they can properly be called draft sills.

Mr. Powell: I make a motion that the term "draft timber" as used in question No. 2 is erroneous,—that it should be termed "draft sill" and that the labor for applying draft sills be used in like cases. Carried.

Pres. Sharp: Subject No. 3—What labor charge should be made for changing Butler pocket coupler?

Mr. Depue: The question is,—What labor should be charged for changing Butler pocket couplers. What for?

Mr. Bates: It applies to cases where a coupler is broken that has the Butler pocket attachment. As you all know, with the Butler pocket casting the pocket goes around the casting, and the spring and followers are inside that casting and the only way to get the pocket down is to cut out the bolts that go through these pockets and get it down that way. I have seen our men put in six and seven hours putting in a coupler with the Butler pocket. We do not think that it is right to put in six hours' labor on a job and only charge two for it. The company who uses the Butler pocket castings ought to pay for the extra labor required to take it down.

Mr. Wensley: We have not had much experience with the Butler casting on our road. We usually charge an hour for the tie bolts. There are four of them in there.

Mr. LaRue: There are some cars that I have in mind, and I am sorry to say that since those cars were built, I think it was in 1892, that the only way to remove the coupler and to get the Butler pocket down is to start on the outside sill and bore through the sills and strike the bolt heads as near as you can. I have made charges against that company for the actual labor performed and never had a bill disputed.

Mr. Powell: For the question involved, according to the construction of the rules, my opinion is, that you can charge only two hours' labor (so long as repairs are made solely on account of break in coupler), no matter what the construction of the casting. The rules allow two hours for applying a coupler, and there can be no additional charge over the two hours, irrespective of the actual time required in replacing the coupler.

Mr. Bates: We are all aware that only two hours can be charged. We know what the rules allow, but we claim that that is not proper. If a man wants to put such a thing as a Butler pocket on his cars he ought to pay for the actual time consumed in changing it.

Mr. Wensley: It seems to me with the number of couplers applied it will even up in the long run. Frequently we put couplers in where only ten minutes was required to replace that coupler. The next coupler may take two or three hours. Of course if you are going to specify each make of coupler you will have to make a separate price for each one.

Mr. LaRue: I think in this case it is no railroad company's cars that are equiped with the Butler pocket. It is a low draught car and the Butler pocket is put in between the two center sills and when the cars were originally built the bolts were put through there. The inter sill is very close to the draft sill. No holes were made or anything of that kind done to get those bolts out. The only way to get them out is to commence on the outside and bore through the side sill and bore on through the inter sills and in that way get the bolts out and the others in, and I think that there ought to be an additional charge when the Butler pocket is between the center sills.

Mr. Grieb: I would like to inquire, as a matter of information, whether there are a large number of cars extant today with that form of draft attachment, and whether any one knows of its being applied to new equipment at the present date. It seems to me from the scarcity of that particular class of cars up our way that there cannot be many in existence and I believe there are some roads that have representatives here tonight using that attachment who consider it out of date and are replacing it by a modern contrivance. It therefore seems to me that this evil will regulate itself in a short time. The belief that the M. C. B. Rules do not allow adequate remuneration is one of old standing, but the thing has run the gamut of its life and it is dropping out of every day occurrence. Since we have been guided by the M. C. B. Rules and charging two hours, we can very well continue it for the few cars in existence with that attachment and charge according to the M. C. B. Rules.

Mr. Nordquist: I believe arbitration case 415 will settle that case.

Mr. LaRue: I do not want to be understood as putting the Butler casting into disrepute. It is only the method of application that is bad. I think the Butler attachment is better than some that are applied today. As Mr. Grieb says, I do not believe that there are any cars being built with them at this date, but at the same time it is an evil and it has been demonstrated that it is an evil, why must the railroad companies be made to stand the extra expense? Why cannot the owner stand it?

Mr. Bates: I want to make a few remarks in reply to Mr. Grieb. He seems to think there are only a few cars around the country equipped with the Butler pocket attachments. There are thousands of cars, all over the country and I am somewhat surprised that Mr. Grieb does not know what cars they are.

Pres. Sharp reads Decision 415.

Mr. Cather: Just for the enlightenment of the members present I believe you will find by reference to the date that the rules under which that decision was rendered allowed two hours for the application of coupler and two hours for the lugs and the decision is based on the assumption that the Butler casting is the same as lugs, so that still, notwithstanding that decision, under the existing rules two hours only is allowed for the coupler and lugs.

Mr. Grieb: I would just like to ask if that decision does not apply to the replacement or renewal of the Butler casting. As I understand it, the question before us is the replacement of a coupler, not the casting. Two different questions.

Mr. Bates: In order to renew a broken coupler that has the Butler attachment it is necessary to take down the Butler pocket and the whole outfit in order to get it back.

Mr. Marsh: Does that Arbitration Decision cover the rules at the present time or have the rules been revised and that particular part cut out of the rules?

Pres. Sharp: The labor charge for the application of the lug castings has been cut out of the rules.

Mr. Marsh: If it is a fact that the rules have been revised since that Arbitration Decision was rendered and we go back to the two hours for the replacement of a coupler, then I do not see where people who have the Butler pockets should pay very much more than the man with the ordinary pocket. It is a fact that in order to replace a coupler where a Butler pocket casting has been applied that there must necessarily be four bolts removed and I do not believe that under the rules you can charge more than two hours. At the same time I believe there is a little more labor involved in renewing a coupler where the Butler pocket has been applied than there is with the ordinary pocket attachment, simply because the four bolts have to be drifted out and the pocket must be taken down, but under the M. C. B. Rules the labor charge is the same for this or a spindle or a pocket coupler. I do not think one hour additional should be allowed. Neither do I think that any man who built cars and put the Butler casting on the draft sills should be charged what the whole car is worth for making that one mistake, if it is such.

I move you that it is the sense of this meeting that the present M. C. B. Rules cover the question, that the charge of two hours is proper. Carried.

President Sharp: We will now take up question No. 4. One of A's cars is damaged on B's road as follows: Two draft timbers and coupler broken at one end: at opposite end of car one draft timber is broken. Bill is rendered against the car owner for the one broken timber, claiming that according to the rules, as there was no combination denoting rough usage at that end, that bill is proper. Owner objects to charge on the grounds that in-as-much as the car was in rough usage, as indicated by the damage at one end of it, that no charge should be made for damage at opposite end, even though no combination existed. Which is correct?

Mr. Dunn: (C. M. & St. P., Stone City, Ia.) I would consider B's road responsible for two draft timbers and coupler broken at one end, also one broken draft timber at opposite end. In my judgment A has a right to object to charge, as the case goes to show that car received rough usage while on B's road.

Mr. Schultz: I agree with the gentleman from Iowa, because it denotes rough usage. The fact that the car was damaged at the other end, does not relieve the party that did the damage even though it did not form a combination at that end, because all the items show that the car was roughly handled, and under the rules it cannot be charged to the car owner.

Mr. Marsh: Really I do not see much in the question. Certainly a combination existed at one end of the car and simultaneous damage at the other end. Now in my opinion it is just as reasonable for a road to break a draw bar, draw bar stop, draft timbers, and sill, end posts or smash in the whole end of the car, put on the coupler, coupler stops and draft timbers as defects denoting a combination and charging for the rest of it. If they broke one end of that car they broke the other. If a man breaks the entire end out of a car he should repair it at his own expense. I do not believe that the M. C. B. Rules ever intended, when they specified the various things denoting rough usage, that a man should repair those free of charge and repair the other damage at the same time and charge for it. I do not think the owner should pay a cent on that car.

Mr. Gather. This is a question that I submitted some months ago to the committee on subjects and at the time was in dispute between our company and an eastern road, who through error originally billed for the whole thing, draft timbers at both ends and a coupler also. Objection was made to the bill in the usual manner and it was corrected by eliminating charge for the end where the conflict existed and they maintained for some time that the damage at the other end was owner's defects, no combination having been broken at that end, and on the strength of their argument this question was submitted. However, that bill was settled long ago by charges being withdrawn. I believe it is now generally conceded that there is no argument but that where a car is damaged in rough usage the whole damage if done simultaneously with that rough usage, whether at one end or both ends, is at the expense of the road damaging the car. Of course that would only apply to damage actually sustained in accident and would not apply to damage to some other part of the car entirely, something like missing roofing, or defects of that nature that could not be damaged in an accident affecting the draft rigging. With a view of finally disposing of this case I make a motion that B is responsible for all the damage. Carried.

Pres. Sharp. In regard to the proposed day's outing, will say that we have been trying to arrange for a boat excursion down the drainage canal and it would be a very good plan for the members to furnish the officers with an estimate of about how many would go, providing the ladies are to go along. The boat we found is small, will acommodate about 200 people, and another small boat that will accommodate about 75 or 100. Of course the size of the crowd that will go will figure a very prominent part as to whether we go down the drainage canal or not. It would be well for the members to talk this matter over and get all the information you can after this meeting, or feel at liberty to write to us what you think about it. We are open to suggestions before closing up this arrangement.

We went to the drainage canal excursion company and they have a boat that they will grant the entire use of for the day for $75.00. They leave the docks about 10:00 o'clock, returning there about 7:00 o'clock in the evening. However we would control that for that day. The boat will accommodate 211 people, and to be sure of just what we were talking about Mr. Grieb, Mr. Miner and myself went over to the docks this evening and inspected it. It was not to our satisfaction, a little small. Personally I have never been down the drainage canal by boat and I believe there are others who would enjoy this trip. The Santa Fe railroad offered to take us down on one of their trains free of charge. A trip across the lake would surely be a very pleasant one and it is a matter for the members to say as to where we are going to go. The members in general should decide the kind of an outing we will take, and I for one, should say if we go across the lake we ought to take one of the very largest boats so as to have a good smooth road and then there would not so many of us have to feed the fishes.

Mr. Schultz. What I have seen of the Drainage Canal does not impress me very favorably as a place to spend the day for an outing. There is practically nothing to see but the two spoil banks and a few bridges and the controlling works at Lockport, which is only interesting as a great engineering feat, but for a day's outing for pleasure I believe a trip across the lake would be preferable. The Williams Transportation Co., and the Graham & Morton line run boats across the lake to such points as South Haven, Benton Harbor and St. Joseph, Mich., and the fare is but 50c each way, and we could probably get the boat company to furnish refreshments at a small additional cost.

Pres. Sharp. What started us to talking about going down the drainage canal was for the benefit of the members inspecting the work,—that is, the engineering features of the drainage canal. It is a good deal like the Masonic Temple. How many of us have been on top of that. Any one coming to town, the first thing they do is to go to the top of the Masonic Temple. Consequently the drainage canal has come into prominence and everybody wants to go and see that. The matter may be decided by a vote of the members. The secretary will mail each one of you a return postal card at an early date, and you will assist the committee by giving us your very early reply. I trust however that you will all make it a point to go on this annual outing excursion. Bring your wives and families with you. Let us make this a red letter day of the association, and each and every one plan to bring your friends with you. It will prove a lasting benefit to the association.

Mr. Powell. I might say a few years ago I used to ride the wheel a great deal and one morning a party of friends and myself started to ride along the drainage canal to Joliet. They were just working on the canal at that time, had all their implements there and it was very interesting. At the present time all you can see is the ditch full of water and I do not imagine anything aside from the controlling works would be very interesting. Any one who is an engineer looking into the technical features might find something interesting, but for the majority of us who are not educated along that line I do not think we would gain a great deal by the trip.

Mr. Bates. I would very much prefer a trip across the lake. I do not care about going down the drainage canal as I have seen it often enough.

Mr. Marsh. I simply wanted to ask if it is the intention to take the family along, that is the lady and the children. If we take one of the small boats down the canal I do not think we could take the children along. If we go across the lake we can take our families and some of our neighbors' children if we are afraid people will think we have not been doing right. For the first quarter of a mile down the drainage canal you could see all the bank you wanted and the rest of the way you would get so sick of it you would never want to see it again.

Meeting adjourned.

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IN another part of this issue will be found an article on flues, by Mr. W. H. Graves who, before writing this article, secured the opinions of some twenty or twenty-five roundhouse boilermakers in bad water districts. Mr. Graves gives not his own ideas entirely, but expresses the experience and opinions of a number of boilermakers located in different sections of the country.

A NEW apprenticeship system has been established at the Baldwin Locomotive Works, which is similar to the old apprentice scheme, but upon rather different lines. The Baldwin Locomotive Works are certainly to be commended for the broad and liberal spirit in which they are instituting this new departure in the apprentice system. We give, in another part of this issue, a fuller description of the scheme.

THE exhibit of machinery at Glasgow, judging from descriptions given in the foreign papers, while not of course comparable in size with the recent Paris Exposition, is of very considerable extent. Engineering of London, in a recent issue, publishes a most interesting article in regard to it, and the September number of Cassier's Magazine, of New York City, contains an article which confines itself to a description of the engines and boilers actually employed in the electrical service.

THE American locomotive abroad seems to be attracting more than usual attention. "British vs. American Locomotives" is discussed in a recent number of Indian and Eastern Engineer, published in Calcutta. The Engineer of London takes up the subject and the railway press of this country is commenting on the American locomotive in India, in Egypt, in Jamaica, in Japan and elsewhere. In view of this a report from Mr. Dean B. Mason, vice and deputy consul-general for the United States, at Berlin, will probably be of unusual interest to our readers. We publish Mr. Mason's report in full in this issue.

A MOST interesting article by Mr. Peter Lueders has recently appeared in The Engineering Magazine on "American Machine Shop Practice from a German View-Point," in which the author explains the success of American machinery as being due to the fact that in this country the engineer and his assistants work together. In Germany the engineer does not believe in this kind of friendly co-operation, the relation of the chief engineer toward his draftsman in respect of knowledge and standing being mostly the same as those of the officer to the common soldiers.

WE have received from Mr. Willard C. Tyler an article recently published in Japan, on American vs. English locomotives, an extract of which will be found in another part of this issue. While the railroad referred to in the article has some fault to find with both classes of locomotives and bestows praise upon each as well, its estimation of the comparative value of the American as against the English is shown in their continued purchase of locomotives of American manufacture. This article was deemed of enough interest and importance to find a place in a recent number of the Consular Reports. Mr. Sam'l S. Lyon, United States consul at Hiogo (Kobe), Japan, under date of July 31 sends the article to the Department of State and says, referring to the views of the Sanyo Railway Company relative to respective merits of the English and American locomotives: "It will be observed that, although British consular reports state that the end is in sight for American locomotives in Japan, this company, so far as it is concerned, emphatically disagrees with that view of the subject."

A SYSTEM of air fans for cooling and ventilating passenger cars on railroads, perfected by the Safety Car Heating & Lighting Company, has attracted our attention. We find that a train on the New York Central has just been equipped with these fans and is now in service, while on a Pullman car running on the Erie Railroad from Jersey City to Tuxedo, there have been two in operation for some time. The plan followed is certainly an excellent one, being both feasible and economical. Two fans are placed in each car diagonally opposite and are made to revolve by means of compressed air furnished by an additional air pump on the locomotive, the air thus supplied being conveyed the entire length of the train by means of the steam pipe, which heretofore has served no purpose during the summer months. On each car is placed a storage tank into which the air is first carried and from there it is taken to the fans by means of a very small pipe. The fans weigh only about six pounds each, and when this is compared with an electric fan weighing between 25 lbs. and 30 lbs., one of the advantages possessed by the air fans becomes at once apparent. Another superior feature is found in the fact that these fans not only stir up the air in the car but introduce into it a large amount of cold fresh air as long as the fan is operated. Each fan is made to turn on the reaction principle and its efficiency and simplicity is undoubted by all who have thus far looked into the system. There would seem to be no question but what the device will prove extremely popular and greatly add to the comfort of American travelers.

IT is announced that a plan for the abatement of smoke in the New York Central tunnel has been prepared by the management of that road. This tunnel, which consists of three bores, the central one having two tracks and the smaller ones a single track each, is ventilated by openings into Park avenue. In the plan proposed the side tunnels, which are ventilated by side openings into the central one, will be used for the operation of electric locomotives for the suburban service. The through trains, drawn by steam locomotives, will use the central tunnel, which is to be better ventilated, so that it is thought that as the through trains will not be very close together there will not be any trouble from smoke. A railroad that can handle between five and six hundred trains a day in the tunnel and terminal yards of the Grand Central Station, which was built over a quarter of a century ago, and has had almost no accidents can be relied upon to furnish the very best solution of the problem which is now confronting it.

WHILE there is no question but what the efficiency of the draft gear must be increased, still, as pointed out in our issue of July, the improper handling of the cars in freight yards is responsible for the greater part of damage to couplers and draft rigging. This may be a necessary evil and perhaps it is impossible to get the train crews and switchmen to handle the cars with proper care. Along this line Mr. H. Englebright spoke very interestingly at the August meeting of the Pacific Coast Railway Club, in his answer to the question: "With larger cars and heavier train loads, is the draft rigging sufficiently strong to meet the present condition of service?"

We quote from his remarks as follows: "If, by referring to draft gear, the ordinary wooden draft timbers, and as generally applied to the center sills of freight equipment, are meant, I think the question easily answered.

MR. R. S. LOGAN.
VICE-PRESIDENT AND GENERAL MANAGER CENTRAL VERMONT RAILWAY.

Mr. Logan, soon after the resignation of Mr. Chas. M. Hays as general manager of the Grand Trunk Railway System, was advanced to his present position as general manager of one of the roads closely allied to the Grand Trunk. He was associated for a number of years with Mr. Hays as his assistant.

"Any one who has any doubt about the matter should visit the terminal freight yard of any trunk line and watch for a half day the present up-to-date methods of switching cars. When he comes away, ask him the question under discussion and you will probably receive an emphatic "no" as an answer. If, however, he is not convinced, let him pass to the freight repair track, and he will find there that a large per cent of the repairing is on draft rigging and attachments. A look at the scrap and wood piles would also be convincing. He would see broken timbers, draft jaws or stops, couplers, knuckles, springs, and other things too numerous to mention here, which all speak of draft rigging that is not strong enough to stand the present service.

"The M. C. B. coupler was designed for the primary purpose of allowing cars to be coupled without the necessity of causing a man to go between them. They have greatly lessened the number of men who have been maimed and killed, and in that way it is much more to be desired than the old link and pin arrangement. But since the switchmen do not have to run any danger, they do not run cars together as slowly as before, allowing them to crash together with great force and consequent damage to sills and draft gear. If the draft gear is strong enough to stand it for a time, the end of the ordinary large capacity box car is not, thus, in many cases, resulting in damage to the carried goods. I think that when the question in hand was asked, it should also have inquired if the ends of box cars as now constructed are stout enough to stand the ordinary usage of the present service. In my opinion they are not strong enough to stand it.

"In building the large-capacity box cars, it seems that extra attention has been paid to large journals, metal bolsters, extra truss rods, etc., while the ends and draft rigging have not received the proper amount of attention. If the question was asked of a switchman, 'Why is it necessary to handle cars so roughly?' he would probably tell you that the work could not be done in a given time; in other words, trains must be made up and cars delivered from incoming trains, but as the work is rushed, the cars, and particularly the draft gear, must suffer. It is a case of waste at the bung-hole and saving at the spiggot."

Communication

To the Editor of the Railway Master Mechanic:

I would like to call Mr. Cushing's attention to the fact that the word type is quite flexible and that the "Prairie type" is less of a new type than is Mr. Marshall's engine class J (although their outlines are similar), in that the Prairie type is a Mogul engine with wide fire-box and trailing wheels and 64-inch drivers, and has nothing new in detail or dimensions, and is incapable of taking ten or twelve passengers and keeping up on the Lake Shore, or other similar good track, a 60 or 65-mile-an-hour gait, which class J engine, of Mr. Marshall's, will do, because of the three pair of 80-inch drivers forward of the wide fire-box, necessitating flues nearly 20 feet long, a distinctly new departure, never before combined in any locomotive anywhere in the world. If the greatest power and high speed in an engine constitute a new type, the Marshall engine stands alone, since they can perform what neither the Prairie or Atlantic type can approach. The Atlantic type is a good attempt, cut short, the Prairie type is similar, while the Marshall type is the carrying out to perfection of all possible details and dimensions. The Prairie type would make a most excellent fast freight engine with her 64-inch drivers, but there is no road in the United States that would care to keep up the repairs on such an engine if run continuously on trains requiring 60 miles or over per hour, inasmuch as it is not the miles an engine makes that puts her in need of an overhauling, but the number of revolutions.

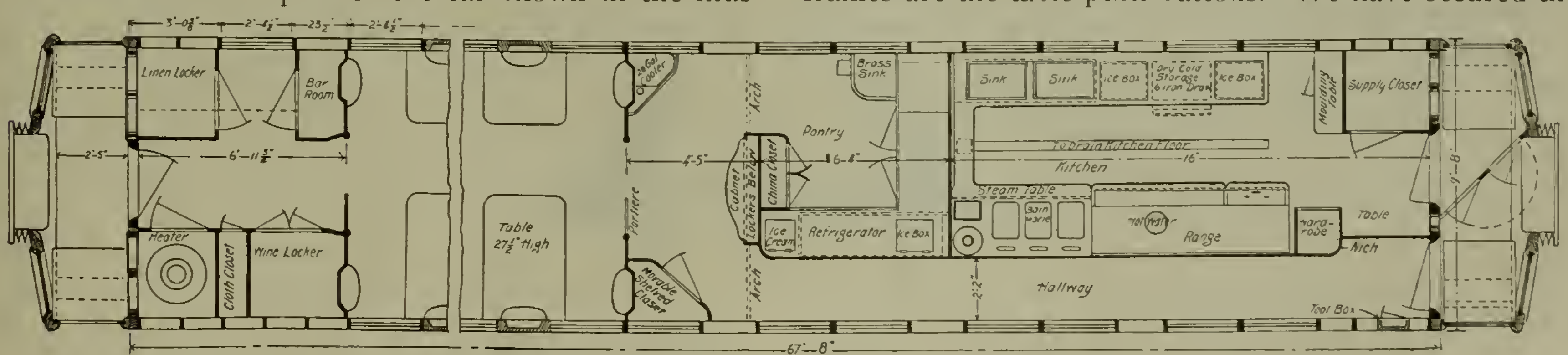
Frank C. Smith.

New Dining Car on the Denver & Rio Grande Ry

IN line with an extension of the dining service on the Denver & Rio Grande Ry., a dining-car has been recently received from the Jeffersonville, Ind., plant of the American Car & Foundry Co. This car not only represents the latest ideas in general respects, but is unique in several particulars—having extra heavy trucks (39,000 lbs.), which have the new style brakes wherein the ox-yoke connections are discarded. The car has a total weight of nearly 60 tons and the body is built on sills of exceptional strength and bracing. The two floors—first of oak and second southern pine—have three thicknesses of deafening paper between, while the hallways, pantry, platform and steps are all covered with rubber matting. The body of car is trussed on sides with iron cantilever overtrusses and all openings are weather-stripped, so that the car is practically weatherproof as well as noiseless and easy riding.

In addition to the plan of the car shown in the illustration, it will be well to add that the ice boxes under the car are very accessible, and the three short kitchen tanks may be filled from top or bottom. These tanks drain from the kitchen, and it may be remarked that no drainage from the car can touch or splatter the trucks. All ice boxes and bins in the kitchen and pantry have sliding secret locks, while the dishes in pantry are all closed in, and the entrance from pantry to dining-room is much wider than usual. The upper and lower deck is solid over the large and roomy kitchen, which is appointed with a steam table, drop pastry table and chill box of the latest description.

The china closet and buffet are in one, which is smaller than usual. The wine lockers reach up to clear story, with sliding ice trays between, and the linen closet adjoins cigar case. The lighting is with gas, and the interior finish is in natural mahogany with a plain but rich effect. Between each window is a fern recess, backed with bevel plate glass mirrors, in the base of whose frames are the table push buttons. We have secured the



FLOOR PLAN DINING CAR, DENVER & RIO GRANDE RY.

comment of the conductor in charge of this car, which we print as containing some points worthy of attention—for the men working with the car are the ones to note any inconveniences. He says: "After making a trip on the car I will say that I have not seen its equal in an ordinary service dining car, and the way the car rides in the train, especially around the sharp curves of the D. & R. G. Ry., is better and smoother than any other car I ever handled

INTERIOR OF DINING CAR, DENVER & RIO GRANDE RY.

—this being due, I suppose, to the solid construction and extra heavy trucks. As to the arrangement inside, I note the roomy dining-room, pantry and kitchen, which enable the men to work faster. The lockers in all three parts of the car are most complete, this being a feature where most dining cars fail, the general ideas of most builders being to make fine only the part of the car that the patron will see, forgetting that a workman cannot do good work without good tools and a convenient place to keep them in. The small buffet can be kept more of an ornament and not a catch-all in the hurry of a big dinner, at which time it often becomes anything but an ornament. The greater space in the entry to the pantry assists in avoiding confusion among the waiters. The conductor's lockers are very complete, with a small buffet that holds all wine glasses, etc. This facilitates the serving of wines and refreshments at table and does not make such service too conspicuous. Also, the window over the buffet gives light enough to allow the sale of a cigar, etc., without going into the body of the car. Among the many other little points I might say that the natural wood ceiling makes a much pleasanter car and lights up much better than a canvas ceiling. The patrons are high in their praise of the car in all its features. Where it can be improved I cannot suggest."

Additional Duty on Emery Wheels

Consul-General Mason writes from Berlin, August 16, 1901: "It will interest certain exporters of machine-shop appliances from the United States to know that a recent decision of the imperial German customs office reclassifies emery wheels, and doubles the duty hitherto levied on that class of imports. German-made emery wheels are usually manufactured of pure corundum, the hole which is pierced through the center of the disk fitting round the shaft or spindle without any metallic support. As a consequence, it happens that such a wheel sometimes works loose on the shaft as a result of disintegration from vibration. To prevent this, American manufacturers of emery wheels are accustomed to line, or 'bush,' the central orifice with Babbitt metal, iron or some other metal that will give a firm seat to the shaft. Hitherto these 'bushings' have been generally covered with a label bearing the name of the maker, size, number, etc., and the metallic portion thereby concealed. Recently, however, this has been discovered, with the result that emery wheels so provided with bushings are classified for duty as metal in combination with corundum (Schmirgel), which increases the rate from 3 marks to 6 marks ($1.42) per 100 kilograms. This rate will not seriously affect the trade in the smaller sizes of wheels, but as they are made and used in all diameters up to 3 feet, the increased duty will have a tangible effect on the net cost of the larger sizes."

The Locomotive in Japan

FROM the Japan Daily Advertiser's issue of August 8, containing an article on American and English locomotives in Japan, reprinted from the Kobe Herald, we publish the following regarding the experience of the Sanyo Railway Company with both makes of locomotives.

"It may be recalled by some that considerable discussion on this very question of the comparative merits of the British and American locomotive took place in the columns of some of the foreign journals of Japan some few years ago—in 1895, to be precise. A budget of letters appeared in this journal in connection with the claims made for the American engine by Captain Crawford, of the Baldwin Locomotive Works, of Philadelphia, who came to Japan in the spring of 1895 and introduced the American locomotive to the railways of this country. At that time, the experience of American engines on Japanese railways was, of course insufficient to admit of any general deductions being made, and the controversy that occurred was entirely based on facts alleged as to the construction of the American and British types, and on experience in other countries. An actual trial of an American against an English engine was made near Gotemba, on the Tokaido line, but the result was disputed, and a final verdict does not appear to have been reached.

"In the interval, the Japanese companies have had full opportunity of arriving at their own conclusions on the merits of the two types of engine chiefly competing for their patronage. In view of the recent discussion in the United States and in England, and in view of the general interest of the question, considerable importance attaches to those conclusions. We are able, through the courtesy of the Sanyo Railway officials, to give the results of the experience of this, the principal local company—one of the most enterprising railway corporations in Japan. In brief, it may be stated at once that the testimony of the Sanyo Company's officials is wholly against the British locomotive.

"The Sanyo Company has been using American engines for six years. They had before used British engines only, and so favorable is the opinion formed of the American engine as against the British that the company does not at present contemplate ordering any more British locomotives. On the other hand, the company ordered eight locomotives from the well-known American works at Schenectady, New York State, as recently as May of this year, and they have at present ten engines on order from the Baldwin Works, of Philadelphia. The Herald representative was given to understand that the Sanyo Company has altogether thirty-three American locomotives at work, exclusive of those about to arrive and those recently ordered. The company has twenty-four English engines. In reply to questions as to the reasons for the company's abandonment of the English engine the officials said: 'We do not intend to order any more English engines just now. Our principal reasons are that we cannot get them quickly enough, and that they cost one and a half times more than the American engine.' From figures quoted to the newspaper representative, it appeared that the American engine costs the Japanese buyer 20,000 yen ($10,000*), against 30,000 yen ($15,000) as the cost of the British engine. Moreover, the period within which delivery is made of the English engine, after order, is from nine to twelve months, as against seven to nine months in the case of the American manufactured. 'And we always want quick delivery,' the company's representatives added.

"The principal fault alleged against the American engine in England is its comparatively great consumption of fuel. On this point the Sanyo Company's early experience, it seems, corresponded with that recently described in very positive terms by the locomotive superintendent of the Midland Company, of England.

"Now, however, the Sanyo Company finds, 'we can run American and English engines upon nearly the same consumption of coal. And the American engines work as well as the English engines. The coal consumption of our American locomotives used to be great in comparison, because we only began to import them years after we had the English engine, and their working was new to us. Now, however, we find that the consumption of fuel is about the same with American and English engines.'

"On the question of the relative durability of the two locomotives, the Sanyo representatives say they believe that the 'life' of the American locomotive will be shorter than that of the English engine, but they had not actually found that this was so as yet—simply because their experience was not extensive enough so far. The company, it appears, has never yet broken up an engine owing to its age. The locomotives of their first purchase are still running and repairs are always effected so as to keep them going—parts being renewed as they become unfit for use. Some interesting particulars were given in response to an inquiry as to the points wherein the American locomotive was found superior to the English engine. The tire was instanced. The Sanyo officials find that the tire of the American engine lasts better than that of the English product. The steel seems to be harder and therefore more durable. Then the sight-feeding lubricator is found an advantage in the American locomotive not possessed by the English manufacture. Also, the American type provides a more comfortable driver's cabin. Again, the American engine is provided with air valves for the cylinders—omitted in the English engine. gine.

"The English engine has countervailing points of advantage, as admitted by the Japanese experts. The work-

*In round numbers.

manship of the American engine, it was stated, is rough—very rough, sometimes, while that of the English engine is good—very good, in fact. The boiler in American engines is found more liable to leak than the English boiler, which is very tight and well fitted. In American engines, the construction has been found to be more scientific and original. The English engines showed inferiority of design, but the workmanship is very good. In fact, the old observation recurred even here; the English manufacturer is much more conservative than the American, who, however, is less thorough. The main observations of the Sanyo Railway officials on the question at issue have been set forth. They are given as told to the representative of this journal, and tthe unprejudiced verdict must be that the testimony is entirely against the British manufacturer and his product, as the practical result of the company's experience is that no further orders are likely to go to England or to firms representing English locomotive manufacturers."

The Brill New Semi-Convertible Car

THE accompanying illustrations are made from photographs of the exterior and interior of a new type of semi-convertible car from the Brill Company's works. The design is one that was first made earlier in the year for the Washington, Alexandria & Mt. Vernon Railway. The design possessed so many satisfactory features and seemed to be worked out in such a complete manner in all its details that the managers of the Beaver Valley Company, who were about to order a large number of cars, decided when they saw the Washington, Alexandria & Mt. Vernon car that it suited their wants exactly. They immediately gave an order for a large number, which have just been shipped.

A word of explanation may not be out of place with regard to the terms convertible and semi-convertible cars. The general acceptance of the word convertible cars means one which when open has side entrances, side steps like the ordinary open car, gaining in this way all the advantages of rapid loading and unloading. In fact, it differs from an ordinary open car structurally rather than in any other detail. As a closed car it has end entrances only and is like the standard box car. Its windows are usually of the same size and its platforms and doors conforming to the standard types. The semi-convertible car differs from the convertible in many important respects. It has large windows which come much lower down than those of the standard closed car type or those of the convertible car. When open or closed it is provided with end entrances only and the centre aisle. The windows and occasionally a portion of the side panels have usually been made removable and when the car was used for summer service these panels are taken out and stored, leaving a car body with cross seats and centre aisle and a side so nearly open as to make it quite as pleasant for passengers as an open car. The lack of side entrances naturally make such a car somewhat slow to load and unload, but there are many advantages in the fact that the side panels are stationary. This gives an increased strength to the car body and it also makes it safer in case of accident than an open car pure and simple. Because of the greater window space in the semi-convertible car, the window rail being dropped lower, they are much more satisfactory than a standard box car with its windows opened. Wherever the type has been used it has become a great favorite in spite of the many serious disadvantages of the older types of semi-convertibles.

The new Brill type has several material advantages over cars of the same description as hitherto built. In its details it is a marked improvement over them. In general appearance it is much like the ordinary car, but the windows are larger and the window sill is lower. The sash are not removed for storage, nor do they, as in some semi-convertibles, drop into pockets within the walls. The objection of this method of disposal of the sash is that the pockets take up space in the wall of the car and thus reduce the available width inside. They also make a space into which refuse is thrown, which interferes with the handling of the sash and also makes the car offensive. In semi-convertible cars, which have been so popular in Baltimore and on the Newport, Covington & Cincinnati roads, the sash and panels have been removable. This is a practice which necessitates a great deal of labor at the car barn in taking out and storing the sash in spring and bringing the sash down and putting in place in the fall. It not only takes time, but is also an expensive operation attended with a percentage of breakage which is unnecessary. It is also attended with the same disadvantages that are found in using the standard open car—it is necessary to guess at the season of the year when they can be put on to advantage combined with the unavoidable loss which is experienced by having cars in service which are out of season. In spite of these objections the semi-convertible car has been very popular on city and suburban lines and has had a large field of usefulness. It is more comfortable on long rides than the open car and where the speed is high is also much safer. It also has the advantage that when passengers enter or leave the car they do not disturb those seated on the outer end of the seats. This is a constant form of annoyance with the usual form of seats having side entrances. These points taken together have no doubt had no inconsiderable influence in maintaining the semi-convertible car in service.

The car illustrated differs radically from anything heretofore produced. It has end platforms and entrances with the centre aisle of the convertible car and also the

Exterior Brill Convertible Car.

cross seats, but the sash, which are of the largest size, are not removed from the car, which is entirely self-contained. The sash are double and when the windows are to be opened they slide up into pockets in the car roof out of sight and out of the way, yet always ready to be dropped in place at a moment's notice. The time required to raise them into the roof or to bring them down again is practically less than that required for raising the ordinary heavy window of the closed car. It will be seen at once that the advantages of this construction are numerous. There is no removal of the sash for storage and consequently no more breakage than of sash in a box car. The sash always fit the window and there is no expense in handling. The most important point, perhaps, is that there is no delay in putting the open cars on in spring or taking them off in the fall. During any warm day, or even any warm afternoon, they may be utilized as open cars, because the change can be made from a closed form in the matter of five minutes time even while the car is in operation, hence it is possible to take advantage of every warm day in the early spring or late fall without subjecting the management to complaints of running cars unseasonably. On the other hand, in the summer during foggy, cold, windy, inclement weather the cars can be closed without interfering with the service and without delay. These are advantages which railroad men will not be slow to appreciate.

The construction is a very ingenious modification of the Brill convertible car; the sash are in two sections held in the usual way in the posts, but there are a pair of grooves on each post into which trunnions on the sash fit. When it is necessary to raise the sash the lower one is lifted a short distance when it automatically engages the upper sash and carries the latter along into the roof of the car, depositing it in its own pocket and itself sliding on until it drops over a switch which holds it in place and at the same time prevents it from moving or dropping. When in the roof both sash are completely locked and cannot fall. The brass work and mountings are particularly strong and large and in fact they are of sufficient size to give the hand a firm hold on the sash. In this respect they form a marked contrast to the skimpy and insignificant hardware commonly employed on both steam and electric cars. The operation of lowering is as simple as that of raising and is almost precisely the same motion as is used in dropping the sash of an ordinary street car. There is a slight forward and upward motion when the lower sash comes down into place, bringing the upper sash with it, both locking themselves fast when in position. The sash are not hinged to each other and

Interior Brill Convertible Car.

Exterior Brill Convertible Car.

are entirely independent. The sash can be raised and held by the sash-lock at any desired height; this can be done by the passengers the same as the window of a steam car is raised as long as the sash is on a vertical line with the post. The avantages of this form of construction are very great. The interior of the car is of the ordinary form, the ventilator or monitor deck can be made any desired width or height. The car itself is suited to any season; it is a closed car on every cold or inclement day and open on warm or pleasant days at any season of the year; in a word it is a car that suits any particular day in the year and in the changes involves no expense and no danger of breakage of glass or damage to sash. There is also another line of advantages. The seats are placed between the posts and a considerable space is utilized which ordinarily serves no purpose beyond that of forming a pocket for the sash. The lining is set in between the posts and the ends of the seats and between them in such a way as to make available about six inches greater inside width than in the ordinary car with flush lining. These six inches can be divided between the length of the seats and the aisles. At the same time this gain of width is made a truss plank is introduced and on it the entire end of the seat rests. The truss plank is edge bolted to the sills and also screwed to every post; in this way the car has all the advantages of a solid side.

In the construction of the roof a very material gain is effected, because in addition to the ordinary rail, a heavy letter board is gained upon the posts so that with this rail and lining and the plate, the roof has nearly as great a cross section of timber as the sill. The roof is as strong as any that we know, if not stronger.

The following are the leading constructive features of the Beaver Valley Traction Company's cars: Length over the end sills is 30 feet; width 8 ft. 1-2 inch. There are 11 windows on a side with the usual monitor deck and deck sash. The gauge is 5 ft. 2 1-2 inches, the standard in the state of Pennsylvania for street railways. The cars are mounted on Brill No. 27-G trucks with four GE-54 motors to each car. They are provided with electic brakes, and also with Sterling brakes for hand service. The inside finish is 3-ply birds-eye decorated with mahogany over the windows. The extreme height over the trolley board was limited to 7 ft. 6 in. One point of considerable importance is the fact that Brill track scrapers were applied to each end of the car. For suburban lines these track scrapers are in the highest degree valuable. Not only are they useful in preventing delays during the beginning of ordinary snow storms or light snows too, they save may derailments of cars from washing of sand or gravel on to the track. A small overflow during a heavy rain may wash sand and gavel enough on to the

Interior Brill Convertible Car.

rails to send a car off and block the whole line for hours. With the Brill scraper there is no difficulty in running though such overflows without danger or delay. The cars were fitted with angle iron bumpers, Brill gates, push buttons on each post and two oil head lights and Dedenda gongs. The round stationary vestibules had folding doors at the step openings which were removable.

A careful examination of these new cars will convince most railroad men that the new design furnishes a successful solution of the semi-convertible car problem. The extra length of sash and the ease with which they are handled and the material gain in the length of the seats, amounting to some six inches, and the width of the aisle, are features which will assure its recognition and adoption. The gain of width obtainable by placing the seats between the posts is an important matter as it is obtained without sacrificing any structural features. The car sides, in fact, being quite as strong and rigid as that of any type commonly used.

The New Apprenticeship System of the Baldwin Locomotive Works

AFTER giving the subject long and careful study the Baldwin Locomotive Works has successfully inaugurated an apprenticeship system, designed to aid in supplying a high grade of workmen especially fitted for positions of assistant foremen, foremen, etc. The general outline of the plan is given as follows, by the company:

In view of the fact that in recent years manufacturing has tended so largely toward specialization that young men apprenticed to mechanical trades have been able in most cases only to learn single processes, and, as a result, the general mechanic has threatened to become practically extinct, to the detriment of manufacturing interests generally, the Baldwin Locomotive Works have established a system of apprenticeship on a basis adapted to existing social and business conditions. Apprentices are taken by them in three classes.

The first class will include boys seventeen years of age, who have had a good common school education, and who will bind themselves by indentures (with the consent of a parent or guardian in each case) to serve for four years; to be regular at their work; to obey all orders given them by the foreman or other in authority; to recognize the supervision of the firm over their conduct out of the shop as well as in it; and to attend such night schools during the first three years of their apprenticeship as will teach them, in the first year, elementary algebra and geometry; and in the remaining two years, the rudiments of mechanical drawing. The second class indenture is similar to that of the first class except that the apprentice must have had an advanced grammar school or high school training, including the mathematical courses usual in such schools. He must bind himself to serve for three years, and to attend night schools for the study of mechanical drawing, at least two years, unless he has already sufficiently acquired the art. The third class indenture is in the form of an agreement made with persons twenty-one years of age or over, who are graduates of colleges, technical schools, or scientific institutions, and who desire to secure instruction in practical shop work. The indentures or agreement in each case place upon the firm the obligation to teach the apprentice his art thoroughly and to furnish him abundant opportunity to acquire a practical knowledge of mechanical business. The firm is also bound to retain the apprentice in service until he has completed the term provided for in the indenture or agreement, provided his services and conduct are satisfactory. In all cases the firm reserves the right to dismiss the apprentice for cause. The rates of pay in the different classes are as follows:

	Per hour		Per hour	
	1st yr.	2d yr.	3d yr.	4th yr.
Apprentices of First Class..	5c.	7c.	9c.	11c.
Apprentices of Second Class	7c.	9c.	11c.	
Apprentices of Third Class.	13c.	16c.		

In addition to the rates mentioned above, apprentices of the first class each receive an additional sum of $125, and apprentices of the second class an additional sum of $100, at the expiration of their full terms of apprenticeship respectively.

By the course of training provided for in this system it is believed that a great benefit will accrue to the mechanic as well as to the employer. To young men who have received a thorough technical education, the two years' course in shop work is especially recommended.

In addition to undertaking to teach the art and mystery of the trade selected they also endeavor to give special attention to the welfare and progress of apprentices in their works. They see that their work is changed as often as their proficiency justifies it, and they undertake to direct boys to suitable boarding houses and generally to look after their physical well-being. They also give sufficient attention to ensure their complying with the requirements as to night school attendance. They have made a special department of apprentices, employing Mr. N. W. Sample as Superintendent of Apprentices. Mr. Sample was for many years General Superintendent of the Denver & Rio Grande Railroad, prior to which he was Superintendent Motive Power of the same road. He has had a wide influence in the bringing up of many of the young men who are now in railroad service in Colorado, and the company feel that he is eminently qualified by experience and by special aptitude for the important work now entrusted to him.

New Locomotive for the Michigan Central Railroad

THE illustration shown herewith is of one of the Schenectady locomotives recently placed in passenger service on the Michigan Central railroad. They differ somewhat from the engines now used on the road in that this locomotive is of the Atlantic type, with drivers 79 inches in diameter. They are furnished with the wide fireboxes and traction increaser. The weight of the engines in working order is 176,000 pounds. The weight on the drivers when the traction increaser is not in use is 95,000 pounds, which is increased to 107,000 pounds by the use of the traction increaser. The cylinders are 21 by 26 inches. The firebox is 96 by 75⅜ inches, giving a grate area of 50.3 square feet. The boiler, which is of the straight type, is 72 inches in diameter, and adapted to withstand a working pressure of 200 pounds. The tubes are 392 in number and afford a heating surface of 3,298.08 square feet. The firebox heating surface is 180 square feet, and that of the water tubes 27.09 square feet, making a total heating surface of 3,505.17 square feet. The tubes are 16 feet long. The firebox water space increases in width from bottom to top, being from 4 to 5 inches in front, 3½ to 5½ upon the sides, 3½ to 4½ on the rear. The tender has a frame of 10-inch steel channel and the trucks are of the Fox pressed steel bolster type. The special equipment of the engines includes Hancock composite inspirators, Westinghouse-American combined brakes on drivers and engine trucks, on tender and for front, Leach sand feeding apparatus, Monarch solid brakebeams on the tender, Gould coupler at front of engine and rear of tender, Michigan Central style of swing drawhead on pilot. The tank is equipped with at water scoop. The engines have been giving very good satisfaction since their delivery.

Michigan Central Locomotive, Built By Schenectady Locomotive Works.

American Locomotives in Europe

Report from Mr. Dean B. Mason, Vice and Deputy Consul-General for the United States, at Berlin

UP to the present, in spite of the large and continued importation of American machinery, the American locomotive, which has for many years been largely and successfully used in Russia, can hardly be said to have made more than an appearance in Germany.

The Bavarian state railway authorities have during the past two years ordered and used a small number of American locomotives for experimental purposes, and the Russian government is also operating a couple of our engines. Up to the present no official report has been made as to the results of these experiments, and although the Bavarian authorities promised the Society of German Engineers at Berlin full information, it may still be a long time before any definite official report will be made. It has been ascertained, however, through reliable private sources, that the results obtained in Bavaria have been highly satisfactory, and have dissipated the belief which has hitherto prevailed in official circles that American engines were not adapted for use on German railroads. It is, therefore, considered extremely probable that the American type of engine will be built by the German locomotive builders within a short time. The Prussian railroad authorities are at present experimenting with the so-called superheated steam engines made by Schmidt, in Cassel. Should these tests not prove satisfactory, it is thought likely that the American type of locomotive will be adopted in Prussia. Both cars and trains are uniformly much smaller and lighter in this country than in the United States, with the result that the percentage of dead weight hauled is greater and freight rates—especially for long distances—very much higher. The 10-ton freight car is still all but universal in Germany. Serious complaints are made by shippers of heavy freights, such as the iron and steel manufacturers of Westphalia, over high freight rates on their raw materials and products, and considerable pressure has been exercised to secure reductions. Since 1893, the year of the Chicago exposition, no important fact of American railway development has escaped the attention of German railway managers. Expert commissions and individual engineers have gone to the United States and spent months in studying every detail of construction and management. The vestibule express train and the sleeping and dining car have been copied almost literally. More recently, the enormous freight trains of 40-ton cars, drawn by powerful locomotives worked up to their full capacity, have taught the German engineers the secret of cheap and effective freight traffic, and there is a demand for a new policy of larger and heavier rolling stock, in which both cars and engines shall be enlarged to the limit of safety with the present weight of rails and efficiency of tracks, bridges, switches, etc. This increase in weight will unquestionably bring a nearer conformity with the American type of freight engines. The somewhat unfavorable report of the Midland Railway of England, as to the results of its practical use of American locomotives, has been explained by an American engineer to have been largely due to the fact that the heavy, powerful American engines were used to perfect the same kind and quantity of work as the smaller English ones. According to the superintendent of the railroad, "the American locomotives which have been employed since the middle of 1899 are £500 ($2,433.25) cheaper in first cost, and are satisfactory as to power, but consume from 20 to 25 per cent more coal than those of English make. As good engines can be built in America as in England, but owing to the different methods of railroading in the two countries, the British locomotives are better adapted for use in England."

The German State railways buy their fuel from the coal and coke syndicates, and pay what would be considered in America exorbitant prices. Economy in fuel consumption is therefore, and must remain, a point of prime importance, and no type of locomotive will be adopted by the Bavarian or Prussian railway administrations which does not conform closely to the German standard of efficiency in this respect. The American engines which have been thus far ordered and used in this country have been bought for purposes of study and experiment, and however efficient they may prove to be it is, for obvious reasons, not to be expected that the German state governments will place any large contract for locomotives or other railway material with other than German manufacturers.

Aside from the railways owned and managed by the several state governments, there are a number of small lines, generally of a secondary nature, which are owned and operated by private companies independent of any political obligation and ready to buy their rolling stock where it can be obtained to the best advantage. Of the 18,291 locomotives in service in Germany in 1899, 17,491 belonged to the State railroads and 800 to private railway corporations.

The average weight of engines on German State railways is 42.67 tons, while those in use on private roads average 37.68 tons. During the year 1899, 446 engines were purchased by the State railways and 56 by private companies. In the year 1898, $556,000 was spent for the purchase of new and the repair of old engines on private lines. These figures show the limited nature of the opportunity in Germany which is open to American competition. There are in Germany five or six leading locomotive builders who have grown up, so to speak, with the railway development of this country. The present equipment of both State and private lines is substantially their work. They are careful, conscientious builders, but slow, and one of the chief advantages which an American competitor would have is in the rapidity with which delivery could be made under urgent circumstances. In Germany it is necessary to wait from four to eight months, and often for much longer periods, from the date of an order before the locomotive can be delivered, and, in case of injury to a part, it generally requires some weeks before it can be replaced. It is also customary in this country to order locomotives from drawings or catalogues, so that the purchaser has not the advantage of actual inspection of the machine which he needs for a certain service. The American system of building locomotives of certain uniform types, with the interchangeable parts, is recognized as an advantage, and this, added to their lower cost and earlier delivery, constitute their chief merits for the European trade.

It goes without saying, however, that the principal opportunity for American railway engines is in countries which, unlike Germany, France and England, have no adequate facilities for building them at home. Such opportunities exist most notably in Russia, Turkey and the Balkan States, where considerable railway construction is now in progress and still more projected. No locomotives are manufactured in Turkey or the Balkan States, where German capital is being invested and where important development is to be expected within the next ten or twenty years.

In order to sell American locomotives in Europe it would seem desirable that our leading American locomotive builders should establish an agency at some central location, such as Berlin or Paris, where close track could be kept of the needs of the European market and whence representatives with good technical education could be sent to confer with representatives of foreign railroads. The importance of having representatives of sufficient technical knowledge to answer all possible questions and versed in foreign languages was strongly insisted upon by a very successful seller of American machinery, with whom the matter was discussed. Recent sales to France and Russia and the satisfactory results of the experiments in Bavaria tend to show that there exists an opportunity for the sale of American locomotives in Europe. In order to make the most of this opportunity, all possibile facilities should be given to the foreign buyer to judge of the nature of the American locomotive without the necessity of sending or going to the United States.

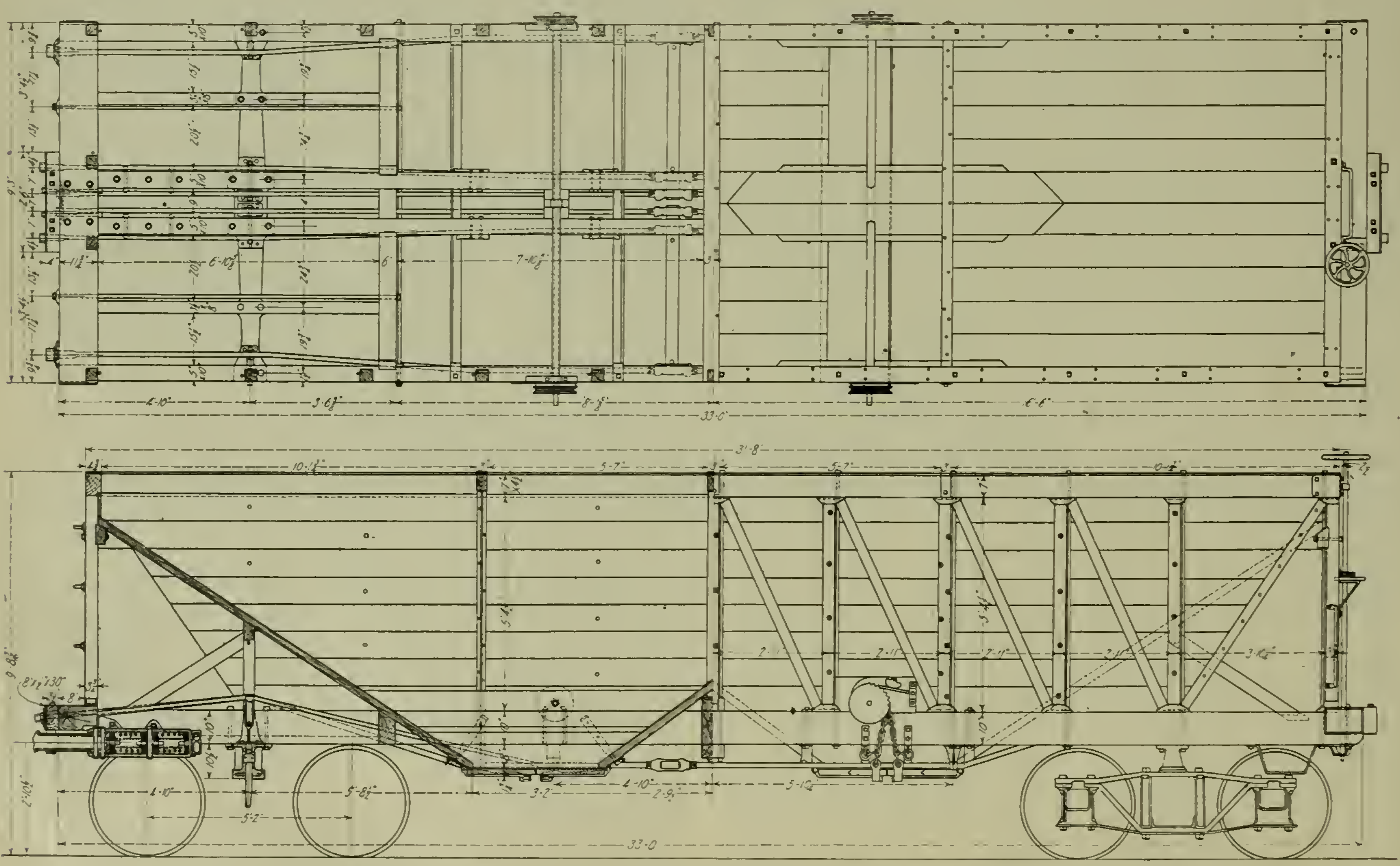
Forty-Ton Hopper-Bottom Coal Cars, C., B. & Q. R. R.

THE Chicago, Burlington & Quincy Railroad are having built at Chicago by the American Car and Foundry Company some hopper-bottom coal cars which are to be put in service on the Burlington lines west of the Missouri river. We present herewith drawings of the cars, which include some novel features.

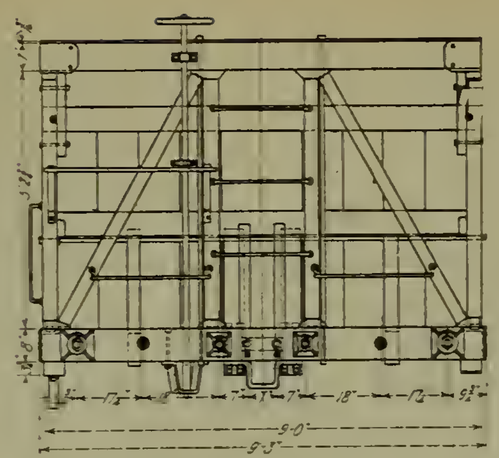
The car is somewhat modified from the Canda designs, from which quite a number of box and coal cars were built a year or two ago for the Southern Pacific. In this case, however, little or no dependence is placed upon the side framing for carrying the load, it being regarded simply as a framework for stiffening and securing the siding. For this reason many of the refinements of design found in the Canda cars and intended to make a satisfactory truss of the siding have been omitted. As a substitute six truss rods are here provided, two 1½-in. rods being located just inside the outside sills and four 1¼-in. rods near the center of the car, one each on each side of the center sills. The four inner truss rods take a bearing on a cross tie placed directly underneath the winding shaft while the bearings of the outer truss rods are at the outer corners of the twin hoppers, this construction being preferable, as it permits the truss rods to clear the header between the center and outside sills and also the sides of the hopper.

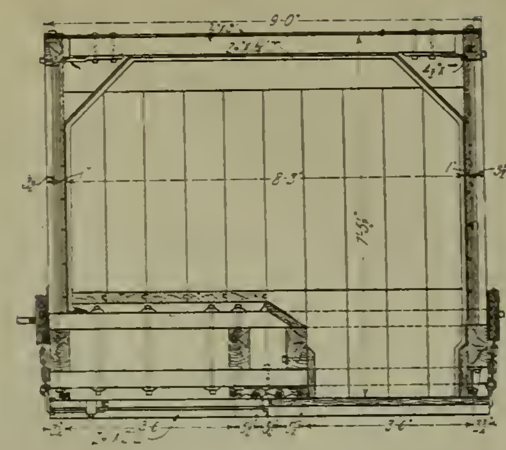
The flooring is of 2¼-in. oak and the siding is 1-in. oak. The cubic capacity of the car, including a 30 degree heap, is about 1,600 ft. The hopper door locking arrangements are of a common design, with safety attachments which prevent the dumping of the load on the track in case of failure of the pawls.

The truck is of the archbar type, with cast steel bolsters, McCord journal boxes and "solid" brake beams, with compressed ends, hung inside. Top and bottom arch bars are 1⅜ ins. by 4½ ins., with tie bars ⅝ ins. x 4½ ins.



40-Ton Hopper-Bottom Coal Cars, Chicago, Burlington and Quincy Railroad.





40-Ton Hopper-Bottom Coal Cars, Chicago, Burlington and Quincy Railroad.

The construction of the sill framing is similar to that used on all freight equipment built by the Burlington during the past year, the plan of the under side of the longitudinal sill being 34½ ins. above the top of the rail and coinciding with the center line of the coupler. The lower side of the end sill is far enough above the bottom edges of the longitudinal sills to permit the coupler to pass underneath without the necessity for notching or cutting into the end sills usually necessary in the construction of low hung cars. The connection between the longitudinal sills and end sills is made by means of sill pockets and a special construction of the Miner draft attachments which are specified on these cars.

Flues and a Few Fallacies

By W. H. Graves

WHEN the keen lancet of mechanical analysis has sheared away all prejudices and absurd theories, and reduced from a cloud of conflicting witnesses a common sense plan deduced from causation that will apply to local conditions, then we may hope for an increased service from that weakest part of locomotive boilers, the flues.

After a piactical experience covering fifteen years in railway service, I have met only one or two foremen who hold the same views on this subject; in one shop it is roll them first and expand them last, and in other shops, it is vice versa, and each man claims longer service for his plan; in a great many cases, it is the workman praising his own handicraft. He will tell you that flues run longer than they did before, but the purchasing agent states that he buys just as many flues as formerly, and the engineman says that he has always that abomination, leaky flues, and when the testimony is all carefully reviewed, we find that those flues that were treated in view of local conditions, gave the best service. It is not only poor setting that is the main cause of flue failures, and if a careful watch is kept on firemen whose engine is always popping off, you will be apt to find a leaky engine, or engines whose air inlet area in ash pan is insufficient, has a tendency to leak; but the cause that has the greatest influence is the one that is generally overlooked, and that is an extra thick flue sheet.

The practice has been these last few years, as we have increased the pressure capacity of our boilers, to increase the thickness of our plates beyond all proportion consistent with safety, and I believe that if we had a more flexible boiler we would have a tighter one, I do not mean a boiler that would give in any degree the slightest cause for apprehension, but by reducing the thickness of some of the plates we would have a better and safer boiler. Take for an example, the tube sheet 9-16 and 5-8 of an inch in thickness, and 3-16 added for the flue bead, you have 12-16 and 13-16 thickness of steel in the hottest part of the fire, a thickness too great to radiate the amount of heat taken up, and the ultimate consequence is the bead gets red hot and the flue breaks. A little calculation will be sufficient to show that with the small area of flat surface to be supported by each flue a thinner flue sheet would withstand the pressure as well, and would increase the life of the tubes, and with all this conspiring against the poor weak flue, the boiler makes able and strong pounces upon it while it is still hot, and mauls the remaining life from it with a beading tool, and it is no wonder that with so many enemies against it, it succumbs to the inevitable; it is a miracle it lasts as long as it does; it speaks volumes for the makers, as there could be no better testimony for good material and workmanship.

To sum up the whole question and reduce it to a rational investigation it would lead us to the following facts: First, flues are set in too great a haste, there is not enough time taken in this important operation. Second, in a great many cases flue sheets are of too great a thickness. Third, there is not enough care taken in their manipulation in round house practice. The engine comes in hot, the boiler maker caulks them up in that condition, and to get through the job which is a very disagreeable one, at best, any expedient that will make them tight is resorted to, and the result is that flues are soon ruined, and my observation has taught me that this is one piece of work with which too much care cannot be taken, and master mechanics should insist so far as it is practicable that all flue work should be done cold, and in a careful manner, and the method that has proven the best in my practice so far as I could observe is to use a fluted mandril slightly tapered, and pin out the flue to the flue hole, but not to drive it in until the flue sheet is distorted, as this is one of the most frequent causes of distorted flue sheets. Roll them only when absolutely necessary, and only a very light beading and for most local conditions this method will give the best results.

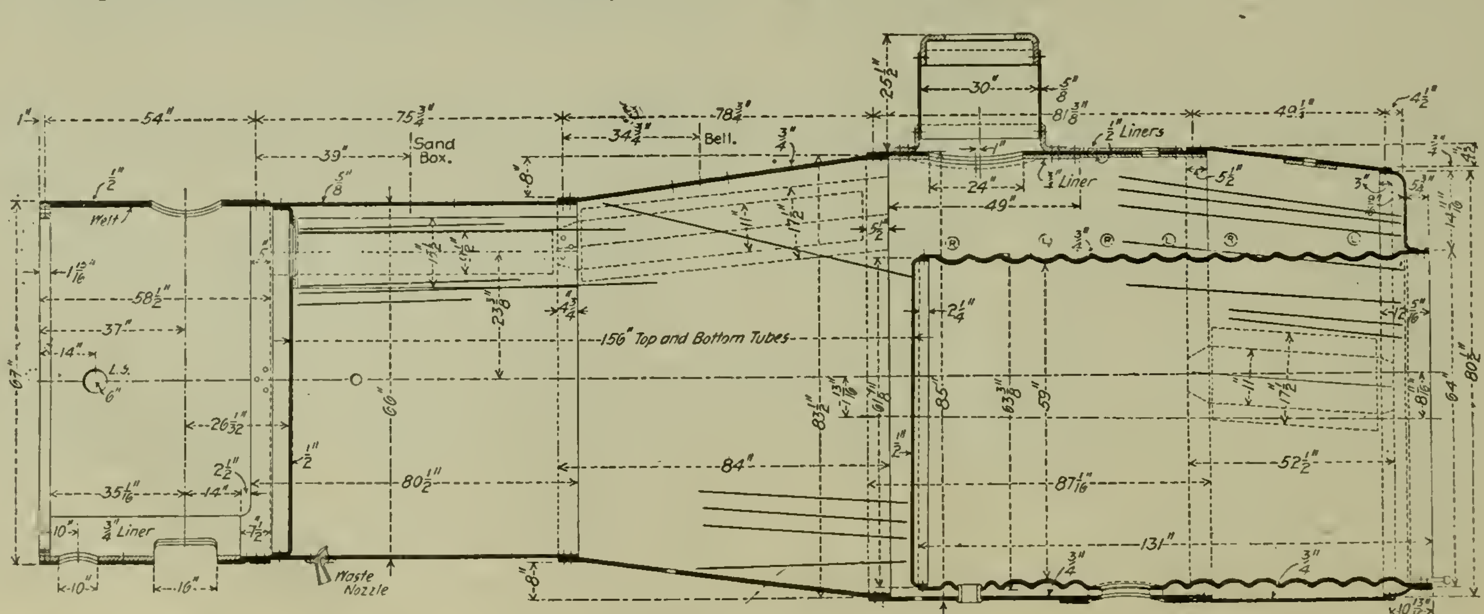
It is the usual practice to pin out the flue and then expand them. Now after the first row is expanded it is obvious that the first row is now more rigid than before, the collar put next to the flue by the expander was added, that leaves the row next to the one being expanded the weakest; and the result is that the hole is pushed out of shape towards the weaker side, and if the hole is now carefully calipered it will be slightly oval. For this I know of no certain remedy, the only thing to be done is to mitigate the evil as far as possible, and that is to pin out the flues, expand very lightly, roll them and then expand them out fully and finish as usual, and I believe if this method be given a fair trial, good results will follow.

From what I have learned from observation and from what has been imparted to me by others on this question of flues and their care we can sum them all up under the following suggestions: Thinner flue sheets, flues should not be worked when hot, less rolling of old flues, more brain and less muscle, more care and less speed on new flues, and a general study of the flue question by enginemen. A strict report of the condition of all flues sent into headquarters monthly. If these suggestions are observed, it will do much to clarify many cloudy problems in flues.

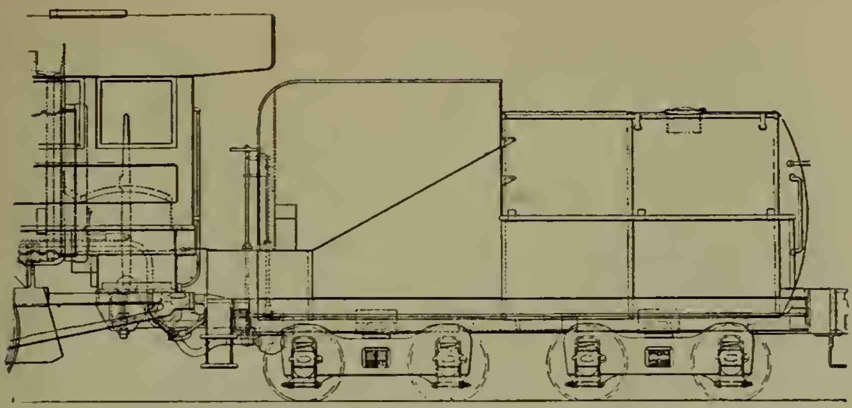
Illinois Central Locomotive with Vanderbilt Boiler and Tender

In a locomotive recently built for the New York Central R. R. the details of the Vanderbilt boiler with which this engine was supplied were fully described, the design being at that time novel. The readily apparent advantages of the boiler attracted considerable attention to its trial in service, so that when, after a year's trial, this boiler was specified on five more new locomotives, while the Baltimore & Ohio and the Union Pacific Rys. followed with two each, there has become prevalent a feeling that a way out of staybolt difficulties has been really indicated. Evaporative tests resulted favorably to the boiler—8.85 lbs. of water per lb. of coal in the Vanderbilt boiler as compared with 8.56 in boiler of the usual type, and 3.68 lbs. of coal per h. p. hour in the former as against 4.04 in the latter—so that, even allowing for the advantage the corrugated tube firebox had in a slightly larger grate area, its evaporative efficiency has been proven. Its efficiency as regards a reduced cost of maintenance is apparently proving to be as expected—the two on the Union Pacific are stated to be evidencing markedly better service than the standard boiler in service in bad water districts.

Illinois Central Locomotive with Vanderbilt Boiler and Tender.



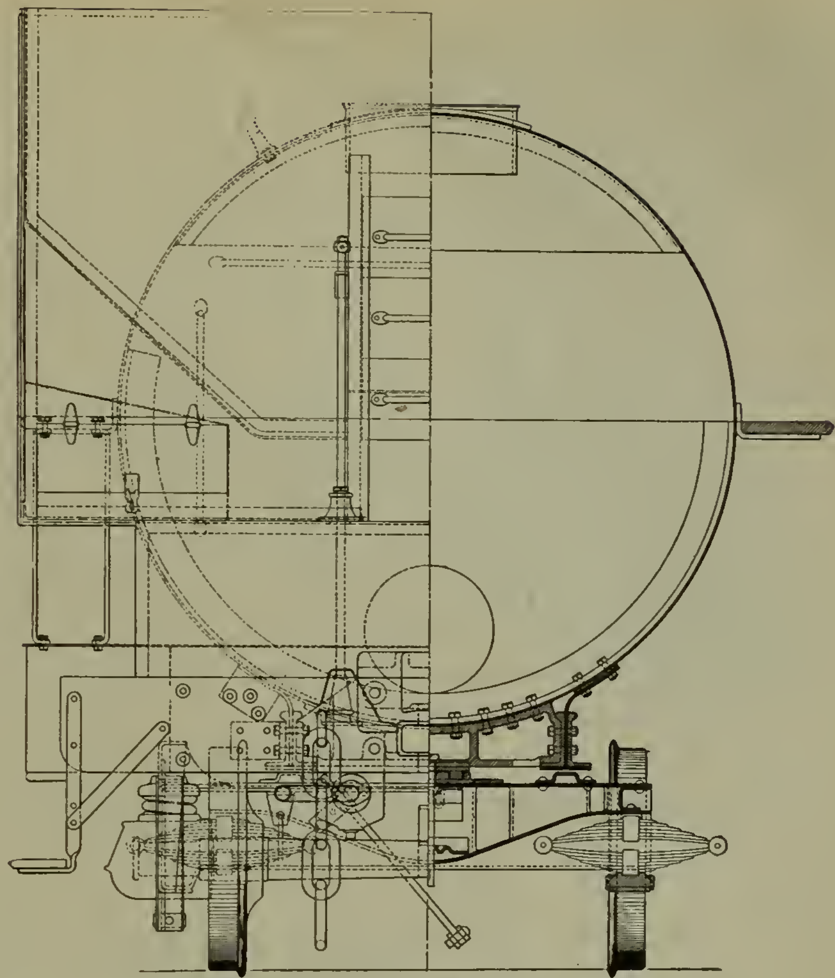
Vanderbilt Locomotive Boiler.



Vanderbilt Locomotive Tender.

Service has, of course, indicated some minor changes of design as desirable—these having been made on the boiler of the locomotive for the Illinois Central Ry. which we illustrate in this issue. This locomotive has been built by the Baldwin Locomotive Works, is on exhibition now at the Pan-American Exposition at Buffalo, and, as will be seen in the illustration of the boiler, has had the steam space increased by using a larger shell, the rear course being tapered down to afford plenty of cab-room. This is a ten-wheel engine, with 20x28 ins. cylinders, 63 ins. driving wheels, and a boiler pressure of 180 lbs. The boiler, as seen, is of the extended wagon top type, with a straight first course of 66 ins., a largest diameter of 83½ ins., and a rear diameter of 80½ ins. The corrugated tube firebox is 7 ft. 10 ins. in length and has a diameter of 59 ins. inside and 63⁄8 outside the corrugations. The grate surface is 57 ins. wide, giving a grate area of 33 ft. There are 350 2 ins. tubes, giving a tube heating surface of 2,362 sq. ft., which, with 135 sq. ft. of firebox heating surface, gives a total of 2,497.5 sq. ft. The weight on drivers is 137,040 lbs., and on engine truck wheels 30,840 lbs., or a total of 167,880 lbs. In other particulars the engine is constructed on the usual lines.

The tender is a striking novelty and is a design which is original with Mr. Vanderbilt. The illustrations show very clearly the features to which we call attention. The water space is constructed as a cylindrical tank, whose diameter is 90 ins. At the back end of the coal hopper the tank slopes downward at an angle to the floor level of the coal hopper, where the remaining segment continues forward 23¾ ins. The coal hopper is of rectangular form, and is walled in at the front by a steel plate cut out to receive vertically sliding coal gates. Doors in the front plate afford ingress to tool boxes placed on either side in the hopper. The tank is 19 ft. 1¼ ins. in length and is built of 3⁄8 in. steel, stiffened by four 6 ins. T irons running round the lower half of the interior, with 2 ins. angle shapes the rest of the way. Surge plates are attached to these stiffeners, and one of the heavy T shapes is placed over each body bolster. The underframing consists of two longitudinal members united by cast steel body bolsters of a shape sufficiently concave to fit the tank. The longitudinal sills are united by end sills and a diagonal strap plate between the bolsters. The longitudinal sills are each built up of two bulb angles uniting on a steel plate which projects upward and is bent out to fit and be riveted to the tank its full length, as shown in the illustration. Fox pressed steel trucks with floating bolsters are used. Among the advantages claimed for the design are a saving of 15 per cent in dead weight, some saving in length, a more compact construction, the weight being carried more immediately over the center bearings, and greater facility of inspection and repair, as well as much fewer parts to be kept in repair. The water capacity is 500 gallons and the coal capacity 12 tons.



Vanderbilt Locomotive Tender.

The Cleveland Engines

THE accompanying illustration is of a locomotive recently built for the Intercolonial Railway by Dickson Locomotive Works, Scranton, Pa. It is equipped with Cleveland cylinders having a double piston cylinder with a central or main exhaust, a valve or supplementary exhaust and a specially constructed blast-pipe. A groove cut in

I. C. R. Locomotive, Cleveland Cylinders.

and around the wall of the cylinder of dimensions ample to provide an almost instantaneous and complete escape, forms the main exhaust port which is always open to the air through proper channels and the smoke stack. When on the return of the piston the main exhaust port is closed the steam port becomes the valve exhaust port through which the slight volume of steam remaining in the cylinder escapes, the blast pipe by its ingenious arrangement acting as an air pump or syphon to render the valve exhaust more effective. The central portion of the blast pipe provides passage for the main exhaust while an annular opening around it provides for the supplementary exhaust. The former being much greater in volume and velocity and commencing sooner acts inductively and removes all opposition in the cylinder to the return of the piston. It is so arranged that just after the main exhaust takes place on one side the valve exhaust on the other does.

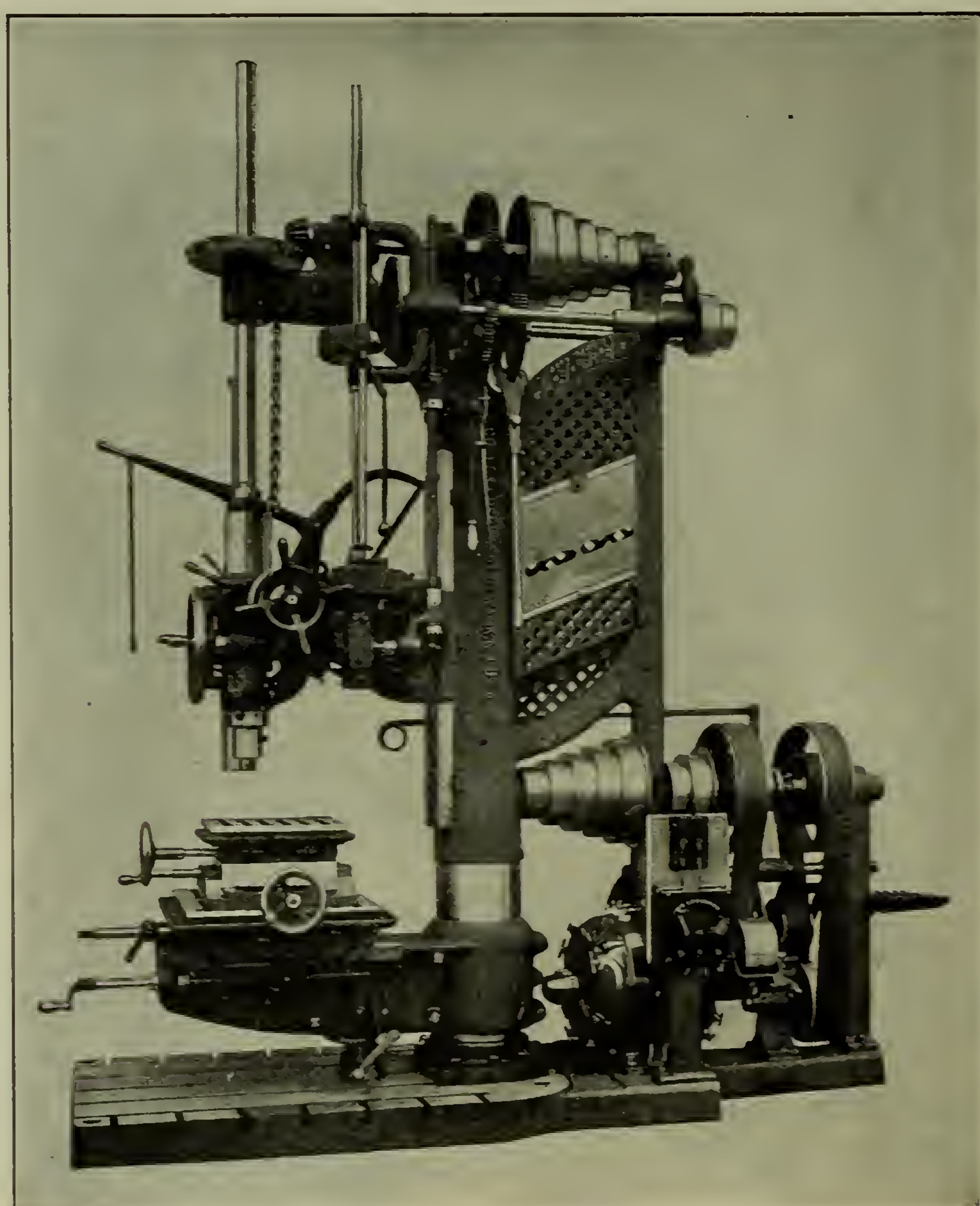
In all other respects the locomotive differs but little from the standard types of simple ones and is quite as free from complications. The first locomotive equipped with the device was an old passenger that had been in service over twenty years and is now doing splendid work, the next one was designed for compound cylinders, but the seven passenger and five consolidation now building at the Dickson Locomotive Works are designed throughout for the Cleveland cylinders.

The new passenger locomotive has, we are informed, quite realized all expectations and made some remarkable performances before being sent to the I. C. R., where it was at once put into service. It is claimed that with these cylinders the schedules of the fastest trains can be considerably reduced without running faster on the level, and that the weight of trains may be considerably increased with marked economy in fuel, repairs and cost of maintenance. Noteworthy features claimed for these engines are the speed with which they get their trains in motion, their facility in climbing hills, their capabilities for high speed and great tractive power, their remarkable smooothness of operation and their great economy.

Motor-Driven Vertical Drill Press

We show in the accompanying illustration a 48-inch vertical power-feed drill press, with direct-connected electric motor, which Gould & Eberhardt, Newark, N. J., have just furnished to the United States Navy Yard at Norfolk, Va. The adaptability of this machine for work in railroad shops is apparent from the cut and the following description, furnished us by the manufacturers:

The machine is the fifth drill press which has been installed in this yard by this same company. It is fitted with the Eberhardt automatic tapping attachment, shown at the left of the drill spindle. This attachment is used for tapping up to 1½ inch, and work after being drilled may be rapidly moved across and centered under the tap by means of the compound traverse table. The drive is fitted with friction clutches, shown at the rear of the machine, to obtain right or left motion for the drill spindle, for large tapping. Straight belts are used for this, instead of the usual crossed belts, the necessity for a crossed belt being overcome by a reverse pulley shaft, in addition to the driving pulley mounted on the armature shaft of the motor, which is coupled to the armature shaft by a pinion at its end.



EBERHARDT DRILL PRESS.

The portable compound chuck shown at the top of the drill table is used in connection with the drill press for vertical profiling or milling dies, punches, cams and other irregular shapes, and reduces the necessity of a special machine for that purpose. The table and base plate are large and sufficiently braced to maintain perfect rigidity for the machine. The column is practically one casting, and together with back brace forms a very strong construction, the back brace to the column counteracting the pull of the cone belt and thus preventing any possible springing or deflection. An index is placed on the feed rod, which tells at a glance the proper feed for any size drill within the range of the machine. This feed is entirely independent of the drill spindle, and changing the speed of the drill does not affect the feed arrangement. Also an automatic stop and depth gage throws out the feed after drill has reached the required depth. The back gears are arranged so that one movement of a lever releases the cone from the shaft and engages the gearing, and changes the feed ten times coarser, while one movement in the opposite direction disengages the gearing. The spindle head is vertically adjustable, and can be raised or lowered and clamped in position. A square quill is used in place of the usual round sliding barrel, which adds to the rigidity of the spindle in boring deep and rough holes. Feeding can be done automatically, or by hand, up or down, separately through the head the entire length of planed surface on the column, or independently through the rack on the quill. All changes are made from the front of machine, thus allowing the operator to remain in the one position, directly before his work.

New Equipment for the Lake Shore Limited

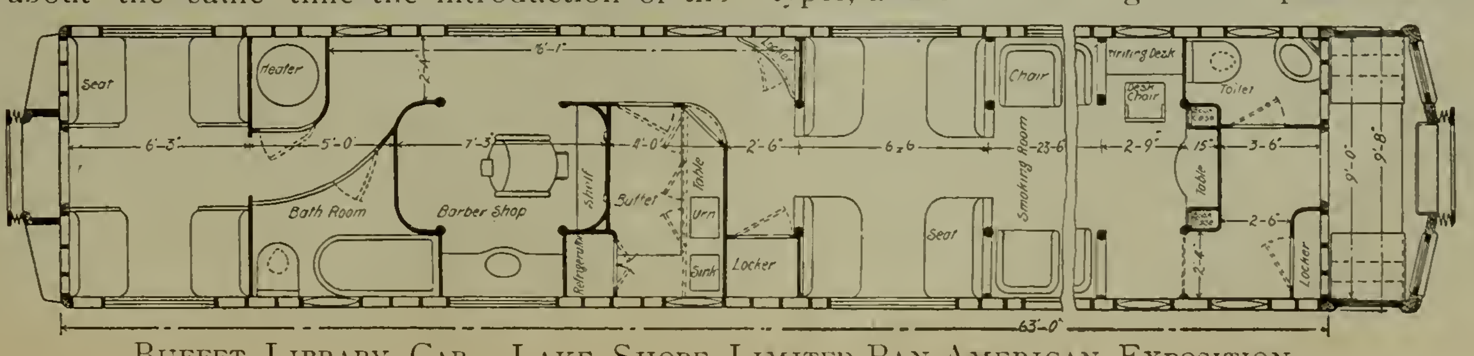
IN April of this year, four new trains, composing the Lake Shore Limited, were placed in service. These trains were composed of seven cars each, all new, from the Pullman shops. They are the result of a number of years' study with a view to meeting the requirements of modern high-class travel. The New York limited originally comprised four cars to the train—two sleepers, a dining car and a combination buffet, library and baggage car, with gas as the illuminant. Some years later, to meet the demands of its New England patrons, a Boston car was added, and at about the same time the introduction of the compartment car (subsequently modified to provide the observation room and end) and the change to electricity for lighting purposes marked a further stage in its evolution.

The increasing patronage naturally resulting from these improvements soon created demands that led to yet another, and, in respect to the general make-up of the trains, a final innovation, the substitution of a complete buffet library car for the combination car and affording twice the accommodations of the latter, and the addition of a baggage car with a fully equipped electric lighting plant. This is the history of the trains that have led up to the present. The story is briefly told in a little folder, issued by the passenger department of the Lake Shore, and which is in itself very much of a work of art, and in keep with the handsome rolling stock which it describes. The illustrations are peculiar in that they consist almost wholly of single features of design and arrangement. Two of them are reproduced herewith together with a floor plan of the buffet library car.

The Vauclain Compound Locomotive

Read at the August meeting of the Pacific Coast Railway Club by Mr. C. T. Noyse.

I HAVE been asked by your committee on subjects to write a paper for the Club, with a view of bringing out the present status of the compound locomotive in general, but more particularly to give some information in regard to the construction and operation of the Vauclain or Baldwin type. The latter type is one that not many of us have had any experience with, and as the probability is that we may soon have occasion to want to know something about it, the committee thought that the information could be brought out in this way, and would perhaps assist the men greatly in operating the "new compounds." To give you a complete history of the different types of compound locomotives would require too much time and space, and make the paper altogether too long, so I will simply try to take up the several types, and endeavor to give their present status.



BUFFET LIBRARY CAR.—LAKE SHORE LIMITED. PAN-AMERICAN EXPOSITION.

First, the two-cylinder. This type, as you know, has the high-pressure cylinder on one side, and the low-pressure cylinder on the other side of the locomotive. Generally the high-pressure cylinder is located on the left side. I do not know why this is done unless it is that it brings the large cylinder in sight of the engineer, and that he can thus more readily see that it clears objects in the way. There are a number of builders of the two-cylinder compound, and as a rule the engines as now built give good service. I think probably the greatest difficulty with them has been to so proportion the diameters of the cylinders and arrange the valve gear that equal work in the two cylinders might result at each point of cut off. This result can not be obtained from the cylinders alone. They may be proportioned so as to give equal work at full stroke, and vary greatly at other points; in fact, if they are so proportioned as to give equal work at full stroke, the work will vary in a constantly-increasing ratio, as a shorter cut-off is used, the least work being done by the high-pressure cylinder. Several expedients have been resorted to to overcome this trouble. That in most common use is to shorten the link hanger on the high-pressure side, usually about one-half inch. This has the effect of differentiating the cut-offs so as to give about equal work in the two cylinders at each point of cut-off. If the ratio of the cylinders is changed, then the arrangement of valve gear must be changed so as to give a varying ratio of cut-off to correspond.

Another trouble with the two-cylinder compound as they were at first constructed, was the inability to start a heavy train equally as well as a simple engine. It was soon demonstrated in actual service, that to operate this type of compound with any degree of safety to drawheads and comfort to passengers, not to say anything about dishes in the dining-cars, it would be necessary to have some arrangement that would enable the engine to start as a simple engine. This trouble has been overcome in some of the two-cylinder compounds by providing a separate exhaust to the atmosphere for high-pressure cylinder. This enables the engineer to operate the engine simple, in starting, and as soon as sufficient headway is attained, he changes the engine to compound. Some of the two-cylinder compounds now have the separate exhaust incorporated with the intercepting valve. This latter arrangement also enables the engineer to start the engine simple.

Three-Cylinder Compound Locomotives.—A number of these have been constructed and are in service in Europe. These are usually constructed with cylinders parallel and connected to a three-crank axle.

Four-Cylinder Compound.—Several types of the four-cylinder compound have been built in the last ten or twelve years. These have, with the exception of the Vauclain compound, been mostly built in Europe. All of the locomotive builders in this country, with the exception of the Baldwins, seem to have had an idea that the two-cylinder compound would be the preferable type for a locomotive, as they all with the above exception adopted that type. Mr. F. W. Johnstone, superintendent of motive power of the Mexican Central Railroad, has built a number of four-cylinder compounds for that road, with the high-pressure cylinder inside of the low-pressure cylinder. It is claimed that these engines have given good service on the Mexican Central, but this type has not seemed to find favor with builders, or other roads. Several four-cylinder tandem compound locomotives have been built, but data regarding the success of this type is not much in evidence. From reports, however, we infer that those designed and built for the A., T. & S. F. R. R. by Mr. John Player, superintendent of motive power, are a success; also that one lately built for the Northern Pacific is doing good work. The four-cylinder compounds in use in Europe are usually built with the cylinder centers parallel horizontally, and either all connected to one four-crank axle, or the inside cylinders are connected to the forward axle, and the outside cylinders to the next axle back of the forward one. I am inclined to think that the trouble relative to unequal work in the cylinders would be more in evidence in the three and four-cylinder compounds than in the two-cylinder, for, owing to the necessity of complicating the valve gear in order to overcome the trouble, it is usually to a great extent disregarded. This, however, does not apply to the tandem four-cylinder compounds, when the two cylinders are in line and their combined force exerted direct as in a simple engine. This unequal work must, of a necessity, cause greater strain and wear on the machinery, and make running repairs greater.

The Baldwin Compound.—In the Vauclain, or, as it is usually termed, Baldwin compound, four cylinders are employed, two on each side, located one above the other, centers vertical. The distribution of steam for the two cylinders on each side is governed by one piston valve, and both piston rods connect to the same cross-head. In some types the high-pressure cylinder is above the low-pressure, and in some the low-pressure is above. When the high-pressure is above, the rock-shaft and indirect valve motion are employed, and when the low-pressure is above, the usual rock-shaft is dispensed with, and the direct valve motion used. The first Baldwin compound was built in 1889. Since that time there have been built, up to and including the year 1900, about 1,8665 engines of this type, which are in service on roads all over this country, as well as in South America, France, Australia, Hawaiian Islands, Mexico, Canada, Russia, New Zealand, Norway, Japan, and China. A number of improvements have been made since the first engine was built, and it is claimed that the engine as now built gives satisfactory service. On special tests that have been made, a saving in fuel of from 20 to 45 per cent has been made. In construction, the Baldwin compound is as much like the simple engine as is possible to make it. One valve distributes the steam to both cylinders on one side of the locomotive. The rest of the valve gear is the same as in a simple engine, except that there are no notches in the quadrant to allow of a shorter cut-off than one-half stroke for high-pressure cylinder. From experiment it has been demonstrated that it is not necessary or desirable to cut off shorter than this.

In practice, when starting a heavy train, it has been found desirable to be able to use steam in the low-pressure cylinder directly from the boiler. To accomplish this a starting valve is used, which is simply a small three-way cock, operated from the cab. When in operation the starting valve admits a limited amount of high-pressure steam to the low-pressure cylinder, thereby increasing the effective pressure in the latter cylinder. The starting valve should not be used except in cases of emergency, and then only for as short a time as possible, as its continued use lessens the economy of the engine. It will be found in practice that ordinarily the engine will start the train satisfactorily without the use of the starting valve. Suitable air-valves are provided, admitting air to main steam passage to high-pressure cylinders, also to the steam passages of the low-pressure cylinders. These valves prevent the formation of a vacuum which would draw cinders into the steam-chest and cylinders. On locomotives for passenger service, a hollow valve stem with an air valve at the end, outside, is used, which admits air to the low-pressure steam passages and cylinders. This "accomplishes the same result" as the valves mentioned above, "and is preferable for fast service." Water relief valves are applied to both the front and back heads of each of the four cylinders. These relieve the cylinders of excessive pressure, whether from steam or water, and prevent the cylinders from becoming broken through the priming of the boiler in hard service.

Directions for Operating.—"When starting the locomotive from a state of rest," the reverse lever and cylinder cocks are operated the same as is the usual practice with a simple locomotive. Do not use the starting valve unless actually necessary to do so to start the train." "After a few revolutions have been made, and the cylinders are free from water caused by condensation or priming, the engineer should close the cylinder cocks, after which the reverse lever should be hooked back a few notches at a time until the full power of the locomotive is developed. If, after moving the reverse lever to the last notch, which cuts off the steam at about half stroke in the high-pressure cylinders, it is found that the locomotive develops more power than is required, the throttle must be partially closed and the flow of steam to the cylinders reduced. On slightly descending grades the steam may be throttled very close, allowing just enough in the cylinders to keep the air valves closed. If the descent is such as to prevent the use of steam, close the throttle and move the reverse lever gradually to the forward notch," and then open the starting valve, which will allow "the air to circulate either way through the starting valve from one side of the piston to the other, which relieves the vacuum, and prevents the oil from being blown out of the cylinder. On ascending grades with heavy loads, as the speed decreases, the reverse lever should be moved forward sufficiently to keep up the required speed. If after the reverse lever is placed in the full forward notch, the speed still decreases, and there is danger of stalling, the starting valve may be used, admitting" high-pressure "steam to the low-pressure cylinders. This should be done only in cases of emergency, and the starting valve closed as soon as the difficulty is overcome." In case of any failure of the machinery which would necessitate disconnecting either side, proceed as is customary with a simple locomotive. The valve should, when disconnected, be placed central, which prevents the admission of steam to either cylinder.

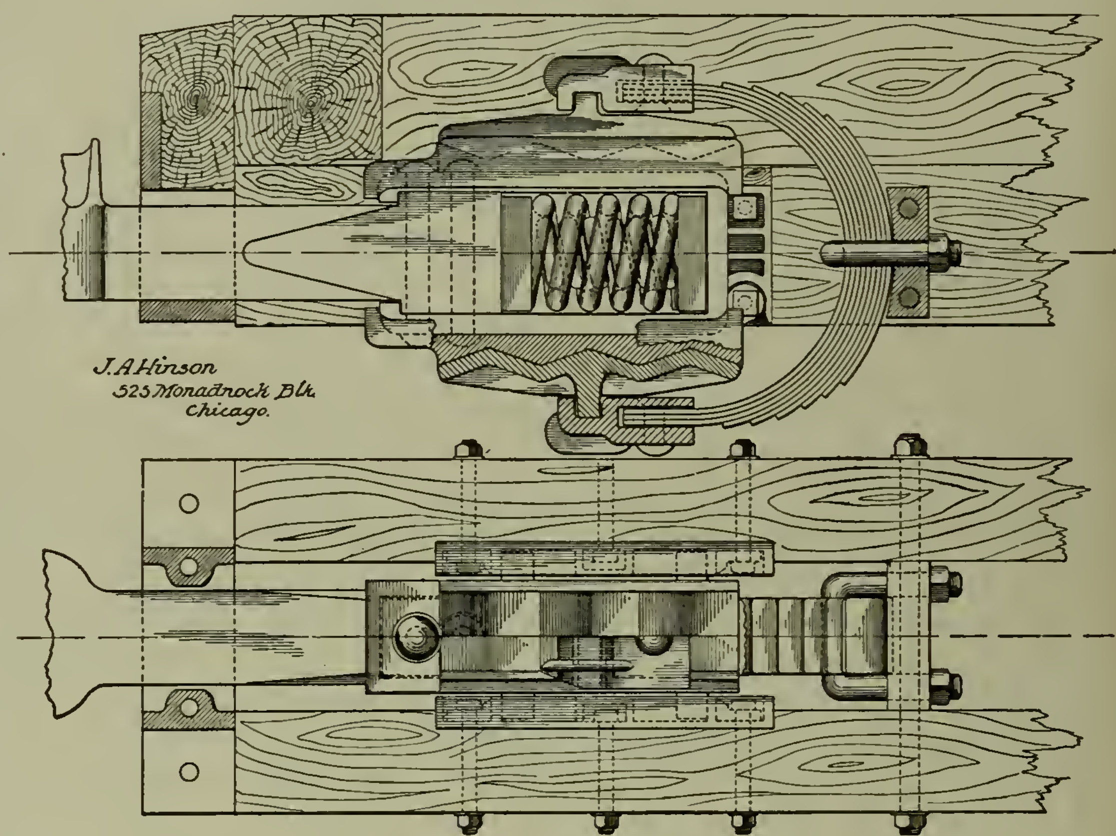
Setting the Valves.—The valve, which is of the piston type, controls the distribution of steam to both the high and low-pressure cylinder. In setting the valve, only the high-pressure ports need be considered. The line and line points are ascertained and marked on valve stem, as is the practice with a simple locomotive. The position of valve with reference to the steam ports leading to low-pressure cylinder and exhaust ports may be ascertained by measurement. It is customary at the locomotive works when the engine is turned out new, not to give the valve any lead for high-pressure cylinder at full stroke, but the valve is set line and line. The ports and bridges are so spaced as to give that portion of the valve governing the admission of steam to low-pressure cylinder, about one-quarter of an inch lead. As a result of much experiment, it has been found that this arrangement gives the best average service. In some types of this compound the construction requires that the ordinary rock-shaft be omitted and the valve gear connected up direct. The valve motion then becomes what is called "direct-acting." The position of the eccentrics with reference to the crank pin is also changed. When coupling up the eccentric rods after repairs, or when setting the valves, special care should be taken to get them connected properly. The following will be a guide to machinists connecting up the eccentric rods: In the ordinary or indirect valve motion (when the rock-shaft is used) the eccentric rods will not appear crossed when the crank pin is on forward center, but will appear crossed when the direct valve motion is used. In the indirect valve motion the eccentric follows the crank; in the direct valve motion, the eccentric leads the crank.

Repairs.—As a natural result of the additional parts of the compound over the simple locomotive, additional repairs may be expected. In the case of the Baldwin compound, these would be simply the maintenance of the two additional pistons and rods, as there is no complicated intercepting valve and gear. There no doubt is somewhat more wear on the cross-head, due to the difficulties incident to the designing of the valve gear for a four-cylinder compound. The following in regard to repairs is quoted from "Vauclain System of Compound Locomotives": "On account of the great similarity to single-expansion locomotives, mechanics familiar with the latter have no difficulty in understanding these compound locomotives. The cross-heads when badly worn may, in a short time, be retinned by any coppersmith; in fact, an ordinary laborer can be taught this in a few days. The cross-head is heated warm enough to melt solder, and is then cleaned and wiped with solder, using dilute muriatic acids, such as tinsmiths use in soldering. Block tin is then poured against the surfaces so prepared, to which it adheres. A piece of iron placed alongside the cross-head can be used to regulate the thickness. The cross-head is then put on a planer to true it up, care being used not to let the tool dig in and tear off the tin. The pistons are treated the same as in ordinary single-expansion engines. The packing-rings in the low-pressure cylinder require renewal more frequently than those in the high-pressure cylinders. It is also more difficult in compound cylinders to detect faulty packing rings, and they are sometimes noticed only by the locomotive failing in steam and in not making time on the road."

"The piston valves should last a long time if properly lubricated, but when the bushing and valve are worn enough to require attention, the bushing should be bored out and new rings put in the valve; very often it is not necessary to bore the bushings, merely to put new packing rings in the valve. After the bushings have been bored several times, larger valves may be fitted to them so as to have as little play as possible. When extracting old bushings, it is best to split them with a narrow cape chisel, as they are only fit for scrap when removed. Attention should be given the starting valves to insure their moving in harmony with each other," as if one is open and the other closed or partly so, it will cause "the exhaust to beat unevenly," and the engineer is apt to complain that the valves are apt of square Before altering the valve motion, make sure that the starting valves open and close simultaneously, and examine low-pressure pistons and piston valve for broken packing rings. To insure the best possible service for the cross-head, the guides should be kept lined up as the cross-head wears, so that there will be no excessive lost motion between cross-head and guides. Keeping the guides perfectly in line with cylinders, and the lost motion at a minimum, not only insures the best service for the cross-head, but also the piston-rod packing, and reduces the wear in the cylinders to the least possible amount. The other repairs should not be more than on a simple engine of the same class. Attention of the engineers is again directed to the very important matter of opening the starting valve when drifting down hill without steam. Allowing the free circulation of air between the opposite ends of the cylinders, prevents excessive back pressure on the low-pressure pistons and consequent irregular wear on tires, and possibly the rupture of a cylinder. With the needful attention to the few points mentioned, there is no reason why the engines should not give satisfactory service.

Hinson Spring and Friction Buffer

A SPRING and friction buffer as described herewith is an entirely new departure in draft rigging construction inasmuch as the friction principle is interposed between two springs. Mr. Hinson, president of the National Car Coupler Company, has recently had a patent allowed upon the device shown in the accompanying illustration. There are two other modifications besides that shown in our cut, but this is the form recommended by the inventor as best. The object of the invention is to take care of heavy shocks in such a way that the recoil will not do more harm than the increased spring and friction resistance does good. It will be noticed that the "U" shaped springs are secured to the draft sill, and the top and bottom incline pieces that fit over two mating incline pieces capped over the drawbar yoke so that when the drawbar yoke is pushed in or pulled out the respective inclines will open—the "U" shaped spring causing as much friction, perhaps, as equals the strength of the spring, which can be made of any desired capacity.



Another very important feature of the device is, that it is constructed so as to be applied to any form of draft rigging that uses a drawbar yoke. Thus, it is obvious that the smaller cars that are in service now with weak or single draft springs, can be run into the shop and this device put on and sent back into service able to hold their own with the larger cars with new equipment. This change is effected without throwing away any part of the present draft rigging or damaging the draft timbers. It is a reinforcement of the existing device instead of a substitute for it.

Exhibit of the Otto Gas Engine Works--Pan-American Exposition

THE exhibit of the Otto Gas Engine Works is large and well displayed and shows a number of engines ranging from 60 to 3½ actual horsepower. Some are running light, while others are driving dynamos or pumps. They are all of what used to be known as the "Silent" class, and with four engines running on the limited space of the exhibit there is no noise with the exception of the click of the valves and the muffled sound of the explosion. Among the features that should interest railroad men is one of 3½ actual horsepower rated to deliver 5,500 gallons of water per hour under a head of 85 feet. Gasoline is used as fuel, and as in the case of internal combustion engines, this requires a minimum amount of attention. Such an engine is, therefore, especially useful for pumping stations. Another engine, also using gasoline as a fuel, is mounted on trucks and, though intended for agricultural purposes, would be equally available for any engineering work where a portable power would be required.

Personals

Mr. J. H. Watters, master mechanic of the Louisville & Nashville at Anniston, Ala., has resigned to accept the position of master mechanic of the Georgia Railroad at Augusta, Ga.

Mr. C. A. DeHaven, formerly master mechanic of the Kansas City Southern at Shreveport, Pa., has been appointed superintendent of motive power of the Shreveport & Red River Valley, with headquarters at Shreveport, La.

Mr. W. R. Howden has been appointed division master mechanic of the Louisville & Nashville, at Anniston, Ala.

Mr. J. E. Muhlfield, who recently resigned as master mechanic of the Grand Trunk at Montreal, has been appointed superintendent of motive power of the Intercolonial Railway.

Mr. W. C. Dallas has been appointed superintendent of the locomotive and car department of the Missouri Pacific system, with headquarters at St. Louis, Mo.

Mr. D. J. Durrell has been appointed assistant engineer of motive power of the southwest system of the Pennsylvania Lines, with headquarters at Columbus, O.

Mr. A. B. Minton, master mechanic of the Mobile & Ohio at Murphysboro, Ill., has removed his headquarters to Jackson, Tenn.

Mr. Charles T. Bayless, chief draughtsman of the Mexican Central, has been appointed mechanical engineer of that road, with headquarters at the City of Mexico.

Mr. T. A. Summerskill has been appointed master mechanic of the northern division of the Grand Trunk at Allendale, Ont.

Mr. A. A. Mayer has been appointed master mechanic of the Grand Trunk at Montreal.

Mr. John Gill has been appointed superintendent of motive power of the Chicago, Indianapolis & Louisville.

Mr. J. Steele has been appointed locomotive foreman of the Great Northern, with headquarters at East Spokane, Wash.

Mr. George B. Williams has been appointed assistant master mechanic of the Canadian Pacific at Toronto Junction, Ont.

Mr. H. P. Jacques has been appointed purchasing and timber agent of the St. Louis and San Francisco, with office at St. Louis, Mo., 702 Century Building.

Mr. A. McCormick has been appointed master mechanic of the southwestern division, east of the Missouri river, of the Chicago, Rock Island & Pacific. He will be in charge of the locomotive and car departments, with headquarters at Trenton.

Mr. S. S. Stiffey has been appointed superintendent of motive power of the Hocking Valley and the Toledo & Ohio Central railroads.

Mr. J. G. Powers has been appointed assistant foreman of the Logansport (Ind.) shops.

Mr. W. B. Chenowith has been appointed foreman of the Chicago, Rock Island & Pacific at Caldwell, Kan., and will be in charge of the car and locomotive departments.

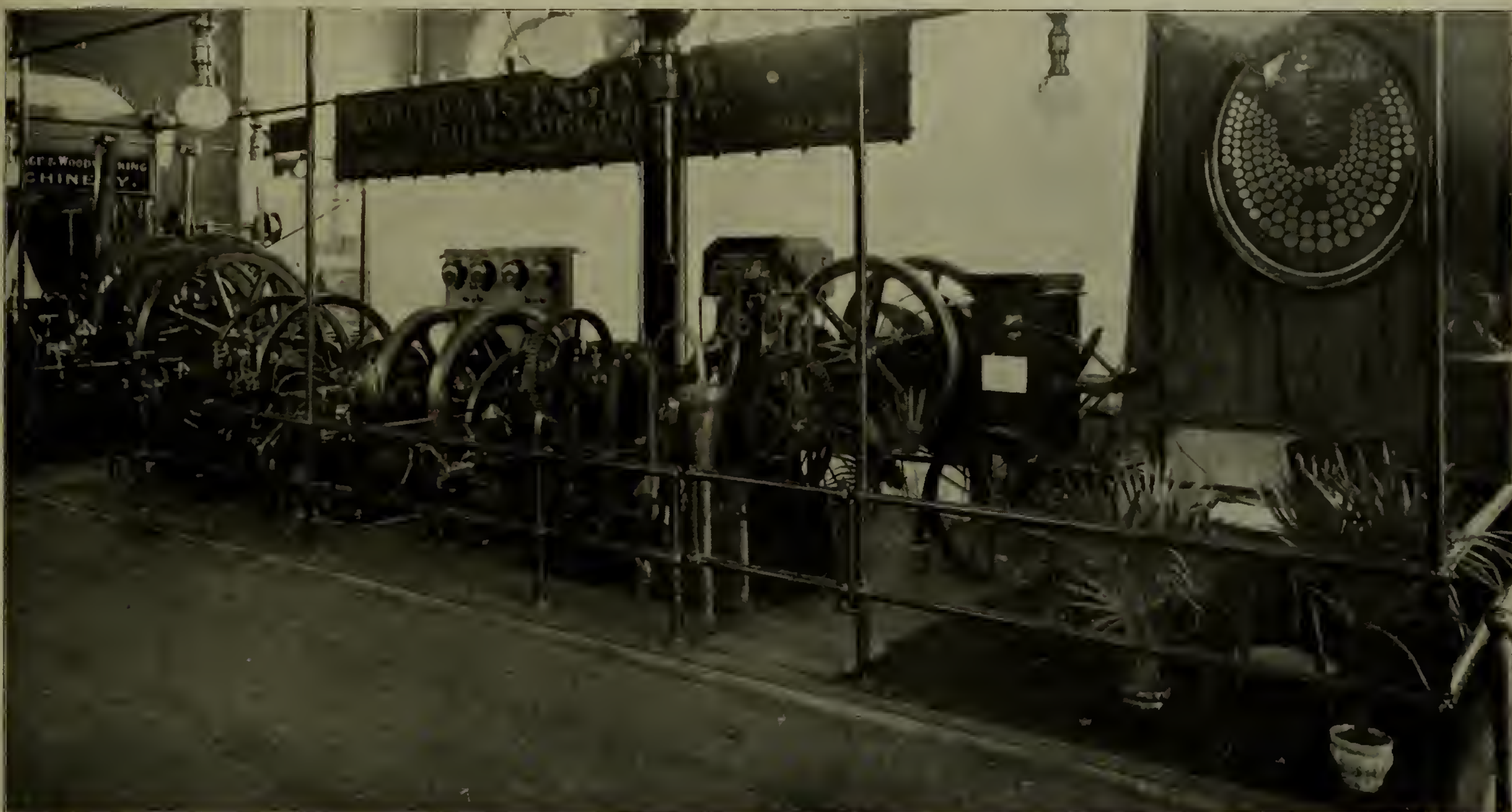


Exhibit Otto Gas Engine Works.—Pan-American Exposition.

Notes of the Month

The ninth annual convention of the Traveling Engineers' Association was held at Philadelphia, beginning September 10. President C. H. Hagan, of the N. Y. C. & H. R. R. R., presided. The report of Secretary W. O. Thompson showed the membership of the association to be 405 and the treasurer's report indicated a satisfactorily financial condition. The attendance this year was not large.

The shipments of the Pressed Steel Car Company still keep above the 100 mark. During the week ending September 13th, the company shipped 628 cars, an average of 105 cars per day. The company is also making large shipments of truck frames, bolsters, brake beams and other pressed steel specialties.

Some interesting statistics in regard to the work done by the Pressed Steel Car Company, of Pittsburg, have recently been compiled. The enormous quantity of the work done can best be realized when it is known that the company is the largest single user of steel in the world. The kind of steel used is what is known as medium-soft Carnegie and the company uses on an average over 1,600 tons of steel a day or over 500,000 tons of steel per year. Another interesting calculation in regard to this company is that in the four years during which the manufacture of pressed steel cars has been carried on, up to September 1, 1901, the company has used about 1,657,080,000 pounds of iron and steel in the construction of the 46,030 cars which it has built. If these cars were placed end to end, allowing 35 feet as the average length of the car, and two feet for the couplings, they would form a continuous train, 1,703,110 feet in length, or over 322 miles. These cars would carry about 4,603,000,000 pounds of freight. and the weight of the freight and cars combined would be 6,260,080,000 pounds, or 3,130,040 tons.

Arrangements are being made by the J. G. Brill Company, of Philadelphia, Pa., for the erection of a plant in England for making American car trucks for the European market. John A. Brill, vice-president of the company, is now in England in interest of the project, and is looking for a site for the proposed plant, which will be built either at Preston, Lancashire; near Birmingham, or in the south of England, near London. British capital will be interested in the scheme, and all the machinery and equipment will be American.

Bettendorf bolsters will be used on 100 furniture cars to be built by the Pullman Company for the Chicago Rock Island & Pacific.

We have received from the Adams Company, of Dubuque, Iowa, their catalogue number 55, describing and illustrating in detail the Farwell Milling Machine in combination with planer. The catalogue is very neatly gotten up, the presswork good and the arrangement of cuts and descriptive matter very convenient.

B. F. Barnes Company, of Rockford, Illinois, under the title "Twentieth Century Machine Tools," have issued a most attractive catalogue of their machine tools. The book is not bound in the usual manner but each machine is described and illustrated on a separate folder and the various folders are placed in the cover in something the way in which a portfolio is used. The effect is certainly very artistic.

The Norton Grinding Co., Worcester, Mass., manufacturers, have just issued a small but artistic catalogue of the "Norton Plain Grinding Machines." Handsome wood cuts show off the machine to good advantage.

The Chicago Pneumatic Tool Co., of Chicago, has issued a new catalogue of rather a striking design, in which they desire to call attention to the merits of their pneumatic appliances, for which they claim economy in the consumption of air, efficiency and durability, workmanship and material used, simplicity in construction, all parts interchangeable and fully guaranteed.

The Baldwin Locomotive Works, of Philadelphia, under the title "Broad Fire Box Locomotives," have issued their "Record of Recent Construction" Number 27. The paper which now appears in this form was originally read by Mr. S. M. Vanclain before the Pennsylvania Railroad Y. M. C. A. in March of the present year.

The Chas. A. Stickney Company, of St. Paul, Minn., manufacturers of gas and gasoline engines, have opened an office at 445 Marquette building, Chicago, in charge of R. J. Randolph, vice-president of the company, who will look after the railroad department.

The Cleveland Pneumatic Tool Company has opened a Chicago office, at No. 335 Wabash Ave., in charge of H. S. Covey, where samples of their complete line of chipping, beading and caulking hammers; the "Cleveland" long stroke riveting hammers, piston, rotary and breast drills may be seen.

The Canadian Engineer has issued a copy of a new Chart of the Metric System of Weights and Measures. Starting in France a little over one hundred years ago, the metric system has made its way from one country to another till it is now used by 44 nations, with an aggregate population of 485,000,000. All the great nations, except Great Britain, United States and Russia, are now using it, and Russia is about to adopt it. As the United States Congress, at its next session, is likely to pass the act, now prepared, rendering the metric system compulsory, you will see that this subject is a live one for Canadians.

Mr. George W. Scott, who for a number of years was the mechanical engineer of the Pullman Company, has opened an office, 816 The Rookery, and has engaged in business as a consulting engineer, prepared to conduct a general engineering practice with reference to the following: Plans, specifications and estimates; examinations, valuations and reports of properties; investigation and development of mechanical undertakings; arrangement, construction and equipment of power plants, railroad and car shops, mills, works and factories; application of economical and cost-reducing methods in existing plants, shops and manufactories. The subjects indicated are those with which Mr. Scott has had an exceedingly wide and varied experience.

The following announcement has been received from Secretary Taylor: At a meeting of the executive committee of the American Railway Master Mechanics' Association, held on August 15, 1901, the following committees for conducting the work of the association for the year 1901-1902 were selected:

1. Ton-Mile Statistics.—H. J. Small, Chairman; C. H. Quereau, W. H. Marshall, Geo. L. Fowler.

2. What is the Cost of Running High-Speed Passenger Trains?—Wm. McIntosh, Chairman; J. F. Deems, G. F. Wilson, Prof. W. F. Goss.

3. What Should Be the Arrangement and Accessories of an Up-to-Date Roundhouse?—Robert Quayle, Chairman; V. B. Lang, D. Van Alstine, G. M. Basford.

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4. Present Improvements in Boiler Design and Best Proportions of Heating and Grate Surface for Different Kinds of Coal.—Geo. W. West, Chairman; T. W. Demarest, H. D. Taylor, M. N. Forney.

5. Standard Specifications for Locomotive Driving and Truck Axles.—A. E. Mitchell, Chairman; S. Higgins, W. S. Morris, L. R. Pomeroy.

6. Internal Combustion Engines in Railroad Work. R. P. C. Sanderson, Chairman; M. K. Barnum, C. M. Mendenhall, John A. Hill.

7. Subjects.—A. E. Manchester, Chairman; Howard Stillman, Alfred Lovell.

In addition to the above it is expected that will be three or four papers by individual members of the Association; and these, together with the topical discussions, will complete the program for the work of the next convention.

The Sterlingworth Railway Supply Company, of Easton, Pa., are said to have been the first manufacturing establishment in the country to adopt the Brown system of discipline as a shop method. Its workings are quite as satisfactory as when applied to the discipline of railroad men. A deep interest is taken in the welfare of the Easton Hospital, and each employe voluntarily contributes the labor of one-half day yearly to this establishment. It is reported to be surprising how much more work some of the piece-work men can do in that particular half-day than any other. In the same institution the Sterlingworth Company supports a permanently endowed bed known as "The Sterlingworth bed."—The Railway Age.

A copy of the proceedings of the eighth annual convention of the Air Brake Association has been recently received from the secretary. It contains a complete report of the proceedings of the convention which was held in Chicago, in the early part of last May. The papers presented and discussions which followed make a book of interest to all men having to do with air brakes.

At the annual meeting of the stockholders of the Franklin Air Compressor Company, held at Franklin, Pa., on Sept. 2d, the following officers were re-elected: President, Charles Miller; vice-president, J. W. Duntley; secretary and general manager, Samuel G. Allen; treasurer, O. D. Bleakley. The following board of directors was also elected: Charles Miller, J. W. Duntley, J. S. Coffin, W. P. Pressinger, S. A. Megeath, W. H. Forbes, C. J. S. Miller, S. C. Lewis, S. G. Allen.

The Standard Tool Company, of Cleveland, has issued a little pamphlet, unique in design and very handsomely printed and illustrated with wood cuts and half-tone engravings. The reading matter is in Spanish, and the pamphlet has been issued for foreign circulation.

The Pennsylvania Lines West of Pittsburg are receiving a number of new dining cars from the Pullman Co., which are models of simple elegance. The interior finish is in light mahogany selected for beauty of the natural grain of the wood. The head-lining, carpet and upholstery are in dark green. The cars are lighted by the electric axle light system of the Consolidated Electric Lighting & Equipment Co. The effect is brilliant and pleasing, and the experience with the system thus far has been very satisfactory.

There are posters, and posters, but an unusually fine poster is one that is being issued by the Colorado Midland Railway, representing an Indian chief astride a beautiful white horse. The redskin is decked out in all the paraphernalia of war, including a large shield on which appears the circle and triangle of the famous "Pike's Peak Route."

The thirty-second annual convention of the Master Car and Locomotive Painters' Association was held, as announced in the September issue of the Railway Master Mechanic, at the Columbian Hotel at Buffalo from September 10 to 13. The programme prepared was carried out and the following officers elected for the ensuing year: President, A. P. Dane; first vice-president, W. C. Fitch; second vice-president, C. A. Cook; secretary and treasurer, Robert McKeon.

At the annual meeting of the stockholders of the Locomotive Appliance Co. the following directors were elected: J. J. McCarthy and Ira C. Hubbell, of Chicago; B. F. Hobart, Clarence H. Howard and C. A. Thompson, of St. Louis; J. B. Allfree, Indianapolis; Robert Shriver, Cumberland, Md. And at a subsequent meeting of the directors Ira C. Hubbell was elected president and treasurer, Clarence H. Howard and J. J. McCarthy vice-presidents, and W. H. England secretary.

Although linotype operators have been using graphite to a more or less degree for years, it is only within the last few months that they have found the kind peculiarly suited to the actual needs of the machine. The Joseph Dixon Crucible Company, Jersey City, N. J., prepare a special linotype graphite, and send samples free and testimonial letters to any one interested.

Some fast running was done recently in the transportation of a quantity of English mail from Australia, sent by way of San Francisco and New York, with a desire to get it into London a week sooner than by the usual route through the Suez canal. The mail, which was carried in 347 sacks, left Sidney, N. S. W., on the steamship Ventura, of the Oceanic line, and was landed in San Francisco in twenty-one days, beating the usual time about five days. It was then arranged to send it by special train a sufficient portion of the distance to get it in New York in time to catch the steamship Campania, leaving at noon on September 7th. Arriving in Omaha, over the Southern Pacific and the Union Pacific roads, a special train was chartered over the Chicago, Burlington & Quincy R. R., making the run from Omaha to Chicago, 506 miles, in exactly ten hours. It took fifty-two minutes to transfer the 347 sacks of mail from the Union Depot to the Van Buren Street Station in Chicago, where a special train of the Lake Shore & Michigan Southern Ry. was sent out with orders to overtake the regular fast mail at Cleveland. This train made a run of 244 miles in 265 minutes and overtook the fast mail at Toledo. The mail arrived in New York at 10 a. m., Sept. 7, two hours before the steamer sailed.

The Standard Railway Equipment Company, St. Louis, Mo., has secured a large contract for pneumatic riveters from the Russian government. Work on the company's new plant in East St. Louis is proceeding rapidly, and equipment of the most improved and thoroughly modern character will be installed.

The Railway Age has a most interesting editorial in a recent issue on the steel passenger car, from which we quote the following: "To the engineer and student who is earnestly studying the trend of events, and who draws his analogies from past experiences, it is very evident that the truck and framing of the passenger car of the future will be of steel. But when he notes what has been done with it and how satisfactory it has proven itself to be, he wonders at the slowness with which American managers can be led to adopt a structure that has everything to recommend it from an engineering standpoint. It is probable that it only needs some one courageous enough to leap the fence, as in the case of the steel ore car, when we may look for a stampede to get into line as users of the steel framed and steel trucked passenger car."

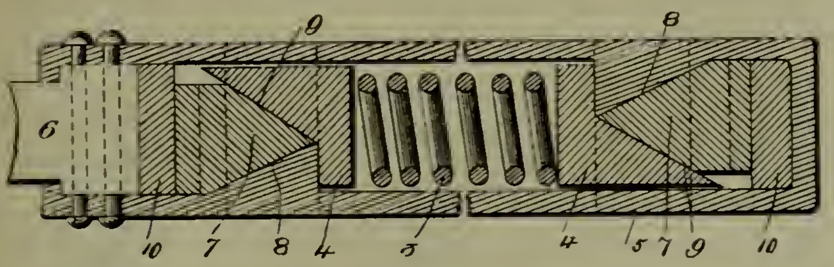
In McClure's Magazine for September, in an article entitled "Is the Airship Coming," the writer, Professor Simon Newcomb, seems to think that there is no immediate danger of the railways going out of existence because of the airship.

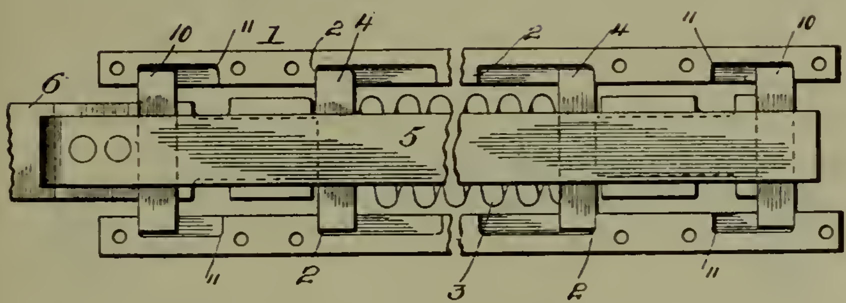
Interesting New Railway Patents

Mr. Richard D. Gallagher, Jr., of New York, N. Y., assignor to Standard Coupler Company, of same place, provides a draft rigging in which the springs are arranged in the line of pressure and at the same time their resistance is so augmented and modified that springs of ordinary standard size and power may, where desired, be utilized for the draft-rigging of rolling-stock of practically unlimited weight and without occasioning shock or oscillation of the cars in starting, stopping, or varying speed and regardless of the length of the train. The working parts of the apparatus are supported and work between suitable support—such, for instance, as cheek-plates having suitable stops and guides for followers. A spring is mounted between the followers, the latter being carried by the cheek-plates and held by the stops against outward movement, but are free to move inwardly or toward each other and back to normal position.

Surrounding the followers and spring is a frame corresponding to the ordinary strap, only preferably heavier and stronger than the usual strap, said frame being attached at one end to the draw-bar. The frame constitutes part of the pressure-transmitting member and between it and the followers a mechanism is provided which will convert the movement of the frame in one direction to a reverse movement of the forward follower thereby compressing the spring reversely and augmenting its resistance by the frictional and wedging resistance of the motion-converting machanism.

The mechanism referred to consists of a transversely-movable wedge-block adapted to be displaced transversely by the frame and to itself displace the follower in the opposite direction to the movement of the frame. The wedge-block is adapted to be displaced transversely by the incline on the frame and in turn co-operate with the incline on the following whereby the follower is displaced lineally and in direction opposite to the direction of movement of the frame. The wedge-block is guided in its transverse movement by a cross or follower plate held by the supports or cheek-plates. The mechanism is preferably duplicated at each end of the spring, the parts being reversely arranged, and in order that the device may be double-acting in both directions, so as to compress the spring from both ends, the cross or follower plates are mounted between stops so as to be capable of an inward movement whereby on movement of the pressure-transmitting member the rear cross or follower plate will advance and carry with it as a body the wedge-block and follower, while the other cross or follower plate will remain stationary, and the incline on the frame, acting through the wedge-block and the follower incline will move the forward follower backwardly against the tension of the spring. The mechanism operates in like manner



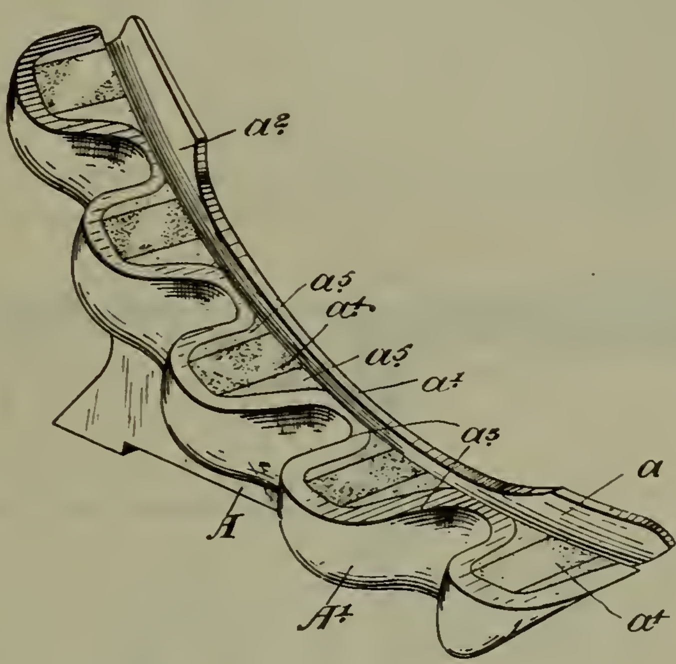


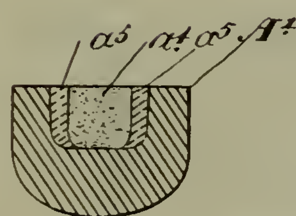
in either direction, and it is obvious that by changing the angle of the inclines the resistance, due to friction and wedging action of the parts, may be varied to suit the conditions under which the apparatus is designed to work, and thus standard springs may be employed for all classes of work, and while with the structure described the spring is adapted to be compressed from both ends it is obvious that the wedging devices alone may be utilized for each movement, thereby compressing the spring from one end only.

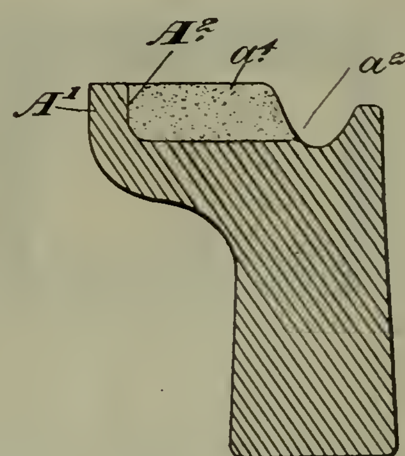
The object of an invention patented by Michael Power, of Toronto, Canada, is to devise a shoe adapted tor temporary use as brake shoes on car wheels, whereby such wheels when they have become flat may be turned up accurately in a minimum period of time; and it consists essentially of a shoe provided with a series of teeth having chilled cutting edges. the central portion of such teeth being provided with a composite roughening material in the center and an adhesive-acting material on each side, which material is flowed or otherwise fitted into recesses in the teeth.

The body of the shoe is made in the usual arch form at the inside and is provided with an inner flange, which has a longitudinal recess made in it in order to minimize the friction on the wheel during the operation of grinding, and a longitudinal groove of arc-shaped form, which straddles the flange of the wheel. A series of teeth is provided with cutting edges which are inclined or have a sheer to them. The outer edge of the teeth are rounded as well as the base of the teeth, the most approved cutting edge being thereby formed. As it is well understood that a straight cutting edge extending straight across the surface to be cut does not act with the same precision as an inclined cutting edge such as described. As there is a minimum amount of friction on the flange of the wheel, it will be seen that the great cutting action is performed by the cutting edges of the teeth which exend close to the longitudinal groove. All the cutting edges are chilled, so as to harden them in order that they may keep their edge.

It is preferably in acting upon the smooth surface of the wheel, which may be flat or out of true, that such surfaces should be roughened to some extent, and in



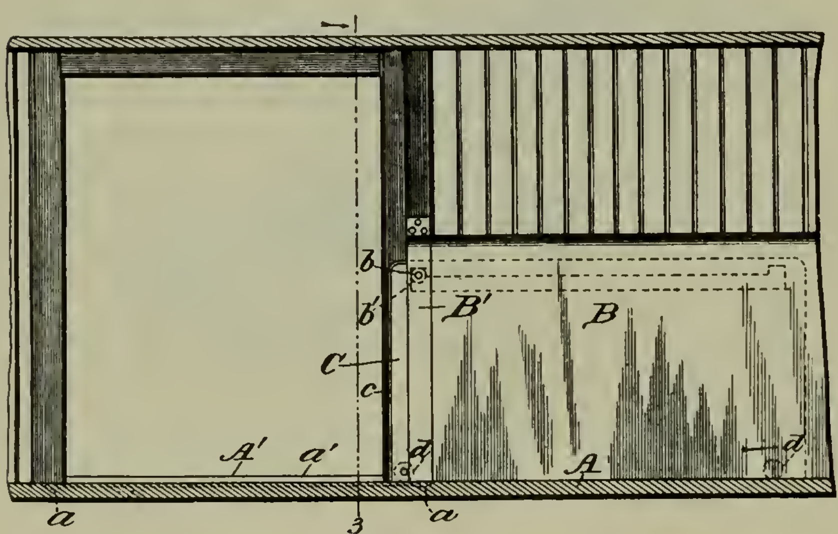


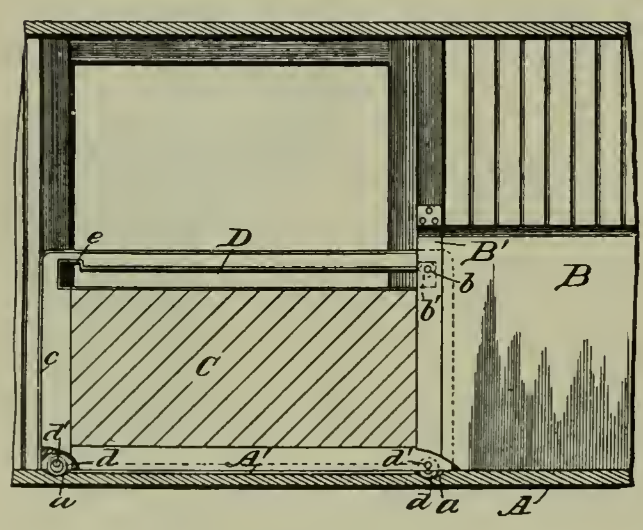


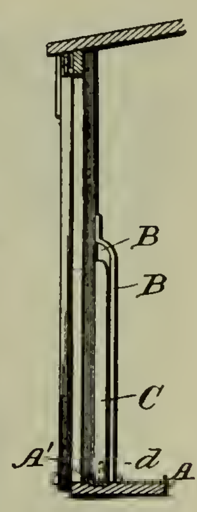
ordr to insure this recesses are provided between the cutting edges of each tooth, into the center of which is fitted a block of material suitable for roughening. A composition preferably of emery corundum, Portland cement and fish-glue, in equal parts, is used. To each side of this block is introduced a strip of Babbitt metal or lead, which has a tendency of causing the shoe to adhere to the surface of the wheel and thereby allow of the roughening composition to act upon the wheel and also keep the surface clear of mud, and thereby permit the cutting edges to act with the greatest facility.

In a patent granted by Mr. Jacob D. Hoover, of Winchester, Va., an inside door for retaining grain in cars is provided. The construction is such that the door will be automatically locked when either opened or closed, and when closed will rest upon the sill, and thus provide a tight joint at the bottom of the door. The car is provided with the usual outside door, and to one side of the door frame on the inner side of the car there is provided a casing or housing into which the grain door may be slid. An upright is secured at its upper end to the inner wall of the car adjacent to the door frame and its lower end is secured in any suitable manner to the floor, and this upright supports one end of a journal upon which is mounted a roller, upon which the door slides. The casing for the grain car door may be either built up or of sheet metal and the upper portion may be rounded or curved.

The grain car door is preferably built up from lumber in the usual manner and is bounded by a metal strip, a portion at the bottom of the door being cut away to admit





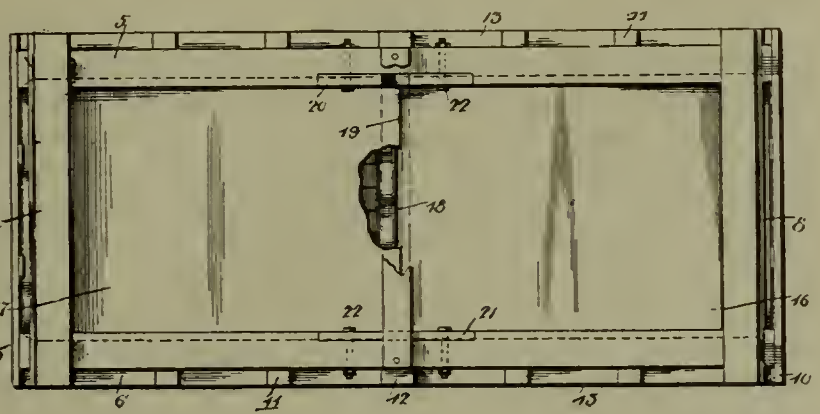


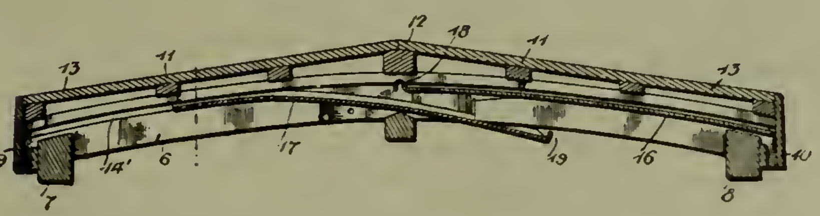
the passage there through of rollers which have apertures of a considerably larger diameter than the fixed journals which connect the rollers to the door. This construction permits the rollers to drop well into recesses in the floor of the car when the door is opened or closed and will roll on the sill when the door is slid out of the recesses. Near the upper portion of the grain door is a longitudinal slot which has at its ends upwardly extending notches or recesses with straight edges, the recesses being practically of the same length as the diameter of the roller upon the upright upon which the door slides, and this slot is provided with metal wear plates. To open or close the door, it is only necessary to lift the door and give it a slight longitudinal movement, and when raised the upper roller will receive the major portion of the weight of the door and the other rollers will move over the sill and prevent the gate binding in its movement. It is obvious that the door as moved either to open or close the same will tilt at certain points upon the upper roller and would be liable to bind unless it was for the lower rollers, and said rollers being loosely mounted on their axle, will give or adapt themselves to the inclination of the door. They will also enter the recesses to the full depth thereof, and thus make a secure lock and allow the door to bear at its lower edge upon the sill when closed.

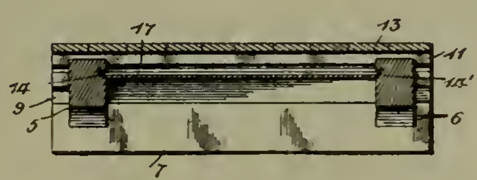
In opening or closing the door it is only necessary to elevate that end thereof with which the upper roller engages with the recess and give to the door a slight movement in the direction which it is desired to move the door, after which the door can be readily slid to open or close. By this construction no openings are provided at the bottom of the door, nor are there any stops which would interfere with the free sliding movement thereof when unlocked, and it will also be noted that this lock operates automatically when the door reaches the limit of its movement in either direction.

A CAR ROOF RECENTLY PATENTED BY JOS. E. ULSH, of Altoona, Pa., is provided with metal plates which may be applied or removed from the inside of the car without removing any of the roof timbers on the frame. Transverse beams are secured at their ends to the upper beams of the side frames of the car body, the transverse beams being projected slightly beyond the upper beams, and to their ends are attached the planks or faces which are separated from the upper beams by slight interspaces. On the transverse beams are secured the furrowing strips and the ridge pole, to which are attached the boards forming the top of the car roof. In the inner or mutually-adjacent faces of the transverse beams are formed longitudinal grooves which in their transverse directions are taken or directed upwardly at an acute angle of the faces of the transverse beams so that the upper and lower walls thereof are beveled and parallel. The lower walls of the grooves or slots are cut away at the central portions of the beams, and the grooves or slots at each side of these centrally cut-away portions are broadened slightly. Each groove or slot thus includes two sections, which lie at opposite sides of the central cut-away portion.

Two metal plates are provided as a filling between the transverse beams, and each of these plates has at its side edges turned upwardly and flaring, so that the plates may be successively entered through the cut-away central portions of the beams and slid into the grooves of the latter. One plate is first slid into place and has its outer end without any bend or flanges, while the inner end thereof is bent upwardly and then downwardly to form a hollow bead. The second plate which has its side edges also bent upwardly and flaringly to engage in the beams has its rear end bent upwardly to form a flange which is adapted to engage in the hollow bead of the first plate. This engagement of the flange with the bead prevents leakage of water between the adjacent ends of the plates, while the flaring side flanges of the plates prevent the water from passing over the side edges of the plates and into the car. The transverse beams are either curved or are formed each of slanting sections, so that water will drain toward the outer edges or ends of the plates, which



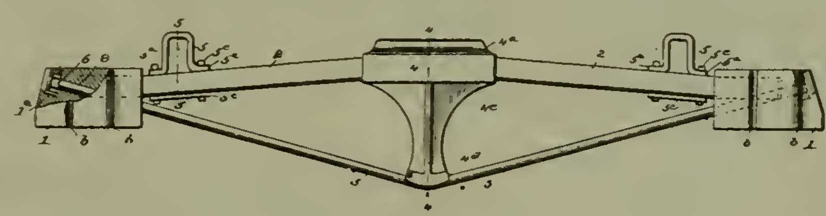


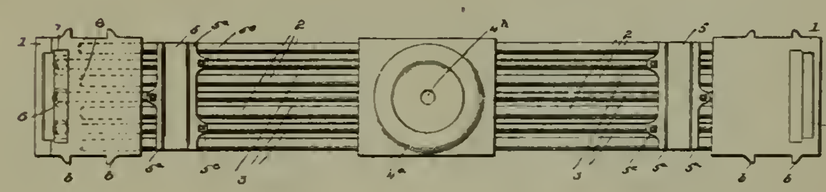


latter project so that the dripping will be through the interspaces between the upper beams and the planks When the plates have been slid into place the cut-away portions of the inner faces of the transverse beams, through which the plates are passed to the grooves, are filled with the filling blocks which are held in place by bolts, passed transversely through the blocks and the beams, in the recesses of which they are seated.

Messrs. Chas. H. Williams and Gilbert P. Ritter, of Chicago, have patented a composite metallic car bolster wherein the tension and compression members are so relatively arranged as to avoid slotting or weakening of the members and the maximum strength or carrying capacity is obtained with the minimum of metal. The bolster, which is a trussed structure, is composed of a plurality of tension members so arranged with relation to each other as to have their axes in different vertical planes when the bolster is in its normal position, provided with an interposed strut and having their ends united by the end caps, the ends of the compression members of the structure being also cross-braced by the side bearings.

The compression members of the structure are preferably constructed of flattened tubing—that is to say, are in the form of a parallelogram in cross-section—as increased stiffness is thereby obtained for a given weight of metal, and the compression members, and are alternately arranged. The strut is formed with a channel for the passage of the compression members for separating the compression members, and with grooves substantially in line with the lugs to insure that the compression members and the tension members shall occupy different planes when the parts are assembled. It will be noted that the strut is strengthened without materially adding to its weight by means of the webs or ribs and that the hole for the king-pin bolt occupies a central position between the webs and the king-pin bolt passes between the tubular compression members, so that the structure retains its strength and stiffness. If preferred the center plate may be detachable from and bolted to the strut. End caps and spring blocks receive the ends of the compression members, each end piece being provided with sockets corresponding in num-





ber with the number of compression members and with rod-openings for the passage of the ends of the tension members, the center lines of said rod-openings and sockets being parallel. The end caps are preferably each provided with a channel for the reception and concealment of the nuts upon the ends of the tension members, which channel may be dovetailed or provided with a lip to receive and retain an end plate or closure which not only conceals the nuts and gives a solid finish to the end caps, but also effectively prevents the displacement of the nuts and tends to the preservation of the structure.

Steel wear-plates may be inserted in the sockets of the end caps to take the wear off the end cap when the same is soft or malleable. The side bearings may be of any well-known form. The several members of the device being substantially such as hereinbefore pointed, the parts are assembled by first passing the compression members through the channel of the strut and the ends of said members into the sockets provided therefor in the end caps next passing the tension members over the planes of the compression members and the threaded ends of the tension members through the proper openings in the end caps, after which the nuts are applied and screwed down until the internal strains desired are established and rendered equal throughout the structure. Finally, the end plates are inserted and driven home, which end plates in turn secure the nuts against accidental displacement, thus preserving the desired initial strains within the structure.

The Car Foremen's Association of Chicago

September Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in room 209 Masonic Temple, Wednesday evening, Sept. 11th, at 8:00 p. m. President Sharp called the meeting to order at 8:00 p. m. Among those present were the following: G. M. Bates, A. C. Bauen, J. R. Cardwell, D. Downing, R. H. Darlington, Ralph Earle, B. Guthenberg, J. C. Grieb, A. F. Johnson, F. C. Kroff, Wm. Kramer, H. V. Kuhlman, Aaron Kline, H. La Rue, T. R. Morris, Wm. Richardson, F. C. Schultz, H. A. Stewart, W. E. Sharp, O. N. Terry, Thos. Williams, Geo. Wentsel.

Pres. Sharp: The first order of business is reading the minutes of the previous meeting. As they have been printed in the Railway Master Mechanic and distributed; if there are no alterations or corrections they will stand approved as printed.

Secretary Kline: The following have made application for membership: J. B. Phelps, car foreman, C., M. & St. P. Ry., Rock Island, Ill.; W. F. Fries, S. C. D. Live Poultry Trans. Co., Chicago.

Pres. Sharp: These names have been passed upon by the proper committee and they will be enrolled as members. In accordance with Art. VI of our By-Laws it becomes necessary at this time to appoint an auditing committee. Our next regular meeting, in October, is the annual meeting, and our By-Laws provide that a committee shall examine and audit the accounts of the secretary and treasurer one month prior to the annual meeting. I will appoint Mr. T. R. Morris of the C., M. & St. P. Ry., Mr. C. C. Cathar of the I. C. Ry., and Mr. Geo. M. Bates of the C., B. & Q. R. R. to report one month hence. The first number on our program for this evening is the discussion of the changes in the M. C. B. rules of interchange. There seems to be some question as to whether we should discuss them, in view of the small attendance to-night.

Mr. Bates (C., B. & Q.): It seems to me it would be a good idea to leave them out this evening. We ought to have a good, full attendance when we discuss the rules, and I would make a motion that we defer the discussion of this subject until some future meeting.

Mr. Grieb (C., M. & St. P.): It is very unfortunate that we have such a small attendance to-night, due to the inclemency of the weather, a matter over which we have no control. Before this question is finally decided I would state that if we do not have the discussion this evening, we will be practically postponing it until November. The annual election comes off in October and we ought to have a little extra time then for ourselves, a little speechmaking for the benefit of the association that would very easily fill in the entire evening, and if we hold this over until November we will be losing at least two months, and before the minutes are printed and distributed we will be in December, which is rather a late date to say anything about changes in the rules. On that account I would prefer to see them discussed to-night.

Pres. Sharp: Mr. Grieb's ground is very well taken about the time these rules will be discussed if they are not discussed tonight. October being the annual meeting and the committee on report on air brakes at that time, there will hardly be room for anything else on the program for that evening.

Mr. Bates: It seems to me if we discuss them this evening there will not be much said about them. I think it would be well to wait anyhow, and see how the new changes affect things and we will then be better able to talk about them.

Mr. Bates' motion was put and carried.

Pres. Sharp: Subject No. 2 is the report of the committee on stenciling light weight on freight cars.

Mr. Grieb: To the President and Members of the Car Foremen's Association of Chicago: Your committee, appointed to make Recommendations for the Proper Method of Stenciling Light Weight on Freight Cars, beg to report as follows:

LOCATION.

To facilitate the work of train and yard men, the committee urges that all stenciling, not only of light weight, but also the capacity and other dimensions of the body, which are usually shown, be placed as closely adjacent to the car number as is permissible, if the car number is located towards the lower edge of body. This may not find favor with those who are disposed to put weight of car at one end; capacity, etc., on another in order that the lettering may represent a symmetrical appearance. Nevertheless, we think the members of this association will see the practical side of this arrangement and endorse it unhesitatingly.

STENCILING.

In our opinion, the most desirable feature to attain will be the adoption of a standard stencil of uniform size and style for the letters and numbers used in stenciling light weight of cars, and the committee would recommend block letters and numbers 1½ inches in height, feeling that these will be sufficiently large and plain, as parties required to read same must of necessity be close to the car. Further, that this stencil be arranged as follows: Begin with the abbreviation "W't," allow sufficient room for the figures (omitting the abbreviation "Lbs," which is often found on cars and which your committee feels is quite as redundant as "L't," which on some cars precedes the abbreviation "W't"). Leave sufficient room for the name of station, and, finally, show month, day, and year on which work is performed.

DOUBLE PANEL.

With reference to the scheme proposed by Mr. T. J. Mullaly, Master Car Painter, Armour Car Lines, for using double panels, in which the stencil marks are to be placed, the committee is heartily in favor of the idea, and endorses same for use on cars painted and lettered in special colors for the purpose of advertising and display, and it is expected the use of these panels will assist in maintaining the good appearance of these cars. The committee does not, however, feel inclined to recommend the use of these panels on ordinary freight cars painted in mineral brown or black where no attempt, either in coloring or lettering, is made for decorative purposes, feeling that, while desirable, this scheme represents a degree of refinement which companies in general would not feel inclined to adopt by reason of the expense and other considerations. For the cars on which the use of panels is permissible, your committee would recommend the use of two, one placed directly above the other, same to be colored in black and spaced one inch apart, each to be 30 inches in length, 3 inches in width, and finished with round corners. Panels to be located as suggested above. On cars so constructed as not to permit the use of panels of this length, by reason of stake pockets, etc., interfering, it is suggested that the panels be divided into four, each 15 inches long, instead of two 30 inches long. The committee feels that a single panel 30 inches in length is sufficient to afford ample room for all the letters and numbers placed thereon, and will allow room for five letters for the station. Sample of panels and stenciling made in accordance with the above is presented herewith. The committee—J. C. Grieb, chairman; T. C. Kroff, Jas Buker, T. J. Mullaly, Ralph Earle, C. C. Cather, W. H. Evans.

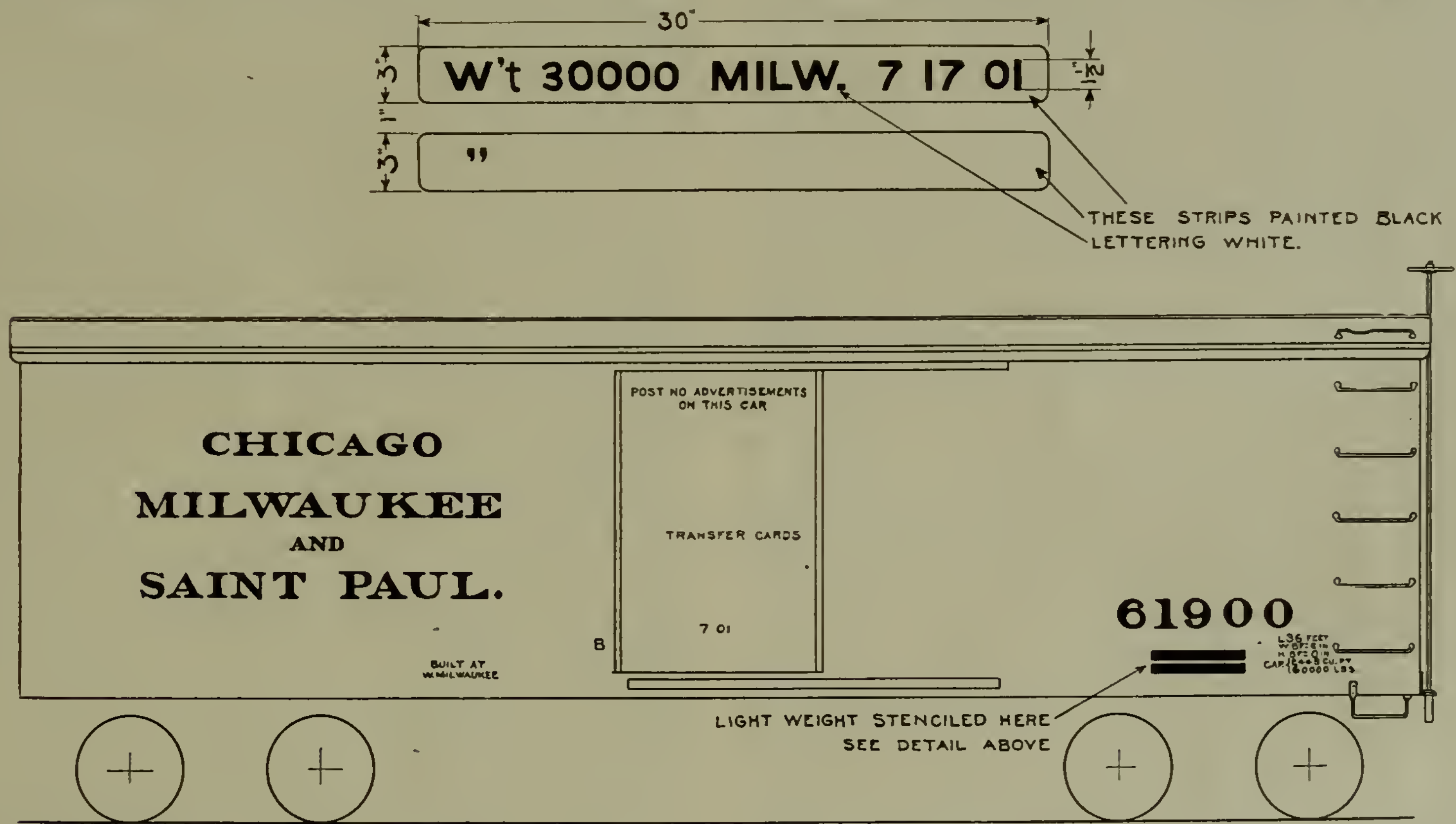
Mr. Morris (C., M. & St. P.): That seems to be about all right, with the exception of the letters. I think they ought to be 2-inch letters instead of 1½-inch. Quite frequently, I think, it will be found after the cars have run for some time they will become somewhat dim, and the weigh master in his house, with glass between him and the car, and the glass none too clean, perhaps, may find it difficult to distinguish the lettering and get the weight just as it is. I would be in favor of increasing the size of the lettering to 2 inches."

Mr. Kramer (P., F. W. & C.): I am of the same opinion as Mr. Morris. I think the letters ought to be 2 inches instead of 1½ inches. I think there is plenty of room on the panels for 2-inch letters.

Mr. Wentsel (Belt Ry.): I think the report is all right. If the letters become dim we can paint them over again, which is done anyway.

Mr. Kroff (P., F. W. & C.): I do not think the figures will get very dim, because the cars ought to be re-weighed once a year, anyhow, and if extensive repairs are made the cars ought also to be re-weighed. Therefore I do not think there is any danger of their getting so dim that the weighmaster cannot read them.

Mr. Bates: We all know that the cars ought to be re-weighed once a year, but they are not. I have been around cars in the evening in the dark, and with 2½-inch letters it is pretty hard to see them sometimes. I do not think this lettering is large enough at all. Our letters are 2½ inches and it is pretty hard to see them when the cars run a while, especially in the evening. A man has got a poor light and with the scale shanty a few feet from the track it is pretty hard to see the numbers from there, and while we are recommending something we ought to recommend it right.



Mr. Darlington (C., M. & St. P.): My experience of it is in the vast majority of cases the cars are lettered in white on mineral paint. The difficulty that Mr. Bates speaks of probably arose from the fact that there is not a proper show for the letters to retain anything in the shape of colors. The mineral paint, if that is the way, gets dirty and there is a simulation of the two colors after the car has been in service, whereas if the foreground is a dark color I think the difficulty spoken of will not arise.

Mr. Bates: I do not believe that many roads would go to work and paint their cars with that panel, that is the ordinary freight cars. It may be well enough to put it on refrigerator cars, but I do not believe it is the thing to do on freight cars.

Pres. Sharp: Don't you think, Mr. Bates, that when the car is being repainted the extra expense would be warranted in view of its making a better-looking car?

Mr. Bates: I do not think so. The black would get dusty very quickly just the same as mineral paint.

Mr. Cardwell (A. C. C. O. Ço.): I would make a motion that the report of the committee be adopted. Seconded.

Mr. Morris: I move you that the report be amended to read that the letters shall be 2 inches instead of 1½ inches. Seconded.

Pres. Sharp: It has been regularly moved and seconded that the report of the committee be amended to read 2-inch letters instead of 1½-inch letters.

Mr. Grieb: It would be hardly right for the committee to allow that motion to go before the house without saying something in defense of the recommendations made. We are willing to admit that our painter was a little too anxious to do a good job; probably he felt inclined, because the subject was good, to do the best he could, although I asked him to use the standard stencil the same as you see used for the length, weight and height, so as to reproduce exactly the same effect which would be noted on a car. With the panel arranged as it is it perhaps shows off the letters and numbers more prominently, but we can judge from the other lettering which is done with the standard stencil what the effect would be. I think everyone will acknowledge that the other figures, which appear to the right, are sufficiently plain to be read by anyone. It would be well to take into consideration the fact that a poor job of stenciling was done, the background being paper which will not absorb and is very ready to blur. To enlarge the stencil will make it necessary to increase the size of the panels proportionately in order to maintain the harmonious appearance shown in the sketch. I would like to ask Mr. Morris how far they would expect the light weight to be seen from—how far the weighmaster and others are from the car when they take note of it.

Mr. Morris: I should say the weigh-master's shanty was between four and five feet from the track.

Mr. La Rue: My idea in making the suggestion that the letters be 2 inches was that probably they would make the weights out of paper stencils and make the bars rather large. To make a figure "3" with a paper stencil with rather a large bar you would have only three small daubs. After it got a little dim, or in the night with a poor light, and on red paint it would be a pretty hard matter to see it.

Mr. Morris: Another question must be taken into consideration, and that is the fact that the men stenciling cars are not going to make as good a job as that, by any means. They have to do it in a hurry in order to get over a good many cars; the stencil gets clogged up and broken, and there is little paint put on, sometimes. I have seen, and I guess all of you have seen, cars newly stenciled which showed up very dim right at the start off, and I think we can get around that to a certain extent by increasing the size of the letters. I think the weighmaster is one that should be taken into consideration more than anyone else. The cars are on the move all the time, and it is a very difficult matter for him, sometimes, to get these figures right. We ought to give him all the assistance we can by making the figures large.

Mr. Grieb: With the party under whose observation these letters come, six feet distant, it seems to me the committee has allowed a very large factor for safety in the size of lettering, considering proper thickness and density of the paint. With the same size letters, if any of these gentlemen here tonight were called upon to pass an examination, such as is usually given train men or any one connected with the operation or movement of trains, they would be required to read those figures at 76 ft., using Snellen's type, to demonstrate that they have normal eyesight. It seems to me if the ordinary man will read them at 76 ft. the weighmaster ought to read them at 6 ft. Then again the size of the letters is no assurance of their being easily read. I think everyone here tonight will acknowledge that they have seen figures of the size of the "66406" that were undiscernible by reason of age and condition. It does seem to me, if we attempt to increase the size of the letters in our stencil from 1½ inches to 2 inches we will have such large, heavy panels that they will be entirely too prominent. It will look like a piece of patchwork thrown into the car, and instead of serving as a means of beautifying the appearance of the car will have a tendency in the other direction. I think Mr. Morris and the other gentlemen here have seen thousands of cars pass through their yards, stenciled with the same size letters as I recommended. I have not heard any objection to them, and I rather think, when the change on the Milwaukee road was made and the 1½-inch letter adopted if there was any chance for a kick we would have heard it.

Pres. Sharp: If there is nothing further we will vote on the amendment to the committee's report, which is to increase the size of the letters from 1½ inches to 2 inches. Motion lost by a rising vote. The motion to adopt the committee's report as read was then carried unanimously.

Pres. Sharp: We will now take up subject No. 4. It is claimed by a member that a Chicago railroad, in making bill for applying a side door on a defect card, makes a charge of one hour labor for applying the door in addition to the $3.50 allowed by the M. C. B. rules. Is this correct?

Mr. Darlington: The M. C. B. rules distinctly give a price for the door applied. There is no opening there for a charge for labor.

Mr. Bates: The rules also give a distinct price for applying a brake shoe. It says: "One brake shoe applied, no credit for scrap, 30c." But if you give a defect card for missing brake shoe you will be charged a half hour labor.

Mr. Grieb: Will Mr. Bates give us the reason why an exception was made for labor allowance on a brake shoe?

Mr. Bates: The Arbitration Committee has ruled on the brake shoe. They allowed it was proper to charge labor for applying a brake shoe on a defect card. Of course with the side door there has never been a case come up for them to decide it and I cannot help but think if a case went to them they would have to decide it the same as the brake shoe case.

Mr. Darlington: The distinction I clearly see in the case is that in one case the decision was on account of there being no scrap. Under the rules there is no labor allowed for a brake shoe applied, except on defect card. The scrap from the brake shoe is supposed to cover the labor. With reference to the door, that case does not arise. A "door complete and applied" is the wording of the rule. With reference to the door, I never had a case in my experience in which any company attempted to charge us, except one, and when their attention was drawn to it the labor was immediately withdrawn.

Mr. Bates: We do not make such charges ourselves, but still we have been charged one hour labor for applying a door. Now then, speaking of the scrap, the rules say "One side door applied, no credit for scrap, $3.50." Now, then, if you apply a door account of being lost on your own line you have the scrap, which no doubt is figured in to make up the labor. If you give a defect card you do not get any scrap any more than if you gave a card for a brake shoe. If you are going to charge labor for a brake shoe on a defect card you ought to do the same with the side door, because when you get the car home you do not get the scrap.

Mr. Grieb: I do not have any hesitation in saying that I never felt very kindly disposed towards that decision. It looks a little too much like scrapping for fine points simply to make something, no matter how small it is. It is simply a case of making a point and sticking to it and getting a decision in your favor. On the brake shoe proposition it makes a very close margin to charge 30 cents and furnish 20 pounds of cast iron, which I believe is the average weight, today when cast iron is worth 1¾ according to the rules, and the brake shoe ought to be worth 35 cents instead of 30 cents. That condition does not apply to the side door, however. Anyone can make money applying them at $3.50 apiece. It does seem wrong to get enough to cover the expense incurred for labor and material and then tack on another little charge of 10 or 20 cents.

Mr. Darlington: I move you that no labor should be charged for applying a side door on defect card.

Mr. Cather (I. C.): In justice to one of the roads involved in the case, although I have heard no remarks from that particular road in substantiation of their views, I wish to make a statement that personally I have obligated myself to bring the matter up here and to state the matter in an unbiased manner. I believe, personally, that according to a literal construction of the rules a road is justified in charging labor for the door. That is, taking the abstract wording of the rules alone, and considering arbitration decisions, but one must consider in M. C. B. law, as well as all law, the intent of the law and the price of the commodity involved. Now, I do not think it ever entered into the minds of the framers of the prices to consider whether this door, or any doors was to be applied under different conditions. For instance, they did not consider whether it was applied account being lost on some other road or on the particular road applying it. The rules say "One side door applied, no credit for scrap, $3.50." That certainly means just what it says—that the door is worth $3.50 applied to the car. The very fact of its saying "applied" indicates that that is the entire charge that should be made. The idea is the door is worth $3.50 without considering the scrap. That, I believe, is the intent of the rules. The other point comes in on account of that arbitration decision being rendered for missing brake shoe. There is something back of that of which some of us may not be aware of. I have been led to believe that it was decided so in order that brake shoes might better be maintained than if no labor charge was allowed. It was not so much as an offset for the scrap as a penalty on the road delivering the car for not maintaining shoes. Just on the same principle that you can apply a door which is lost from the car on your line and charge the owner for it. If you deliver the car with the door missing you pay for the door, and not the owner. I am in favor of the motion that a labor charge in such a case is not proper at all.

Mr. Grieb: I think there is another very important factor to be considered in matters of this kind, and that is the current practice. I do not know just how long this rule has been in force specifying $1.75 for an end door and $3.50 for a side door. Now, it seems to be a pretty late date to bring up this question if there are any new points to be made, as there must have been thousands of bills rendered where no charge has been made for labor. I think that fact alone ought to answer as an argument to any one who is in favor of adding labor at this date:

Mr. Bates: Of course our road is not one that starts these new things. You know it is always some other road that does it. We have been charged for extra labor for applying side doors. Personally I do not believe it is right, but here we have the rules—"Brake shoe applied, no credit for scrap, 30c"; then just a little way below that is "Door, for side of box or stock car, wooden, each, applied, no credit for scrap, $3.50." Now, the Arbitration Committee has ruled that it is proper to charge labor for applying brake shoe on a defect card, and I do not see see why it should not be done in this case if the other is right. Personally I do not believe it is right to charge labor on a defect card, but then we have to do it because the Arbitration Committee ruled that way, and the reason that it has not been charged on a door is because there has never a case come up. It is a new thing. It is only a month or so ago that we have been charged labor for applying side door.

Mr. Grieb: It is very pleasing to hear of one who has such a very sincere regard for the doings of the Arbitration Committee as expressed by our friend Bates. I would like to ask him if he has known of changes in rules that have annulled any decision of the Arbitration Committee? I do not think you would have to go back of the rules for 1901 to find cases where the Master Car Builders' Association as a body has formulated rules that have been in direct contradiction to decisions of the Arbitration Committee.

Mr. Kroff: This is a case where I am on top of the fence, would not know which side to jump on. The point is well taken on both sides. Now, the rule says: "No charge to be made for labor of replacing or applying M. C. B. knuckles, knuckle pins, locking pins, clevises, clevis pins, lift chains, brake shoes or brake shoe keys, except on the authority of a defect card." Now, it seems that a defect card carries labor charges, according to that ruling. I do not see why the defect card should carry labor charge one place and not in another. It is pretty hard to say which is right. If I would judge I would say they are both right. It is a point that the Arbitration Committee should decide.

Mr. Cardwell: Our Arbitration Committee has troubles enough, and I am in favor of Mr. Grieb's argument of current practice. I do not think we have a right to go before the Arbitration Committee. They have made a ruling on the brake shoe, but have not made a ruling on the side door. Since the current practice has been that no labor has been charged on side doors in the past, I think it would be a bad precedent for us to take up a technicality of that kind at this date.

Mr. Grieb: Even at the instance of keeping our secretary unduly busy I think we ought to help such a good man as Kroff to come out of the darkness and get the benefit of the light. I believe there is something in the scripture which says, "Seek and ye shall find." Section 22 of Rule 5 says "No charge to be made for labor of replacing or applying M. C. B. knuckles, knuckle pins, locking pins, clevises, clevis pins, lift cahins, brake shoes or brake shoe keys, except on the authority of a defect card." Now, anybody that has got any doubt in his mind, it seems to me, will, after looking at this rule and thinking for a second, have all doubt removed by the fact that it does not include any door, and surely the M. C. B. Association, if they wanted to permit a charge for labor in applying doors, would put it in here, and it is very safe policy to draw the conclusion from the fact that as it is not shown here, it was not intended to allow labor.

Mr. Darlington: Mr. Kroff, if he reads first paragraph of Sec. 22, Rule 5, will see that it itemizes every part on which labor can be charged on a defect card, and on which no labor is charged in ordinary repairs.

Mr. Kroff: There is nothing in the rules where it says that labor cannot be charged on an M. C. B. defect card.

Mr. Cather: The fact that the rules have been changed, and as Mr. Grieb very fittingly placed it awhile ago, it seems to me if it was the intent to allow labor charge those having in view a charge would have embodied all the items that were to be entered. Now then, there is one item here for which the rules provide a price applied, and that is air hose. If you apply an air hose on authority of a defect card, do you charge $2 for the hose and labor also? If that argument prevails they ought to do it. We have had cases where labor has been charged for missing air hose on a defect card. The rules say "Air hose, one and a quarter-inch, complete with fittings, applied, $2." The rules also say "Door for side of box or stock car, wooden, each applied, no credit for scrap, $3.50." Now then, there is no more labor allowed on one than on the other, and most surely under the new rules the fact that they have specified what items labor is chargeable on a defect card such items not included are not entitled to labor charge. Mr. Darlington's motion was here put and carried.

President Sharp: We will now take up subject No. 5. "A case in dispute. A makes request for M. C. B. defect card for one broken side door post and one broken header on one of their cases delivered home (refrigerator car equipped with side slide door) on account of rough usage. B declines to furnish card on account of hidden defects and no record, defects not detected until delivered home and the slide door opened by the owner. B also argues, while it might be that the slide door had been left open and the inside refrigerator door flew open while in transit and tore them off, an intermediate road has no means of protection under ordinary inspection, as it is not practicable to open slide doors of refrigerator cars in order to inspect the inside doors and posts. From a reasonable standpoint it would seem that the owner was entitled to a card. On the other hand the intermediate road and delivering line have no means of protection; in fact, these are hidden defects, as the slide doors are supposed to be closed to protect the inside doors. Should card be issued?" I might say that this is a case submitted by the joint inspector at St. Joseph. I have seen refrigerator cars that have the outside sliding door and I fail to see how a door post could be broken and the inside door swinging open in transit. I am rather inclined to think it is done at the loading platform. The door has been left open and the platform is too close to allow the refrigerator door to pass where the ordinary box car would pass. I believe it is the practice of all railroads to see that the refrigerator doors are shut and fastened and you will readily notice it would be impossible to shut the outside sliding door without the inside door proper was shut and fastened because the style of door lever and lock is such that you cannot shut the outside sliding door without the inside door is fastened. I therefore think that it is a case of unfair usage and that the owner of the car should not be held responsible. We have no cars of this design but we have had numerous cases where the doors are torn off and door post broken and I do not call to mind but one or two cases where there was any question that such a defect was the result of fair usage. We therefore have been furnished with authority to bill for all such repairs.

Mr. La Rue: We have a few cars that have those sliding side doors and I do not see, hardly, how it would be possible for the door post to be so damaged as to require renewal if it was not visible on the outside. The outside door closes only 1½ in. past the door post so that if the car was damaged so as to need a new door header and new door post there would be some visible defect on the outside.

Mr. Kramer. I have come across a good many refrigerator cars which have the outside sliding doors and folding doors inside, where some folding doors and door posts have been broken. A good deal of this is done in freight houses on account of folding doors not being properly closed after car had been unloaded by freight handlers. A great many refrigerator cars at the present time are loaded with grain. Western roads are doing this daily and one side of the car is boarded up in every case when such cars come to the elevator, and on this account the folding door is pried off and the door and post broken.

In my opinion the party handling the car should be responsible for the damage.

Mr. Schultz (C. B. & Q.): It does not state whether B simply handled the car over his line or whether he unloaded it. If they made a direct move from Chicago to St. Joseph over some line then I think if the car went to some point on B's line he should be responsible. But I would say if the car went over different lines I do not see how we can hold the delivering line responsible if the sliding door covered the door post and header.

Pres. Sharp: Then you think the owner is responsible?

Mr. Schultz: In looking at it as concealed parts I do not see how you can hold the delivering line responsible.

Mr. Sharp: Inasmuch as it constitutes unfair usage, the only proper way, it seems to me, under the rules, is to hold the delivering line responsible.

Mr. Darlington: Section 28 of Rule 3, I think, distinctly covers the case. When the sliding door is closed, so far as the evidence shown in the question goes, the delivering road had no means of ascertaining whether any damage had occurred to the inside doors or not. The question before us distinctly states that. It was under Sec. 28 of Rule 3 a concealed part, and without any question under the rules the owner is responsible. The owners can look where that car was unloaded and ascertain if it was damaged there, but as between the delivering road and the owner I can see no question but that the owner is responsible.

Mr. Morris: I do not think there is any other way to get around that. It would certainly be a hardship on the delivering line to make them pay for a door post that was damaged by somebody else. If, for instance, an Armour car was damaged in that way by the C. B. & Q. and the car given to the C. & N. W. and by the North Western given to the owners, it would be a hardship on the North Western to make them pay for the damage, with no opportunity to protect themselves by inspection, and as I understand it, the rule governing concealed parts was made to cover just such a case as this—where a road has no opportunity to protect itself by inspecting those defects.

Mr. La Rue: Broken side post on a car of that build, with the door post flush with the siding and generally a 4 in. face on the outside, the side door when closed covers but $1\frac{1}{2}$ in. of it. If the side door post was damaged it certainly would be visible on the outside.

Mr. Morris: In this case it is stated positively that the defects could not be seen, so there is no chance for an argument there.

Mr. Cather: In order to dispose of this case I make a motion that the owner of the car should look to the company last unloading it, for redress, and not to the delivering road, as it is a hidden defect. The point is that the intermediate road certainly could not be held responsible for hidden defects. This is according to the way the question is put before the association as a hidden defect. Without the outside door which concealed the defect it would be apparent. Therefore the motion as I just made, that the owner would have to look to the road unloading the car as the one probably at fault and the owner should look to him for redress.

Pres. Sharp: It seems to me it would be better, as an association deciding this case to decide that this is a hidden defect and covered by the rules. It seems to me if we take the stand that the car owner must look to the road doing the damage rather than to the delivering line, that we are getting out of the spirit of the rules. The case that Mr. Morris cited very clearly shows where the delivering line could be placed in a position to pay for defects which they did not cause, but the same effect would be obtained by classing this as a hidden defect and that the car is taken care of by the rules and would make our decision a little more complete.

Mr. Cather: My idea is that in all such cases of interior or hidden defects, that is, damage caused through either maliciousness or ordinary rough usage, that the owner must take up with road where such damage evidently occurred, and if the evidence is good that such road will furnish protection. It is not necessarily at all a delivering campany's defect.

Mr. Morris: I think that is right. I believe the decision should cover this condition so that the owner could, by tracing, perhaps, find out where the damage occurred and then make the company that did the damage, responsible. Of course it practically makes the owner responsible for it. At any rate it relieves the delivering line, which I think is what we ought to get at.

Pres. Sharp: The owner of the car has the privilege in any case whether we grant it to them or not. If the C. B. & Q. delivers a car to you in a damaged condition and under the rules you cannot collect from them, you still have the power, without any provision of the rules, to go back of the delivering line to find out who did the damage and endeavor to get them to settle for it. We recently had a case with a railroad company who delivered a car to us with defects, denoting rough usage. We called the inspector and made a joint inspection and mate the usual request for defect card and he saw the repairs made. In tracing the car it was found to have come through St. Louis inspection. They located that a part of the damage existed at that time and this delivering line said to us, "We have located now where this damage occurred: you will have to collect from party No. 2." You can readily see the position that it places you in. I think it is the spirit of the rules that the two parties at delivering or interchange point must settle it. Motion put and carried.

Pres. Sharp: At our last regular meeting the question of our annual outing was discussed and there being evidence of different opinions it was thought advisable to ask for the views of the members, which the secretary did by sending out a return postal card, and at our executive committee meeting a few weeks later the replies received up to that time indicated that everybody was in favor of taking a trip across the lake and we made all necessary arrangements with the Williams Steamboat Co. to go across the lake, it just remaining for us to confirm our verbal agreement, but during the time that elapsed between our conversation with the excursion company and the time I received their letter, several other replies came in which materially changed the majority vote, a trip down the Santa Fe railroad to Joliet being the most favored. As soon as we found the majority of the members were in favor of going via the Santa Fe we took the matter up with Mr. Mudge, their general manager, who is located at Topeka. Te replied that they would be glad to take us any time between Sept. 7th and 15th. This letter, however, was not received until this afternoon. On this account we could not go on the dates mentioned, not having time to complete the arrangements, and have asked him if we could go on the 21st, but have not yet received a reply. The plan is to go to Lockport, at which is the controlling works of the canal, which is four miles this side of Joliet. We can inspect the dam as long as we want to and take the street cars into Joliet and inspect the prison. Meeting adjourned.

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RAILWAY MASTER MECHANIC

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Communications on any topic suitable to our columns are solicited.

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Vol. XXV. CHICAGO. NOVEMBER, 1901. No. 11.

IN this issue are illustrated two locomotives made by two different American locomotive companies for the government railways of New Zealand. When so much has been said recently regarding the failure of American locomotives to equal the English make, as regards economy in the consumption of fuel, it is rather gratifying to note the continued export of the American locomotive into the British colonies. So long as the American locomotive is still being sold in foreign countres our friends across the water will be compelled to admit that there is some merit in the American locomotive. In this connection a communication from Mr. Willard C. Tyler, which will be found on another page of this issue will be read, with great interest. Mr. Tyler's wide and varied experience in railway matters in this and foreign countries, and his knowledge especially of railway affairs in Japan, enables him to discuss most intelligently the American locomotive abroad.

WHY is there not more attention given to educating shop men to a sense of the cost of things? Walk into any railway shop and ask the first twenty men the price of a lubricator, an injector, a driving spring, a pound of waste, a chisel, or in fact the price of any of the materials, devices or parts of locomotives or cars with which he is working every day—and it's a safe proposition that not one of the twenty will have any but the haziest idea of the cost of any article mentioned. This should not be. How are men to develop judgment in the entire absence of information upon which to base much of their judgment? How are these men, when promoted to foremen and master mechanics, to exercise good judgment in the question of cost, both of material and labor, when the entire question has heretofore been a sealed book to them? What is the object of a railway company concealing the costs? It is not a manufacturer, intent upon hiding under discounts the prices of the output. There is little need for expatiating upon the benefits accruing a railway for a little endeavor to educate its shopmen to a sense of the cost of things. A moment's reflection will bring all this to mind. And how easily it could be done! A monthly material price sheet bulletined in the various shops, price tags on all supplies and devices which are passed over the storeroom counter and prices stencilled on the large articles in the stock yard! Some trouble to inaugurate—but once in shape it would need little additional labor to be kept going—and the sense of the cost of things thus unconsciously absorbed by the shopmen would amply repay these efforts. At the same time all hands would be in a better position to know what they are doing. What is the valid objection to this plan? It has been in force on one road and to our personal knowledge worked nicely. Why not on all railways?

THE report of the committee of the Chicago Car Foremen's Association, presented at the October meeting of that organization, is in many respects one of the most important reports which has been presented for discussion. In closing their report the committee calls especial attention to the fact that the "introduction of heavy power has brought about a condition where it is absolutely necessary to know that the air hose and its connections are in both proper position and condition." The committee confined its report to the following:—Loose and defective train pipes; train pipe brackets; angle cocks; air hose; air house clamps; air hose nipples; air hose couplings; gaskets or any features which might contribute to damage any of these parts. The report in full will be found in this issue of the Railway Master Mechanic in the proceedings of the Chicago Car Foremen's Association.

The "Railroad Paint Shop"

BEGINNING with this issue of the Railway Master Mechanic, and continuing through subsequent issues, a department having the above title will be conducted by Mr. Charles E. Copp, general foreman painter, car department, Boston & Maine Railroad, Lawrence, Mass. With the November issue the Railway Master Mechanic becomes the official organ of the Master Car and Locomotive Painters' Association. As is probably known to some of our readers, the "Railroad Paint Shop" has been conducted by Mr. Copp for over eight years in the Railroad Digest, more widely known as the Railroad Car Journal, and has been a department of great interest to the painters' association and to all mechanical officials engaged in railway work. The publisher of this paper has had an exceedingly pleasant though short acquaintance with Mr. Copp, and in introducing him to our readers feels that it is entirely appropriate to quote a few words from a recent editorial in the Railroad Digest, in which the editor of that publication pays "a well merited tribute to the excellent ability and faithful devotion of Charles E. Copp, who, for eight years, has so efficiently edited the columns of the 'Railroad Paint Shop.' The ability thus manifested has been too widely acknowledged to need repetition here; his devotion has been more to the cause—the uplifting of his fellow craftsmen and their useful organization—than in seeking the rewards of a facile pen. The M. C. & L. P. Association has in him one of its staunchest pillars, and may well be, as it is, justly proud of him."

Communications

Chicago, October 5, 1901.

To the Editor of the Railway Master Mechanic:

I noticed communication of Mr. Frank C. Smith in the October Master Mechanic, and it seems proper to say in reply, that there is not a shade of question relative to the good qualities of engines Mr. Smith refers to as having handled 10 to 12 cars at 60 or 65 miles per hour. We know also that these Lake Shore new passenger engines take 16 cars on schedule time easily. Great capacity, however, even when coupled to exceptional uniform good results, has not heretofore constituted an engine type.

It is suggested that types are flexible. The designer or builder of engines, having a new wheel system or a marked change in outline elevation, has always been allowed to designate the type name, as in the case of "Prarie" type.

One quite recent instance of the Baldwin Works' choice of title has come to notice, where a ten-wheel engine with a trailer truck has been named "Six-wheel coupled double-ender locomotive." These engines are for New Zealand, for use in passenger service; and having a pilot only in front, they are to run in one direction, as in usual practice.

Geo. W. Cushing.

F. D. Underwood,
PRESIDENT ERIE RAILROAD.

Mr. Underwood entered railway service in 1868 as a clerk in the employ of the Chicago, Milwaukee & St. Paul Ry., from which position he rose to be general superintendent. He has been general manager of several roads among them the Baltimore & Ohio, which he but recently left to become the head of the Erie R. R.

Decision in Favor of the Westinghouse Air Brake Company

A DECISION has been recently rendered by Judge Lacombe, U. S. Circuit Court, Southern District of New York, in the case of the Westinghouse Air Brake Company vs. Christensen Engineering Company on application for an injunction against the latter company to restrain them from making use of their quick-action triple valve, which the Westinghouse company claims to be an infringement. It will be noted that the decision grants an injunction on claim 2 of the Boyden patent, which is controlled by the Westinghouse company.

United States Circuit Court,
Southern District of New York.

Westinghouse Air Brake Company
vs.
Christensen Engineering Company.

Motion for preliminary injunction, on claims 2, 4 and 11, of United States Patent 481,134, to G. A. Boyden, August 16, 1892, for valve for air brakes.

This patent does not stand here with such presumption of validity only as arises from its issue by the patent office. It was before the U. S. Supreme Court in Westinghouse Air Brake Co. 170 U. S. 537, a litigation mostly hotly contested and which involved a most careful examination of the state of the art. It is true that in that case the patent now in suit was not the one sued upon, but was the shield availed of by defendant therein to protect itself. Nevertheless the decision of the Supreme Court, expressed with no uncertain sound, must be accepted here as establishing the proposition that Boyden was an independent and meritorious inventor, who solved with great ingenuity and in the simplest manner the problem of quick action. Nothing in the affidavits or prior patents shown here calls for any qualification of this proposition.

The second claim reads:

"2. In valve mechanism for automatic air brakes, the combination of a communication with the brake cylinder from both the auxiliary reservoir and train pipe, a single valve controlling said communication, and means to retard or restrict the flow thereto of the auxiliary reservoir air when applying the brakes in comparison with the flow thereto of train-pipe air, whereby train-pipe air at lower pressure than said auxiliary-reservoir air will pass said valve when making an emergency application of the brakes."

It seems quite plain that the three elements of this claim—the "communication," "the single valve," and the "means to retard or restrict" are all present in defendant's valve. In view of the statement of variety of form of structure which is found near the close of the specification, and of the history of application in the Patent Office, it would seem that additional elements are not to be read into this claim restricting it to the precise form shown in the drawings, but that the patentee should be entitled to a fair application of the doctrine of equivalents. As defendant's experts demonstrated when it was sought to enjoin this same valve under U. S. Patent 360,070, it is modeled upon and belongs to the group of which the valve now in suit is the exemplar. Doubtless is contains improvements, but it operates by reason of its possession of the three elements above referred to; it does not present the differences in form and principle which will distinguish it from the Boyden valve, as that was distinguished from 360,070. There are some questions as to claims 4 and 11 which may better be reserved for final hearing, but complainants may take preliminary injunction as to claim 2.

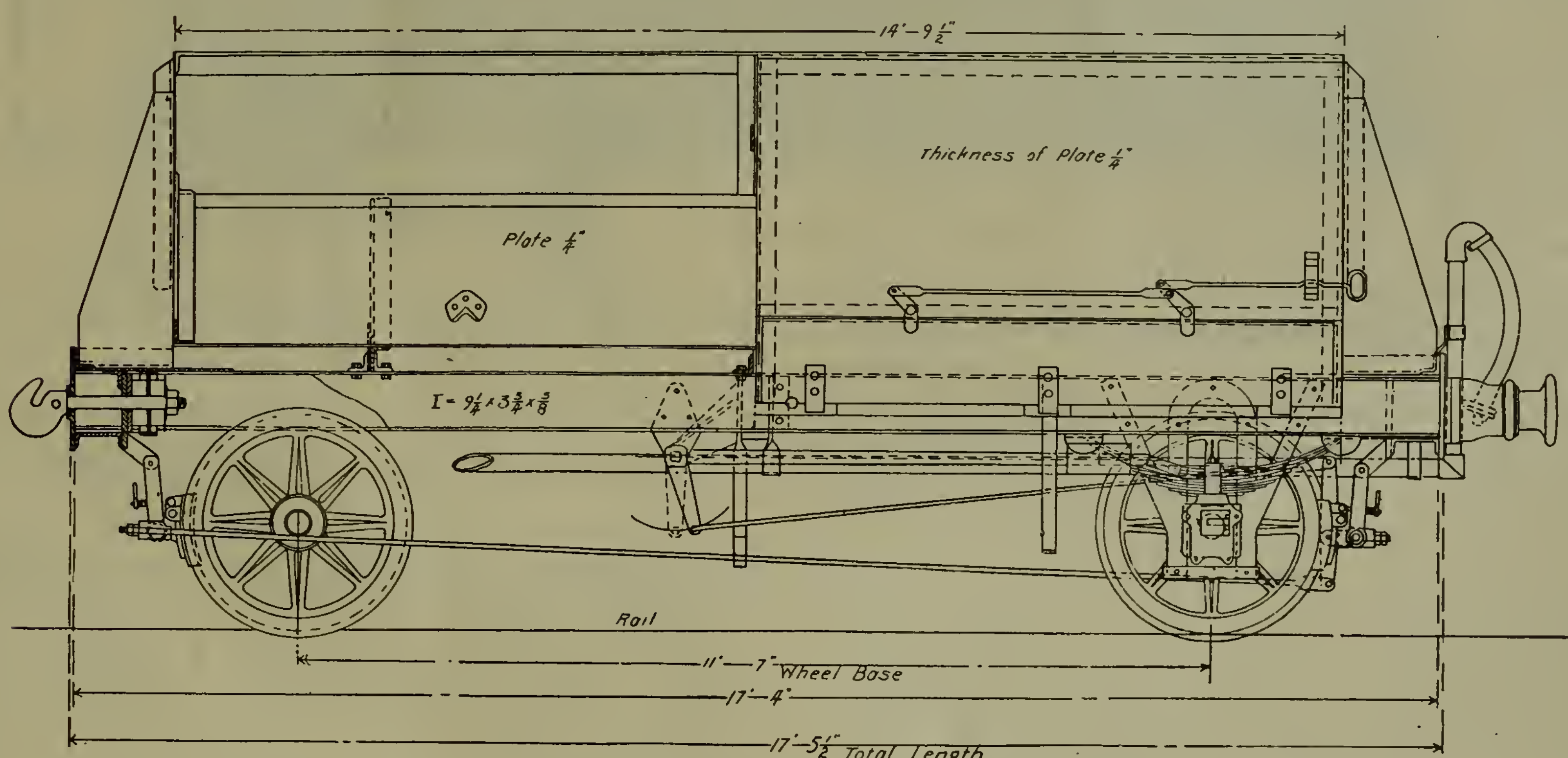
Some Japanese Railroad Notes

Tokio, Japan, Sept. 15th, 1901.

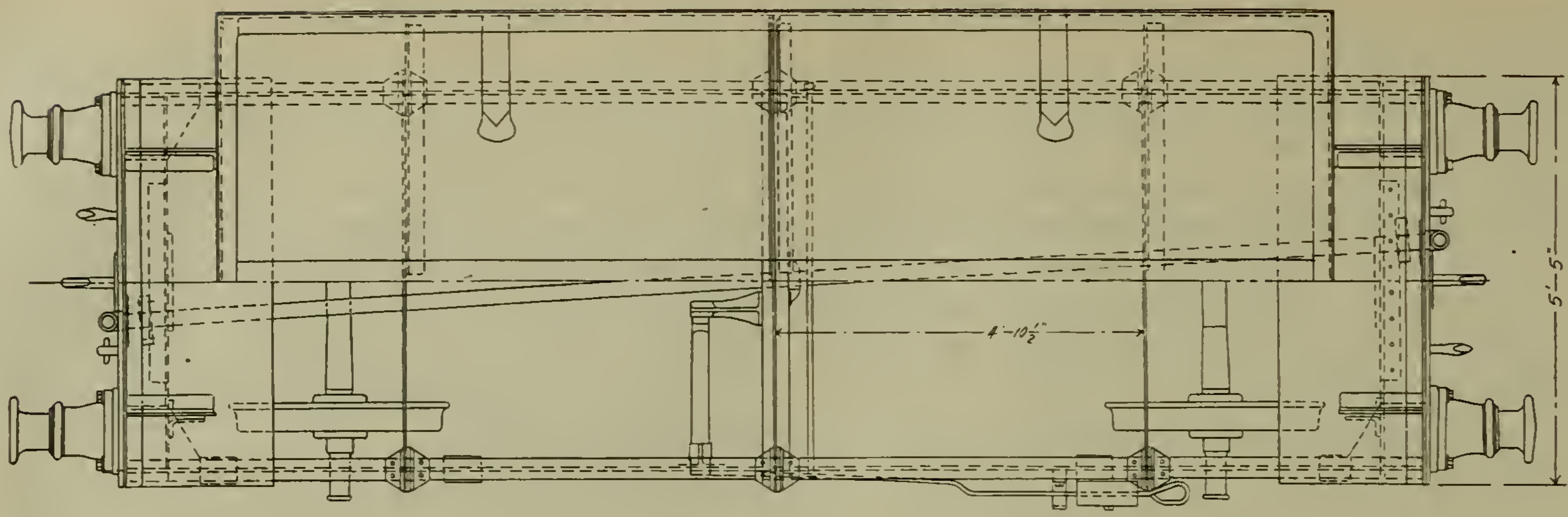
To the Editor of the Railway Master Mechanic:

GENERAL railroad matters in Japan are quiet owing to a rather depressed financial condition now prevailing. This has been caused by a heavy balance of trade against Japan, amounting to about 25 millions (gold) last year, and to the increased government expenditures made necessary by the recent Chinese fiasco. This condition is however passing and things have begun to improve. The worst is now over. The government railway extension appropriations have as a result been cut down or suspended, which of course has lessened the market for that kind of material. The British locomotive builders having agents here are appalled at the number of American engines that have come in during the last three years and they are filling the air (and the local newspapers) with their howls and predictions as to the loss of money caused to the railroads by the continued use of the American locomotive. They are also causing to be reprinted here various British newspaper attacks on the coal consumption of our engines. These are one-sided statements telling only part of the story, with little or no reference to existing conditions. Really dust throwing, instead of real honest warfare.

The Japanese railroad men, who are bright fellows and who see through most things, do not take this hue and cry seriously at all, but go only by their own experience. The result has been that in the past three years about 160 American locomotives have been purchased here as against only about fifty of British manufacture. The Sanyo Railroad, which is one of the most modern and progressive roads, aggregating about 350 miles, has come out openly in favor of the American engine and it has bought nothing else for years. The Kiushiu Railroad, operating 400 miles, the second longest private company in Japan, has not purchased a British engine in over four years, during which time it has purchased 72 of one of the best American works. The Kansai, operating 300 miles, has bought many American locomotives. The two roads on Hokkaido



Steel Coal Cars, Building at Hiogo Shops for the Sanyo R. R., Japan.
Capacity 9 English tons, Weight 6 tons, Wheel diameter 33 inches, Cost 1100 yen.

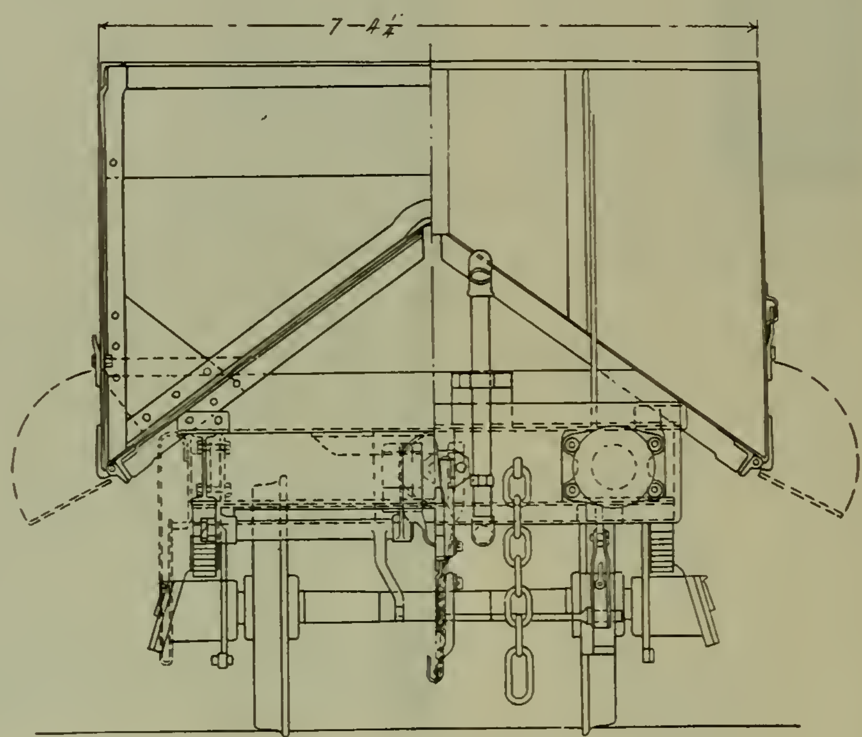


Steel Coal Cars, Sanyo R. R., Japan.

Island(North), operating over 400 miles, have purchased American engines exclusively of late years. This leaves only the Government Railways of Honshiu (the main island), the Nippon and a few small roads as the only recent customers of the British in Japan. Ten years ago practically all the locomotives here were British, now there are over 1,100 engines running in Japan and about 500 of these are American, which have all come in in less than ten years. This does not look as if all of these dreadful stories emanating from England could be true. The men in charge of the motive power of the Japanese railroads are educated engineers, skillful and close observers of expenses, defects, etc., etc. They are running the British and American locomotives side by side, so to speak, hauling the same trains and loads day after day and yet a large majority of them keep right on ordering American engines. This speaks loudly for itself. "The men behind the throttle" also like the American engines much better than the British.

Since the discovery of oil in the Echigo district over on the Japan sea, and the coming to Japan of the Standard Oil Company, some iron tank line cars have been built by the Imperial Railway, which runs through that district with the Takasaki-Noetsu line These cars are of about ten tons capacity and the cylindrical tanks are held in place by steel cables which pass over the top of the tank on each side of the dome and cross each other as they extend to their fastenings on the frame of the car near the ends. Some of the railroads over near the oil fields are burning oil in their locomotives with good economical results. These roads are a long way from coal. The price of coal is high here, as the mining operations are slow and the demand fully equals the supply. The Sanyo Railroad is building at its Hiogo shops 100 all steel coal cars, with a capacity of nine English tons. These will cost about $550 gold each. The cost of all freight cars is very high out here for the small capacity in use. About all the work on them is hand work and the cost of labor is rising rapidly. A works here has recently turned out two locomotives of British design, but it was really merely a case of buying the rough shapes and finishing and assembling the engines The relative cost is not easily to be estimated.

The Sanyo Railroad Company is working its American locomotives much harder than any British engines are worked in Japan. The average run of locomotives in Japan is only between 40 and 50 miles without changing, but the Sanyo has established 90-mile divisions and is running some new Schenectady engines, which were bought last year, over these divisions and back every



Steel Coal Cars, Sanyo R. R., Japan.

day, a distance of 180 miles, and these engines are doing splendid work. This company now runs the fastest trains in Japan from Kobe to Shimonoseki, 320 miles in thirteen hours, an average of twenty-five miles an hour, but as the station stops are frequent and very long, these trains run sixty miles an hour in certain places, which is a good speed for three foot six inch gauge. When we consider the rapid increased use of the American locomotive in Japan and that no less than 552 American locomotives were sold abroad last year we surely can only be amused at the wails going up from foreign rival builders. Some of the largest British builders have not changed one thing about their engines in twenty years, while the American production is strictly modern and up-to-date. On the Imperial Chinese Railway only American engines are in use, also on the Chinese Northeastern and Siberian Railways, so if some of these British and Continental newspaper men would take the trouble to properly investigate what they are trying to write about, they would get some miles nearer the truth. Where the American locomotive is intelligently studied and properly loaded it will show economy and more power and give better service than any British or Continental locomotive every time. Its use all over the world has only just begun and is bound to increase as it has most certainly gone abroad to stay. In other words the railroad world refuses to stand still in this age of progress. W. C. T.

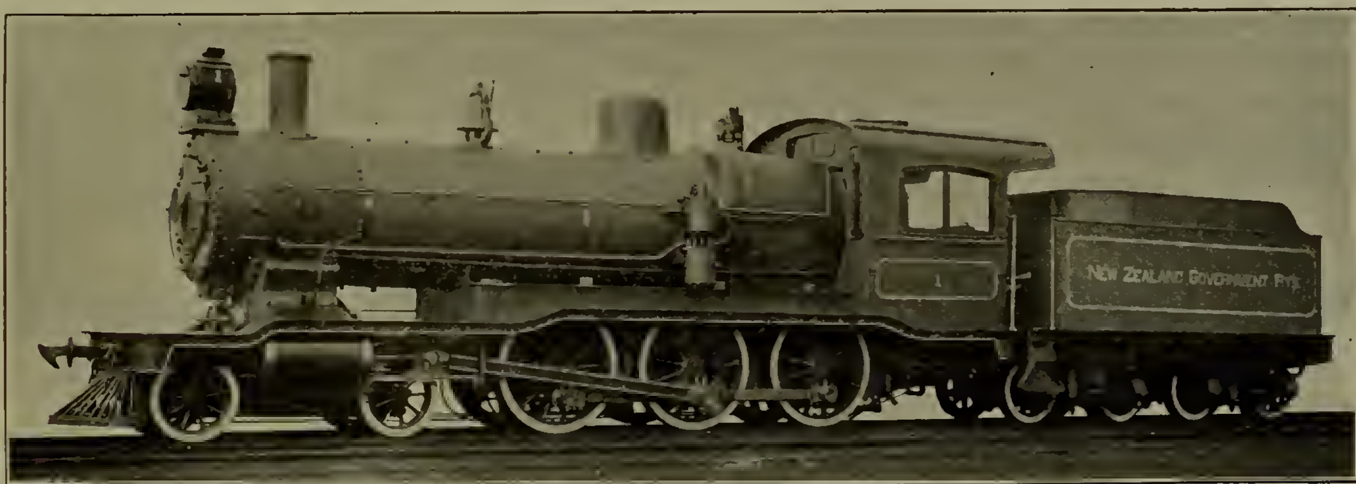
Brooks Locomotive for New Zealand

THE American Locomotive Company has recently furnished to the New Zealand Government Railways one ten-wheeled passenger locomotive. The gage of the road is 3 ft. 6 in., and bituminous coal is to be used as fuel. The weight on the drivers is 64,500 lbs., and the truck 27,000 lbs., total weight 91,500 lbs., the weight of the tender when loaded is 57,000 lbs. The dimensions are as follows:

Wheel base, total of Engine................18 ft. 3 in.
Wheel Base, driving............................10 ft.
Wheel Base, total Engine and Tender......40 ft. 6 ins.
Netting wire or plate............................Plate
Netting, size of mesh or perforation....¼ in. x 1¼ ins.
Stack, straight or taper.......................Taper
Stack, least diameter......................12½ ins.
Stack, greatest diameter...................13¾ ins.
Stack, height above smoke box...............30 ins.

Wheels and Journals.

Drivers, number...................................Six
Drivers, Diameter...............................50 ins.
Drivers, material of centers.................Cast steel
Truck wheels, diameter.......................30 ins.



Brooks Locomotive for Government Railways of New Zealand.

Length over all, Engine..................29 ft. ¾ in.
Length over all, total Engine and Tender...46 ft. 9 ins.
Height, center of boiler above rails.......6 ft. 8½ ins.
Height of stack above rails..............11 ft. 5½ ins.
Heating surface Firebox.....................91 sq. ft.
Heating surface Tubes...................1,260 sq. ft.
Heating surface Total....................1,351 sq. ft.
Grate Area.................................16.7 sq. ft.
Grate, kind of....................Cast iron stationary
Tubes, number of...................................220
Tubes, material....................................Steel
Tubes, outside diameter.......................1¾ ins.
Tubes, thickness....................No. 13 B. W. G.
Tubes, length over tube sheet.........12 ft. 7 1-16 ins.

Smoke Box.

Smoke box, diameter outside.................54 ins.
Smoke box, length from tube sheet..........55½ ins.

Other Parts.

Exhaust Nozzle, single or double.............Single
Exhaust Nozzle, variable or permanent.....Permanent
Exhaust Nozzle, diameter...............3¾ and 4 ins.
Exhaust Nozzle, distance of tip below center of boiler.......................................1 in.

Journals, driving axle..........................
..........6½ ins. x 8 ins. with enlarged wheel fit.
Journals, truck axle..................4½ ins. x 8 ins.
Main crank pin, size.....5 ins. diameter x 4½ ins. long.
Main coupling pin, size.......5½ in. dia. x 3¾ in. long
Main pin, diameter wheel fit.........5¾ ins. diameter.

Cylinders.

Cylinders, diameter ....16 ins.
Piston, stroke ....22 ins.
Piston rod, diameter ....2¾ ins.
Main rod, length centre to centre..........115½ ins.
Steam ports, length ....17⅞ ins.
Steam ports, width ....1¾ ins.
Exhaust ports, least area ....25 sq. ins.
Bridge, width ....2¾ ins.

Valves.

Valves, kind of .... Improved piston
Valves, greatest travel ....4¼ ins.
Valves, steam lap (inside) ....1 in.
Valves, exhaust lap or clearance (outside)..line and line.
Lead in full gear ....1-16 in.
Lead, constant or variable .... Variable

Boiler.

Boiler, type of ....Improved Belpaire wagon top
Boiler, working steam pressure ....200 lbs.
Boiler, material in barrel .... Steel.
Boiler, thickness of material in shell.............
........................½, 9-16 in. and 7-16 in.
Boiler, thickness of tube sheet ....½ in.
Boiler, diameter of barrel, front...............51 ins.
Barrel, diameter of barrel at throat ....55⅛ ins.
Boiler, diameter at back head ....51 ins.
Seams, kind of horizontal ....
.... Quadruple butt and quadruple lap.
Seams, kind of circumferential..............Double.
Crown sheet stayed with...............Direct stays.
Dome, diameter ....22 ins.

Fire Box.

Fire Box, type of .... Sloping
Fire Box, length ....84 ins.
Fire Box, width ....29½ ins.
Fire Box, depth, front ....56 ins.
Fire Box, depath, rear ....43 ins.
Fire Box, material .... Steel
Fire Box, thickness of sheets ....
....Crown ⅜ in., tube ½ in., side and back 5-16 in.
Fire Box, brick arch ....Self supporting
Fire Box, mud ring width ....
..........Back 3 ins., sides 2½ ins., front 3½ ins.
Fire Box, water space at top ....
............Back 4 ins., sides 4 ins., front 3½ ins.

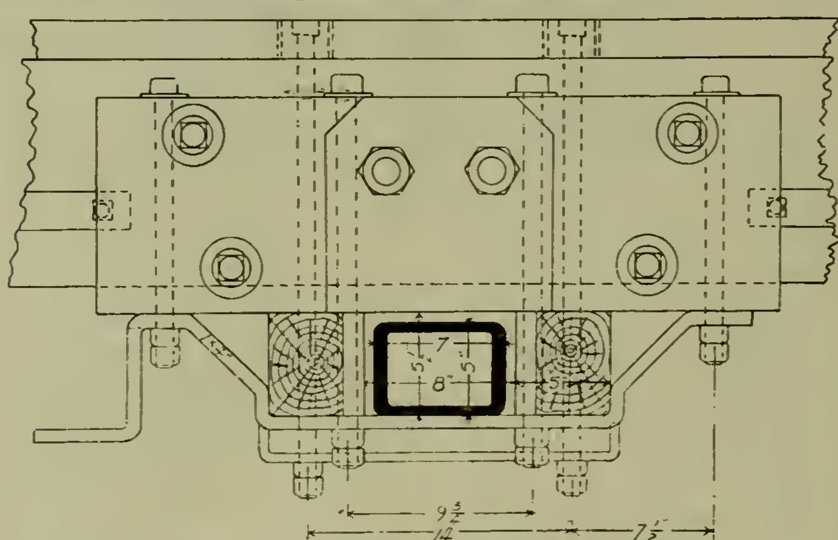
Tender.

Type ....8-wheeled steel frame.
Tank, type............................Straight top.
Tank, capacity for water................2,100 gallons
Tank, capacity for coal........................5 tons.
Tank, material ....Steel
Tank, thickness of sheets.......................¼ in.
Type of under frame..............13-in. steel channel
Type of truck.......................Brooks Works.
Type of spring......................Double Elliptic
Diameter of wheels..........................30 ins.
Diameter and length of Journals........3½ ins. x 6 ins.
Distance between centers of Journals..........62 ins.
Diameter of wheel fit on axle..................4⅝ ins.
Diameter of center of axle.......................4 in.
Length of tender over bumpers..........15 ft. 11 ins.
Length of tank........................14 ft. 6 ins.
Width of tank.........................7 ft. 4½ ins.
Height of tank, not including collar............45 ins.
Type of draw gear......Ry.'s spring buffer and hook.

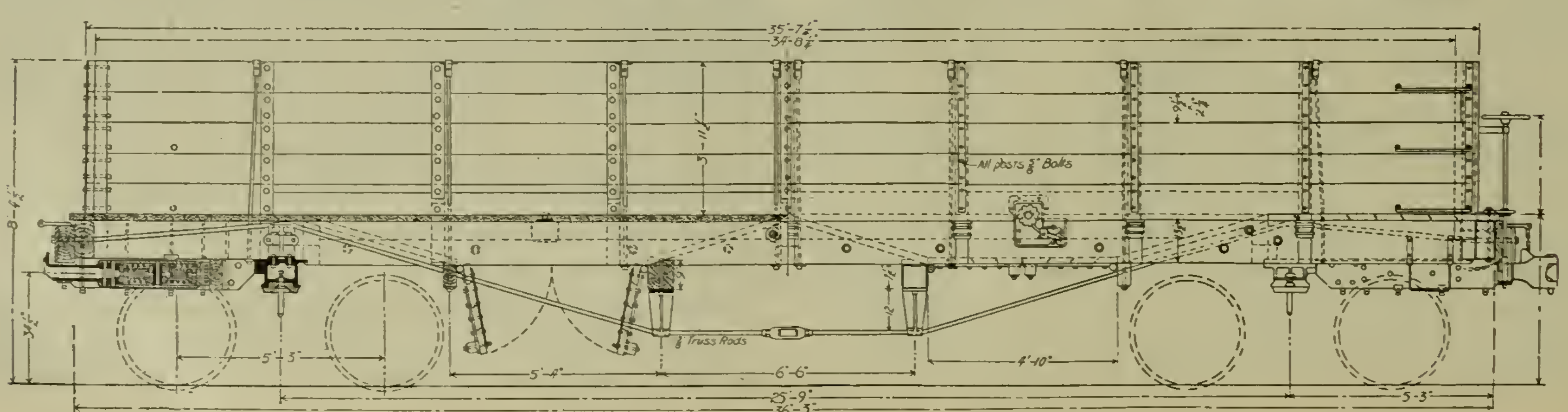
The special equipment includes Westinghouse brakes, of English manufacture, equalized on the back of all drivers, Detroit sight feed lubricator, Ashton safety valves, Seller's injectors, French springs and United States and Brooks metallic packing.

Drop Bottom Coal Cars of 80,000 Pounds Capacity, Louisville and Nashville R. R.

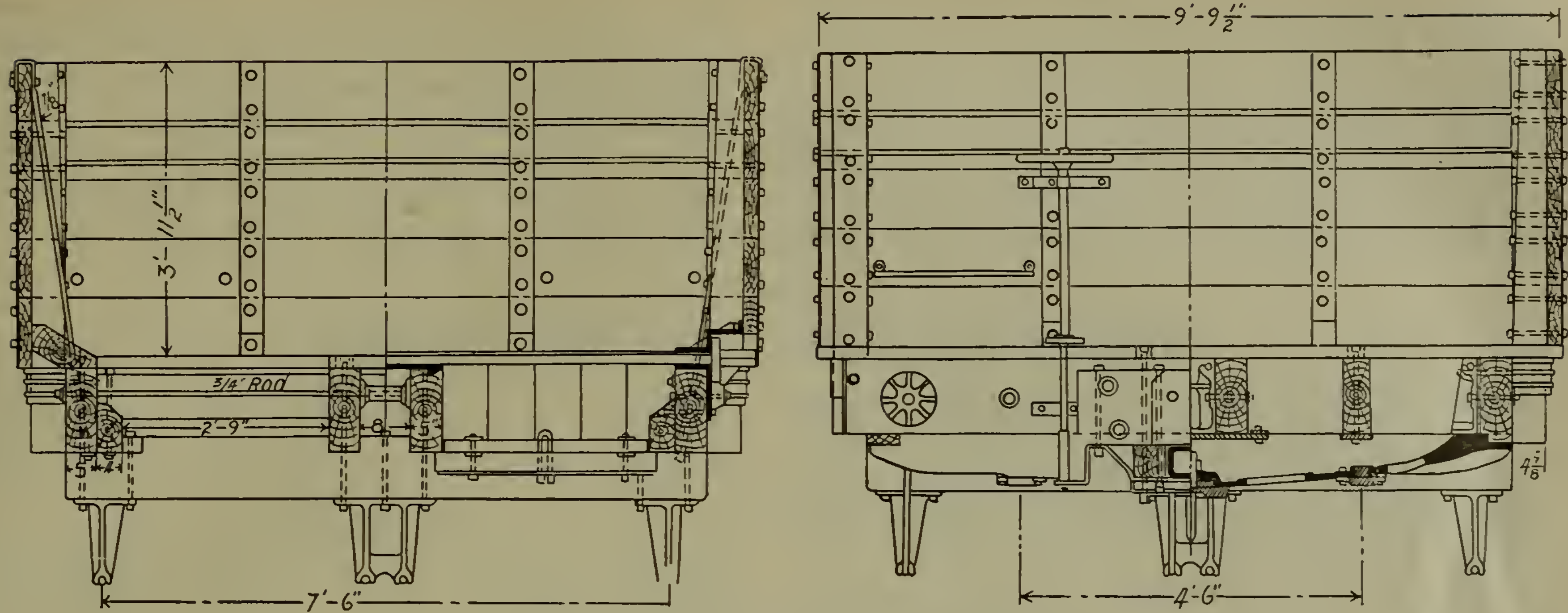
THE Louisville & Nashville R. R. are building at their shops at New Decatur, Ala., 400 36-foot drop bottom coal cars, the first installment of which has recently been turned out, and which we are enabled to illustrate through the courtesy of Mr. Pulaski Leeds, Superintendent of Machinery. The general dimensions are as follows: Length outside of end sills, 36 ft. 3 in.; width over side sills, 8 ft. 6 in.; length inside of end boards, 34 ft. 8 in.; width inside of side boards, 9 ft. 5 in.; height of sides and ends, 3 ft. 11 in.; outside of end sill to center of bolster, 5 ft. 3 in.; distance between center sills, 0 ft. 8 in.; distance between center and short sills, 1 ft. 3 in.; distance between side and short sills, 1 ft. 6 in.; distance between centers of bolsters, 25 ft. 9 in.; distance between centers of center ties, 6 ft. 6 in.; distance between centers of cross ties, 17 ft. 2 in.; length of each door opening, 4 ft. 10 in.;



80,000-LBS. GONDOLA CARS, L. & N. RD.



80,000-LBS. GONDOLA CARS, L. & N. RD.

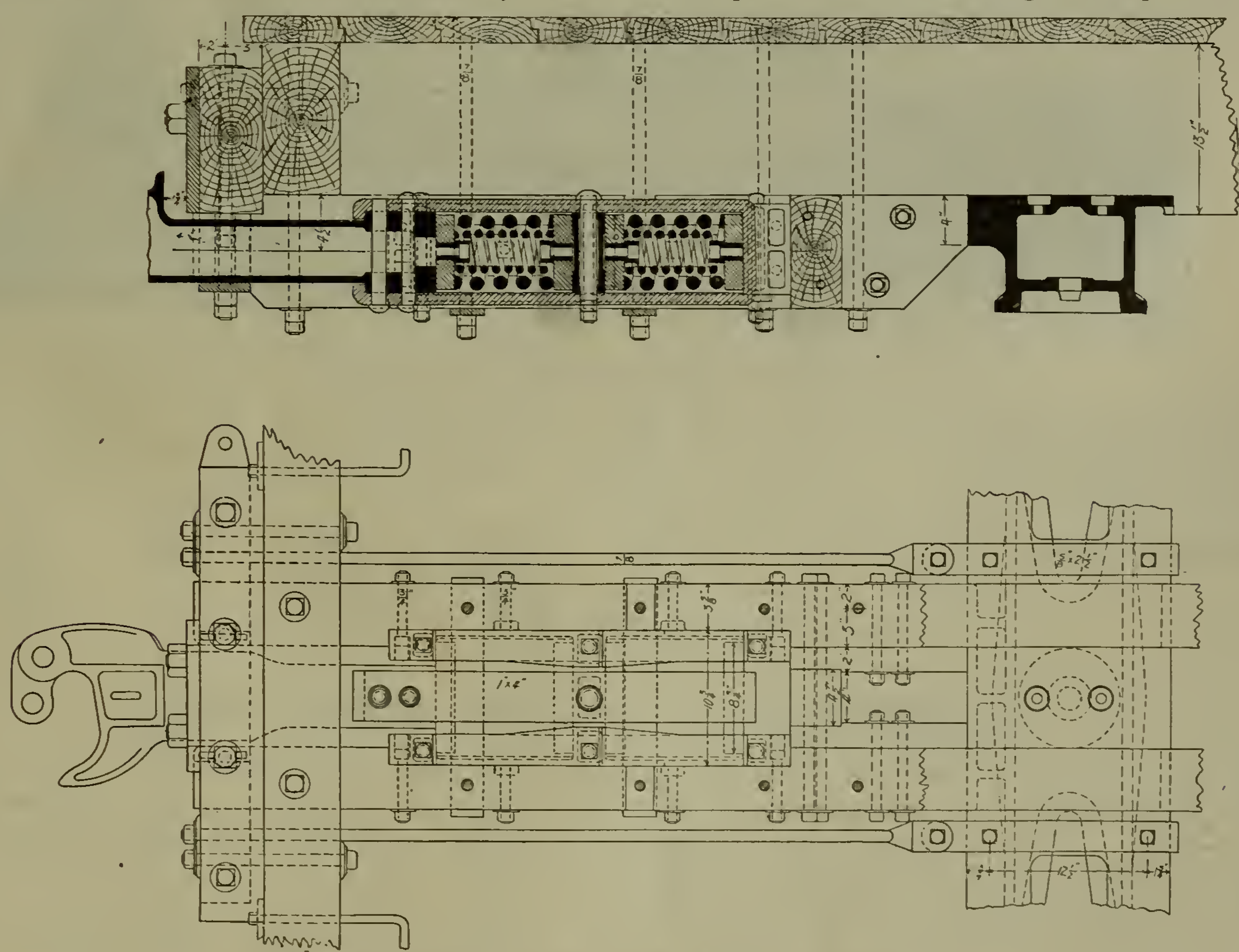


80,000-lbs. Gondola Cars, L. & N. Rd.

width of each door opening, 2 ft. 9 in.; centers of doors opening lengthwise of car, 12 ft. 0 in.; centers of door openings in width of car, 4 ft. 3 in.

The cuts showing elevators and cross sections indicate so clearly the construction of the body of the car that little comment is necessary. The floor of the car is provided with four door openings, two each between cross-ties and truck so that, although shoveling is necessary in unloading, the material will not have to be moved far from any part of the car to get it to the doors. In order to further facilitate the unloading of the car the flooring slopes from the center of the car in each direction to the cross-ties and from each bolster to an auxiliary cross-tie to which the outer door is hinged. These cars conform to the usual construction for high capacity cars of this class in having the siding outside the stakes, thus effecting a considerable increase in the cross section of the load without exceeding the usual limits for height and width. The sides are well stayed by diagonal rods at each post, the rods being secured at the top of the sides and running through to the bottom of the side sills where they are provided with nuts and beveled washers.

The body and truck bolsters are of cast steel of the railroad company's design, and differ from most designs in common use in having movable cast iron bearings for center plates and side bearings, thus providing against



Miner Draft Rigging, L. & N. Rd., Gondola Cars.

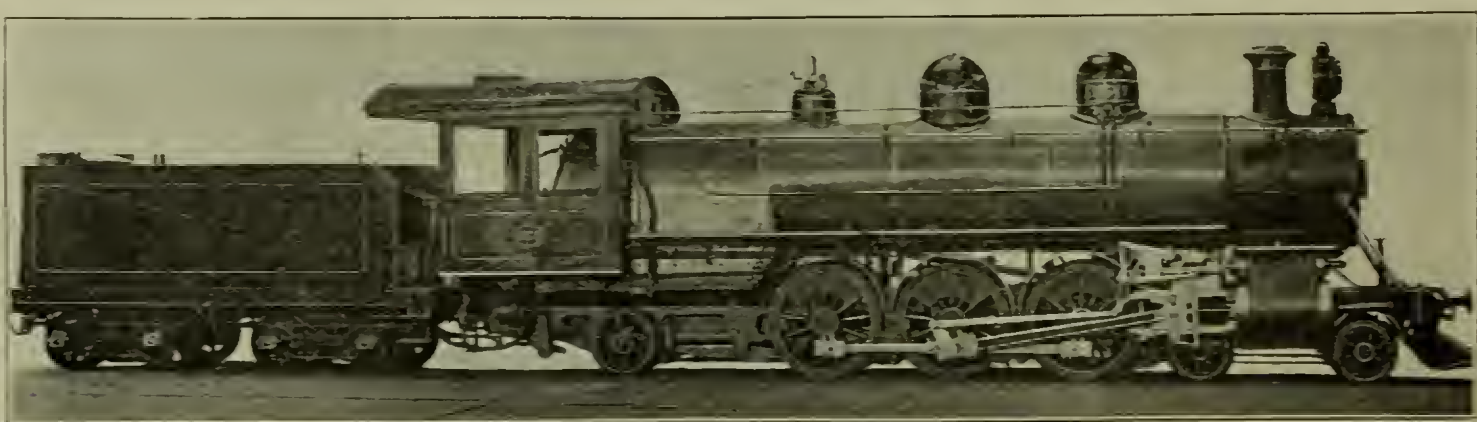
damage to the steel castings through excessive wear and affording a ready mean of adjusting for height as required. The Miner tandem spring draft attachments are applied, as shown, to short draft timbers butting against suitable projections on the body bolsters and in addition to the usual vertical bolts the body bolster is secured in position by two tie rods just outside the draft timbers and extending through the end sills and buffer beams. The trucks are of the arch bar type with axles having 5-inchx9-inch journals, special journal boxes and brasses, and cast steel bolsters and spring planks.

Among the specialties used are the Miner draft attachment, Ajax Metal. Sterlingworth brake beams. Perfection journal box packing and Galena car oil.

Baldwin Locomotive for New Zealand

THE Baldwin Locomotive Works has furnished two locomotives to the Government Railways of New Zealand. The accompanying illustration shows the design and we append the following general dimensions:

Cylinders.	
Diameter	16 ins.
Stroke	22 ins.
Valve	Balanced piston.
Boiler.	
Diameter	54 ins.
Thickness of sheets	9-16 in.
Working pressure	200 lbs.
Fuel	Poor lignite.
Firebox.	
Material	Steel.
Length	96 ins.
Width	60 ins.
Depth (front)	53⅛ ins.
Depth (back)	50⅛ ins.
Thickness of sheets—sides	5-16 in.
Thickness of sheets—back	⅜ in.
Thickness of sheets—crown	⅜ in.
Thickness of sheets—tube	½ in.
Tubes.	
Material	Charcoal iron.
Number	188
Diameter	2 ins.
Length	16 ft.
Heating Surface.	
Firebox	705.2 sq. ft.
Tubes	1,568 sq. ft.
Total	1,673.2 sq. ft.
Grate area	40 sq. ft.
Driving Wheels.	
Diameter outside	49 ins.
Diameter of center	44 ins.
Journals	6½ ins. x 7 ins.
Wheel Base.	
Driving	9 ft. 2 ins.
Rigid	9 ft. 2 ins.
Total engine	26 ft. 3 ins.
Weight.	
On driving wheels	65.530 lbs.
On truck (front)	16,800 lbs.
On truck (back)	17,400 lbs.
Total engine	98.730 lbs
Total engine and tender	138,730 lbs.
Tenders.	
Diameter of wheels	28 ins.
Journals	3¾ ins. x 7 ins.
Tank capacity	2,000 gals.



BALDWIN LOCOMOTIVE FOR GOVERNMENT RAILWAYS OF NEW ZEALAND.

Standardization of Extra Heavy Flanges

STEAM pressures varying from 100 to 250 pounds pressure entered into engineering practice about the year 1889. For pressures less than 100 pounds there had long existed confusion regarding standards for flanges of pipe, fittings and valves. A schedule of standard flanges was adopted July 18, 1894, by a committee of the Master Steam and Hot Water Fitters' Association, a committee of the American Society of Mechanical Engineers, and the representatives of the leading valve and fitting manufacturers of the United States. As the use of high steam pressures became more general there came into existence so many different diameters, thicknesses, drilling circles and number of bolts for flanges on fittings, valves and pipe for extra heavy pressures that manufacturers could not safely keep stocks of goods, and mill architects and engineers were greatly delayed at times in making up specifications for contemplated work on account of time taken to find out what the different manufacturers could or would furnish.

Recognizing the need of a standard for extra heavy, Mr. J. C. Meloon, mechanical superintendent of General Fire Extinguisher Company, Providence, R. I., issued an invitation to the leading valve and fittings concerns of the country to meet and consider this subject. In response to this invitation several of the largest concerns sent representatives to a meeting at New York City, April 24, 1901. At that meeting a committee was chosen to formulate a standard. This committee consisted of J. C. Meloon, mechanical superintendent, General Fire Extinguisher Company, Providence, R. I.; J. F. O'Brien, secretary, The Pratt & Cady Company, Hartford, Conn.; L. R. Greene, engineer, Walworth Manufacturing Company, Boston, Mass.; H. D. Gordon, M. E., Jenkins Bros., New York, N. Y.; F. A. Strong, superintendent, Eaton, Cole & Burnham Company, Bridgeport, Conn.; F. A. Connet, engineer, Builders Iron Foundry, Providence, R. I.

Mr. Meloon was made chairman, Mr. O'Brien secretary. The committee had various sessions, and submitted to the manufacturers interested the following recommendations and schedule for standard, at a meeting held in New York City, June 28, 1901:

Paragraph No. 1:

Multiples of four for drilling.

Paragraph No. 2:

Drilling should straddle vertical axis.

Paragraph No. 3:

Bolt centers not to exceed 3⅝ in. except on 2½-in. size. Committee at first proposed 8⅝-in. bolts, but sample elbows and flanges were drilled and bolted together and it was found that 8⅝-in. bolts interfered with inserting bolts.

Paragraph No. 4:

Distance from center of bolt to edge of the flange should always equal or exceed the diameter of bolt plus ⅛ in. for 9-in. valves and under, and diameter of bolt plus not less than ¼ in. for sizes larger.

Paragraph No. 5:

Size of Pipe	Diam. of Flange	Thickness of Flange	Diam. of Bolt Circle	No. of Bolts	Size of Bolts
2 in.	6½ in.	⅞ in.	5 in.	4	⅝ in.
2½ in.	7½ in.	1 in.	5⅞ in.	4	¾ in.
3 in.	8¼ in.	1⅛ in.	6⅝ in.	8	⅝ in.
3½ in.	9 in.	1 3-16 in.	7¼ in.	8	⅝ in.
4 in.	10 in.	1¼ in.	7⅞ in.	8	¾ in.
4½ in.	10½ in.	1 5-16 in.	8½ in.	8	¾ in.
5 in.	11 in.	1⅜ in.	9¼ in.	8	¾ in.
6 in.	12½ in.	1 7-16 in.	10⅝ in.	12	¾ in.
7 in.	14 in.	1½ in.	11⅞ in.	12	⅞ in.
8 in.	15 in.	1⅝ in.	13 in.	12	⅞ in.
9 in.	16 in.	1¾ in.	14 in.	12	⅞ in.
10 in.	17½ in.	1⅞ in.	15¼ in.	16	⅞ in.
12 in.	20 in.	2 in.	17¾ in.	16	⅞ in.
14 in.	22½ in.	2⅛ in.	20 in.	20	⅞ in.
15 in.	23½ in.	2 3-16 in.	21 in.	20	1 in.
16 in.	25 in.	2¼ in.	22½ in.	20	1 in.
18 in.	27 in.	2⅜ in.	24½ in.	24	1 in.
20 in.	29½ in.	2½ in.	26¾ in.	24	1⅛ in.
22 in.	31½ in.	2⅝ in.	28¾ in.	28	1⅛ in.
24 in.	34 in.	2¾ in.	31¼ in.	28	1⅛ in.

Paragraph No. 6:

The bolt circle diameters as above stated will allow the use of calking recess on pipe flanges, provided such device is specified.

The schedule presented was unanimously adopted by the manufacturers present, and Jan. 1st, 1902, was date set for adoption of same.

The following firms have agreed to adopt the standard and put same into effect Jan. 1, 1902:

The Eaton, Cole & Burnham Co., Bridgeport, Conn.
Chapman Valve Manufacturing Co., Indian Orchard, Mass.
Walworth Manufacturing Co., Boston, Mass.
Crane Co., Chicago, Ill.
The Pratt & Cady Co., Hartford, Conn.
Jenkins Bros., New York City.
General Fire Extinguisher Co., Providence, R. I.
Builders Iron Foundry, Providence, R. I.
Jarecki Manufacturing Co., Erie, Pa.
Crosby Steam Gage & Valve Co., Boston, Mass.
The Kennedy Valve Mfg. Co., New York City.
The Ludlow Valve Mfg. Co., Troy, N. Y.
The Lunkheimer Co., Cincinnati, Ohio.
The Michigan Brass & Iron Works, Detroit, Mich.
The Kelly & Jones Co., New York City.
Eastwood Wire Mfg. Co., Belleville, N. J.
National Tube Co., Pittsburg, Pa.
Coffin Valve Co., Boston, Mass.
Rensselaer Mfg. Co., Troy, N. Y.
The Mason Regulator Co., Boston, Mass.
McNab & Harlin Mfg. Co., New York City.
The John Davis Co., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
Ross Valve Co., Troy, N. Y.
Edward P. Bates, Syracuse, N. Y.

The following firms will furnish to standard if desired by their customers:

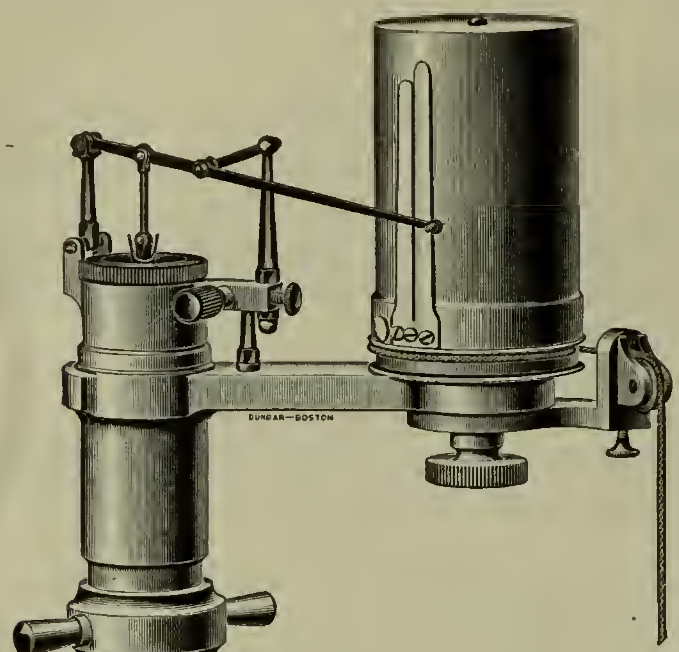
Best Mfg. Co., Pittsburg, Pa.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
Eddy Valve Co., Waterford, N. Y.

The committee's labors were very much lightened by the hearty co-operation of all the firms with whom they held communication, and the list of firms mentioned, embracing the largest manufacturers of valves and fittings in the east and west, shows the interest taken in the subject.

A limited number of the schedules will be printed by the committee, and copies can be obtained of the secretary, J. F. O'Brien, P. O. Drawer No. 66, Station A, Hartford, Conn.

The Star Improved Steam Engine Indicator

UNDER the modern conditions of steam engine practice, the equipment of an engine room is incomplete unless it is furnished with an indicator, or a pair of indicators. The Star Brass Mannufacturing Co., of Boston, Mass., finding that they were continually



STAR IMPROVED STEAM ENGINE INDICATOR.

being called upon to supply these instruments, and in order that they might be able to supply them of their own design and manufacture, they have brought out a new instrument, called "The Star Improved Steam Engine Indicator." They have fitted their shop with the latest machinery and appliances for their manufacture, including a special apparatus, operated electrically, for testing springs, and have placed at the head of the new department one who has occupied a similar position in the shop of one of the largest and most successful makers of indicators in the country, and who by past experience and training is admirably fitted for the duties of the position. With these facts in mind this instrument should command the favorable consideration of engineers, and all who are interested in the correct operation of steam engines and the economical use of steam.

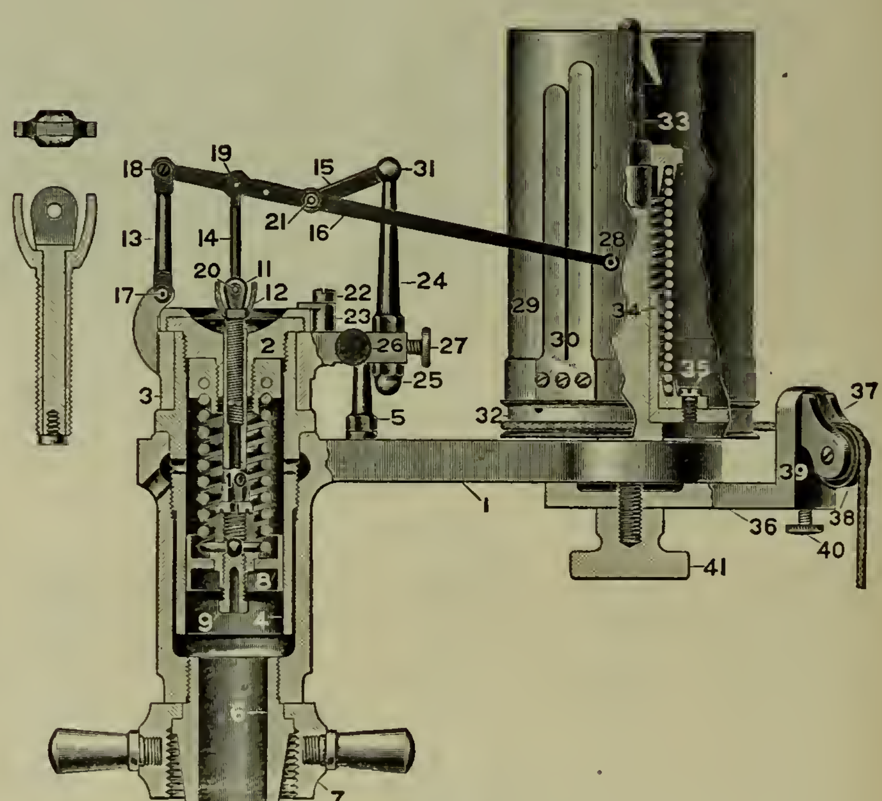
A careful study of indicator design and practice has been made, and the manufacturers have endeavored to combine in the new instrument all the best features of the indicators which have preceded it, or such as have had a long period of successful service, at the same time introducing some points of special design which none have heretofore possessed, and they feel assured that they have succeeded in making "The Star Improved Indicator" in all respects the most desirable instrument that has yet been built.

Viewed from the outside it will be found that the instrument is designed somewhat on the lines of the celebrated Thompson indicator, inasmuch as the pencil movement is of the Thompson pattern improved. This movement is chosen because it furnishes the most rigid arrangement of delicate levers that can be found for obtaining the rectilinear motion of the pencil desired. It is strong, durable, light in weight, and in all ways satisfactory. The interior design of the indicator is shown herewith in the sectional cut. The lower end of the spring terminates in a simple ball or bead, which has met the test of a long and most successful period of service in other instruments.

Owing to the extreme lightness of this construction, and the fact that it is attained without sacrifice of strength, no arrangement could be more satisfactory. At the same time it furnishes a ball and socket connection between the spring and the piston, which is necessary in all indicators of the Richard's type. The form of drum-spring adopted is the helical coil, which has been found by long experience, and by accurate tests, to furnish the most uniform tension on the driving cord. It possesses the desirable features of simplicity and accessibility, and it can be most readily adjusted for differences of tension.

One of the improvements which has been introduced consists in the attachment of the cap at the top of the cylinder to the interior shell within which the piston moves, rather than to the outer shell, thus securing and maintaining the most correct alignment for the motion of the piston and its rod. At the same time the interior shell is removable, as in instruments which do not possess this feature. The method of construction is clearly shown in the cut. This arrangement also provides a jacket space filled with working steam completely surrounding the interior shell, and it secures a uniform temperature with absolute immunity from unequal expansion.

A noticeable feature to which the manufacturers invite attention is the means for unscrewing and removing



STAR IMPROVED STEAM ENGINE INDICATOR.

the cap from the cylinder with the parts attached to it. The cap has a milled edge of the usual construction, but, unlike instruments of previous makes, the edge is protected by a hard rubber non-conducting covering. This covering can be handled with absolute comfort to the one using it, whereas in the indicators heretofore made, as every one who has operated an indicator knows, it is impossible to unscrew the cap without risk of burning the thumb and finger with the hot metal. Another thing which will be appreciated by those having the active handling of the instrument, is the provision of a vent tube for carrying away the waste steam and hot water which blows by the piston. This tube is attached to the side of the cylinder and it extends a sufficient distance below the body of the instrument to fully clear it, and prevent the hot water which is mixed with the steam from dripping on the hand of the operator while in the

EXHIBIT CLEVELAND TWIST DRILL CO., PAN-AMERICAN EXPOSITION.

act of turning off the indicator cock. In previous designs the operator must often use considerable dexterity if he would avoid getting burnt with the escaping drops of hot water.

The piston rod of the Star Improved Indicator is provided with an adjustable swivel-head so planned that the position of the pencil arm can be varied and the atmospheric line drawn at any desired distance from the lower edge of the card without going to the trouble of removing the piston and its mechanism from the cylinder. It is simply necessary to screw the swivelhead up or down the desired amount, using the thumb and finger. A new form of detent motion is used in this instrument. The ratchet and pawl, which has become familiar by extended employment heretofore, has been discarded, and a form of friction clutch which is exceedingly simple and effective has been designed. It consists simply of a ball which is thrown into contact with a groove in the circumference of the drum-base.

Most of the details are clearly indicated in the appended cut without further description, and all parts are carefully adapted to their respective uses. The frame of the indicator and the coupling are made of unusual strength so as to secure ample rigidity where it is most needed. The instrument is nickel plated and fitted in a mahogany case in the usual manner.

The Star Brass Manufacturing Co. are prepared to furnish a complete outfit for indicating, embracing not only indicators, but reducing wheels, lazy tongs pantagraphs, planimeters, carrying pulleys and blank cards, the latter either plain or made of prepared paper.

The Cleveland Twist Drill Company

The Cleveland Twist Drill Company of Cleveland, O., have an attractive exhibit of drills, reamers, milling cutters and taps. It is arranged in a handsome white enamel case with glass sides, and consists of a large variety of various sizes of drills made by the company. The drills include those with the tube for feeding oil to the point, as well as of the solid variety. The exhibit also includes some fine samples of end mills, as well as those for facing and ordinary work. A number of cutters are also shown that are adapted for special work.

The Street Railway Convention

The twentieth annual convention of the American Street Railway Association, which was held in New York City last month, October 9 to 11, was most interesting, and the exhibit of railway appliances and apparatus held in Madison Square Garden in connection with it was the best that has ever been made. Among the exhibits noted by the editor of the Railway Master Mechanic were the following, who are interested in the manufacture of steam as well as street railway supplies:

American Brake Shoe Co., Chicago.
American Wrecking Frog Co., Indianapolis.
Adams & Westlake, Chicago.
Atlas Railway Supply Co., Chicago.
Baltimore Ball Bearing Co., Baltimore.
Bierbaum & Merrick Metal Co., Buffalo.
R. Bliss Mfg. Co., Pawtucket, R. I.
J. G. Brill Company, Philadelphia.
W. H. Coe Mfg. Co., Providence.
Curtain Supply Co., Chicago.
Corning Brake Shoe Co., Corning, N. Y.
Dearborn Drug & Chemical Works, Chicago.
Duff Manufacturing Co., Pittsburg, Pa.
Hale & Kilbaum, Philadelphia.
Heywood Bros. & Wakefield Co., Wakefield, Mass.
H. W. Johns Mfg. Co., New York.
Kinnear Mfg. Co., Columbus, O.

Magnus Metal Co., Jersey City, N. J.
McGuire Mfg. Co., Chicago.
Palm, Fechteler & Co., New York.
Pantasote Company, New York.
Pearson Jack Co., Boston.
Standard Paint Co., New York.
Standard Varnish Works, New York.
Westinghouse Electric & Mfg. Co., Pittsburg.
Wheel Truing Brake Shoe Co., Detroit.

The Sherwin-Williams Co., of Cleveland, although it had no exhibit except its signs, was represented by the manager of its street railway department, Mr. E. M. Williams. The Arnold Electric Power Station Co. was represented by its manager, Mr. W. L. Arnold and Mr. F. G. Bolles, of the sales organization of Bullock and Wagner companies, was in evidence, as were also his "taking" souvenirs.

Walworth Manufacturing Co., Pan-American Exposition

THE Walworth Manufacturing Company, of Boston, Mass., manufacturers of steam, gas and water fittings for power plants, also general mill supplies, has been well represented by ther exhibit at the Pan-American Exposition at Buffalo. The accompanying illustration gives a general idea of their exceedngly well displayed and interesting exhibit. A gold medal has been awarded to them on their valves, tools and fittings. The Walworth Manufacturing Company are also to make an extensive exhibit at Charlestown, S. C.

Standard Dimensions of Box Cars

AT the recent meeting of the American Railway Association the following report of the committee on standard dimensions of box cars was adopted:

The committee on standard dimensions of box cars respectfully presents the following report:

It held a session at Mackinac Island, Mich., on August 21 and 22, 1901, at which time there were present by invitation the following representatives of traffic associations:

Mr. C. E. Gill, chairman Official Classification Committee.

Mr. J. T. Ripley, Chairman Western Classification Committee.

Mr. P. J. McGovern, Chairman Southern Classification Committee.

Mr. John Earls, Chairman Classification Committee of the Canadian Freight Association.

Under the resolution of the association passed on April 24, 1901, your committee was requested to confer with the representatives of the various traffic associations and recommendations herewith submitted are the result of the action of this joint conference.

EXHIBIT WALWORTH MFG. CO., PAN-AMERICAN EXPOSITION.

A standard car of the dimensions of 36 ft. in length, 8 ft. 6 ins. in width and 8 ft. in height was originally favored. It was subsequently stated that cars 8 ft. in height could not be transported over certain important lines and the height was therefore made 7 ft. 6 ins. This was adopted by the association in April, 1901.

On April 24, 1901, the following principle was approved by the association:

"That the essential elements of the standard box car require the height and width be as great as are permitted by the physical limitations of the important railroad clearances and the present established height of loading platforms; that the length be determined by economy in construction, maintenance and operation, and the requirements of economical stowage."

The objections to the car 8 ft. in height have now been withdrawn, and in pursuance of the principle above enunciated the following resolution is offered for adoption:

(1) Resolved, That the dimensions of the standard box car be 36 ft. in length, 8 ft. 6 ins. in width and 8 ft. in height, all inside dimensions. Cross section, 68 sq. ft.; capacity, 2,448 cu. ft. The side door openings to be 6 ft. in width.

After a thorough discussion of all phases of the question as affecting both the transportation and traffic departments, the following resolution was approved and recommended for adoption:

(2) Resolved, That the standard 36-ft. car be considered the unit for the establishment of minimum carload weights; and that where necessary in any classification territory to recognize cars under 36 ft. in length, it shall be by a reduced minimum of 2½ per cent for 35-ft. cars and 5 per cent for cars 34 ft. or under, inside dimensions.

In the opinion of the conference committee cars exceeding the standard dimensions are uneconomical and undesirable vehicles of transportation and they ought not to exist. As they do exist, minimums are recommended which will permit of the use of such cars until they shall be worn out. The rate of increase of the minimum is slightly greater than the increase in the capacity of these cars, and will therefore tend to discourage their further construction. These figures have been embodied in the following resolution, which is recommended for adoption:

(3) Resolved, That for cars over 36 ft. in length the percentage of increase of the minimum weights shall be as follows:

For cars of 37 ft. and 38 ft., 10 per cent over the minimum for the 36-ft. car.

For cars of 39 ft. and 40 ft., 25 per cent over the minimum for the 36-ft. car.

For cars of 41 ft. and 42 ft., 40 per cent over the minimum for the 36-ft. car.

For cars of 43 ft. and 44 ft., 55 per cent over the minimum for the 36-ft. car.

For cars of 45 ft. and 46 ft., 65 per cent over the minimum for the 36-ft. car.

For cars of 47 ft. and 48 ft., 70 per cent over the minimum for the 36-ft. car.

For cars of 49 ft. and 50 ft., 80 per cent over the minimum for the 36-ft. car.

For cars of over 50 ft., 150 per cent over the minimum for the 36-ft. car.

As the alterations in the minimums above recommended may affect the revenue your committee suggests the passage of the following:

(4) Resolved, That any dimunition of revenue incident to the minimum proposed in the accompanying schedule shall be adjusted in the rate.

With improved methods of construction, the carrying capacity of freight car equipment has been constantly increasing. It is therefore recommended:

(5) Resolved, That the minimum carload weights of heavy articles, such as iron, brick, lumber, minerals, etc., should as fast as practicable be advanced to the stenciled capacity of the car.

In order that the growth of the evil now under consideration may be effectually checked, the following resolution is recommended for adoption:

(6) Resolved, That no box cars of larger dimensions than those prescribed for the standard car shall be hereafter constructed and all owners and builders of cars be officially notified of the adoption of this resolution.

The following amendments to the Car Service Rules were also adopted:

The following note has been appended to Rule 1: "Whenever the words 'home road' are used in these rules they refer to the road which owns the car."

Rule 3 was amended as shown by the italics below:

3. Foreign cars may be sent empty in the direction opposite to the junctions at which they were received, for loads to points on or reached by using the home roads, but not otherwise.

Foreign cars must not be sent empty to connecting roads without the permission of the owners, except for switching service. Loaded or empty cars received for switching service must be confined to switching limits, and returned to the home or the delivering road.

When, with the consent of the owners, empty foreign cars are delivered by one line to a connection for return, loading via the road making the delivery, they must be so loaded and returned.

Rule 5 was amended so that it stands as follows:

5. Cars shall be considered as having been delivered to a connecting railroad when placed upon the track agreed upon and designated as the interchange track for such deliveries, accompanied or preceded by proper data for forwarding and accepted by the car inspector of the receiving road.

Unless otherwise arranged between the roads concerned the receiving road shall be responsible for the cars and contents after receipt of the proper data for forwarding and until they have been accepted by its inspector or returned to the delivering road.

In order that uniform application of this rule may be secured in practice, agents of the respective roads at interchange points should exchange copies of their "received" or "delivered" reports, to be checked up, cases of difference or error located and adjusted, and each agent should furnish proper correction for his reports to his officials.

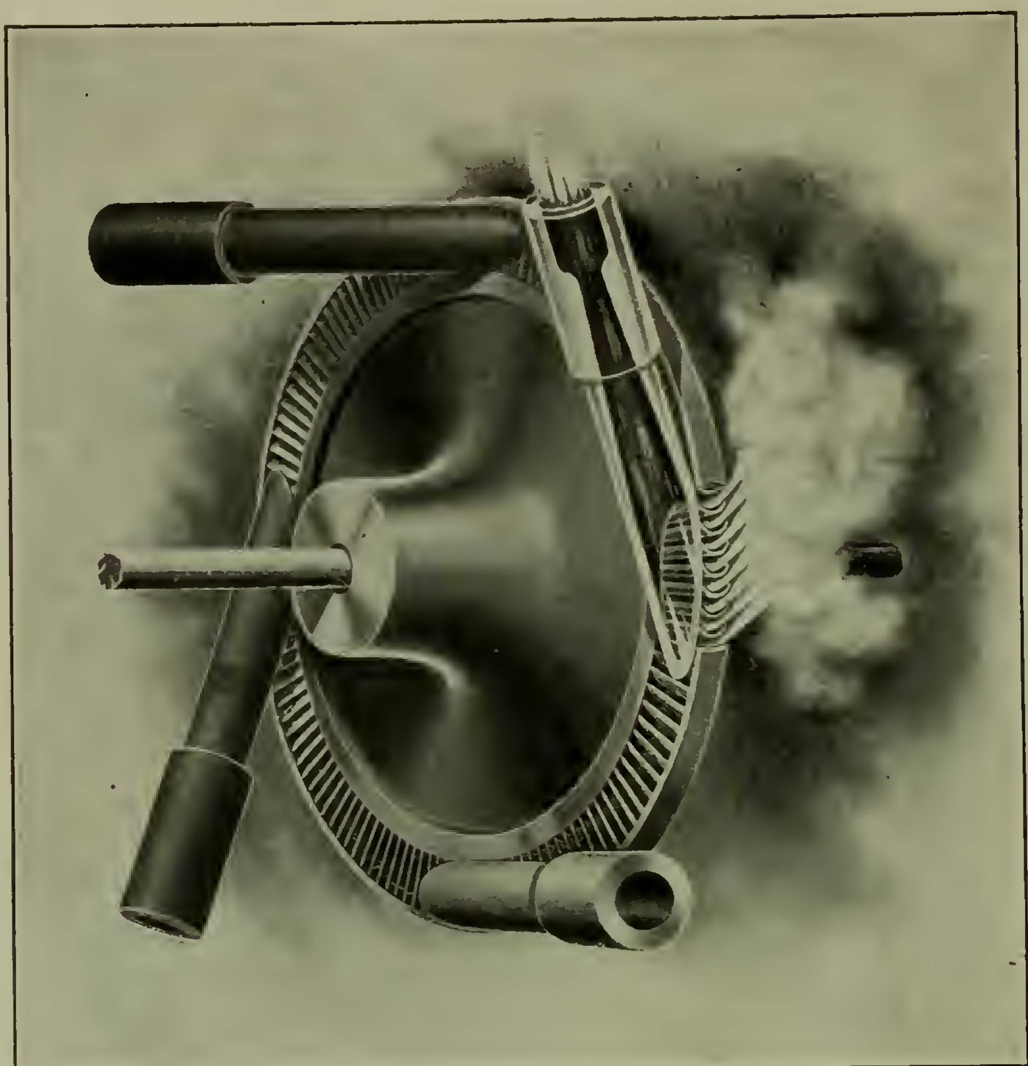
A new rule, No. 15, was added, which reads:

15. Cars shall be considered in switching service whenever such cars are being handled by one road for another road for the purpose of loading or unloading at a local industry within switching limits.

Switching lines shall be responsible for delay to cars while in their hands for switching service; and shall be responsible for the contents of the cars whenever responsible for the cars themselves.

The De Laval Steam Turbine

As early as 1629 was seen the introduction of the reaction and impact turbine, although of imperfect form and not capable of practical application, and all attempts at perfection along these lines have, until a comparatively short time ago, proven unsuccessful; this was probably owing, however, to the interest aroused in the success of Newcomen in 1705, and later by Watt and his followers, in perfecting the reciprocating engine. In 1883 De Laval made the first successful steam turbine, using it in direct connection with the shaft of the well-known Cream Separator manufactured in this country by the De Laval Separator Company. This, his first steam turbine, in design and construction a reaction wheel, was, however, soon replaced by one of the Branca type, and of the results attained Prof. Thurston says, "The result was an astonishing efficiency in many cases of good design; and the Branca form, particularly, exhibited such satisfactory qualities as constructed by De Laval for this use as to make it a permanent and standard addition to our list of prime movers."



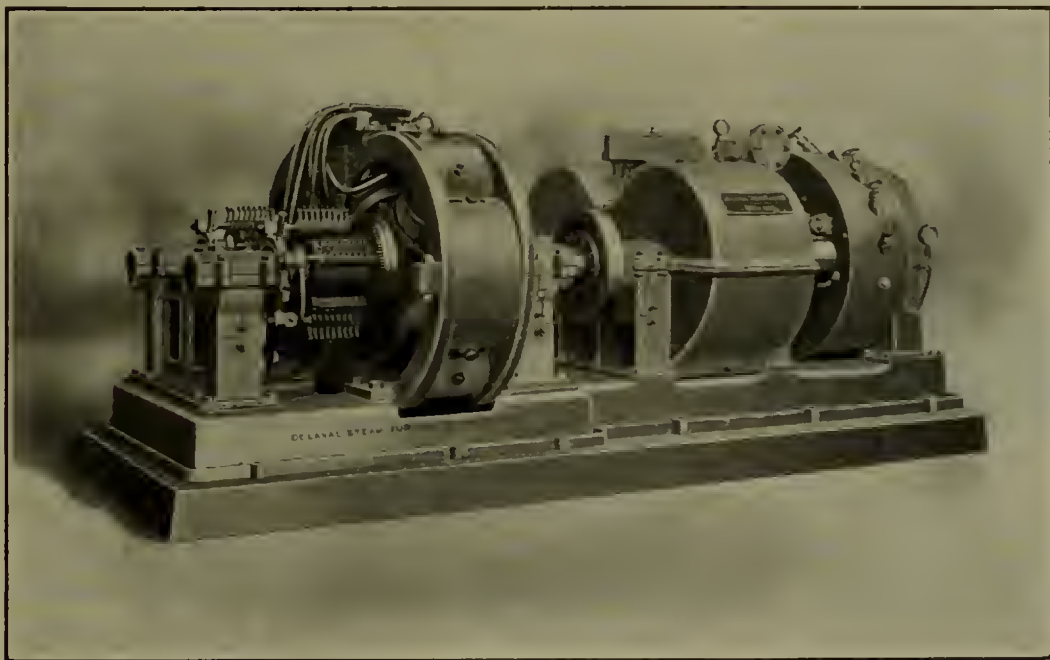
The De Laval Turbine Wheel and Nozzles.

However, satisfactory as these results were, the steam turbine was yet very limited in its application and comparatively wasteful of steam, and to successfully compete with the reciprocating steam engine, it was necessary to introduce means for the complete expansion of the steam. Should the true Branca type further be retained, which was in every way most desirable on account of its simplicity as compared with a combination of the Branca and Hero types, the constructive difficulties arising out of the enormously high speed necessary would have to be overcome. This De Laval aimed at and accomplished in a remarkable way. By use of the diverging nozzle, which he patented, he secured a complete and adiabatic expansion of the steam and the conversion of its entire static energy into kinetic, and to overcome the impossibility of producing a wheel accurately enough balanced to revolve about its center of gravity at a velocity sometimes as high as 1,350 ft. per second, without causing a side pressure destructive to plain bearings and a rigid shaft, he produced a flexible shaft which he also patented.

The De Laval nozzle, the simplest means imaginable for its great purpose, and the flexible shaft, daring and ingenious in its application, may well be regarded as among the remarkable inventions in steam engineering. They have placed the steam turbine in the foremost rank among heat motors. With the advent of the diverging nozzle and the flexible shaft, the De Laval turbine has steadily progressed, thousand of machines in sizes from 3 horse power to 300 horse power having been built up to the present time, and outside of the United States De Laval Steam Turbine Companies are operating in Sweden, Germany, France and England.

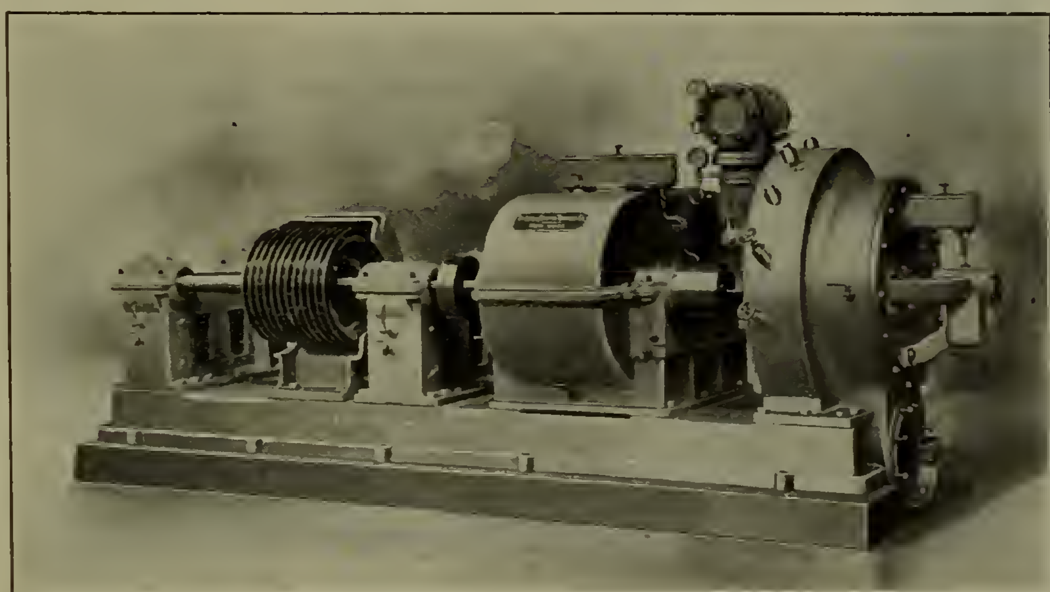
In a properly constructed nozzle, a volume of steam of maximum pressure (as every element of the nozzle assumes a temperature constant and equal to that of the passing steam) adiabatically expands to minimum pressure, and as this pressure is that of the surrounding medium, the steam at the point of discharge issues in a solid jet without tendency of its particles to divert in any direction.

Through numerous experiments Prof. Zenner has shown that theoretically the work of this adiabatic expansion converts the entire static energy of the steam into kinetic, and that the stored energy of a jet of steam issuing from the nozzle is identical to the amount of work produced if an equal volume of steam is allowed to adiabatically expand behind the piston of a cylinder and at the same ratio of expansion—the diagram ending in a point.



De Laval Steam Turbine and Dynamo.

Simplicity of construction is one of the most important features of the steam turbine. The wearing parts are few, practically being limited to the bearings. These are plain and simple in construction, and like all the other moving parts are made interchangeable and can therefore be cheaply and quickly replaced, no fitting whatever being necessary. There is absolutely no danger from water being carried over into the motor as there are no valves and no clearance spaces where danger could result, the only affect of a large body of water being a slight slowing down of the wheel until it is disposed of. It is well, however, in all cases to use a separator close to the governor, as wet steam slightly decreases the efficiency of the turbine.



De Laval Steam Motor Turbine for Rope-Driving.

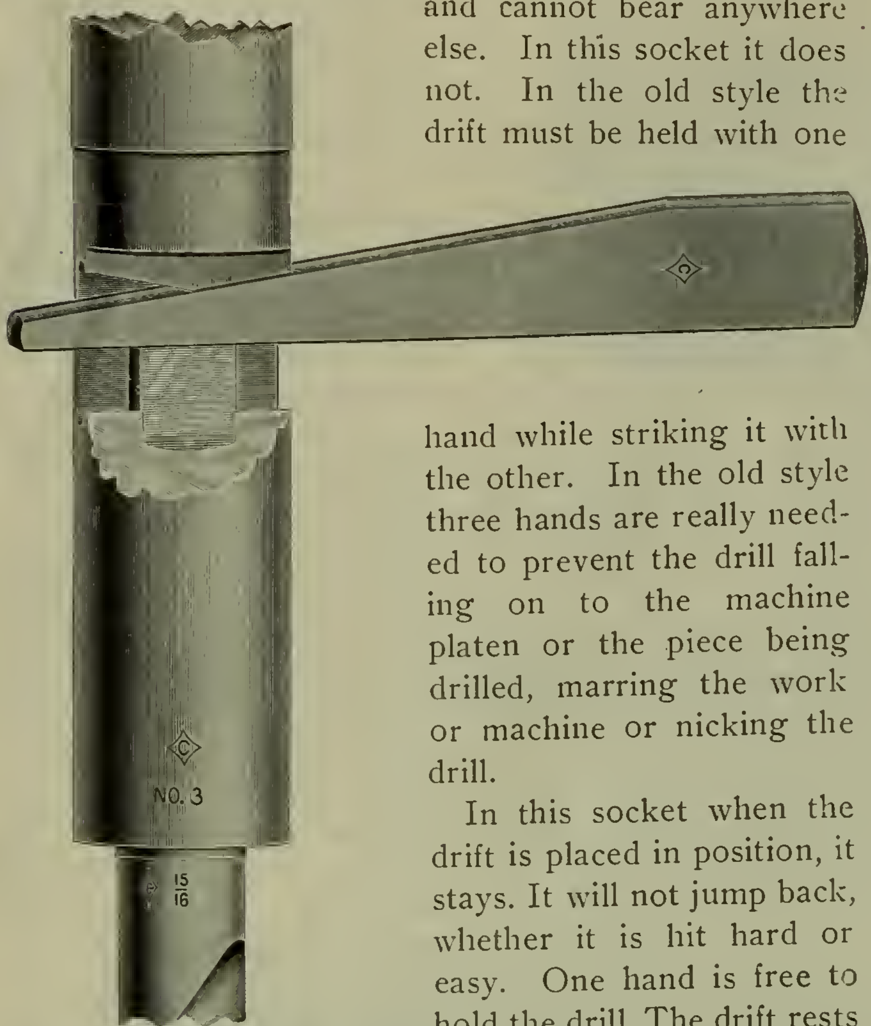
An experience extending over a period of about eight years, during which time there have been placed on the market from the European factories upwards of four thousand steam turbines, has demonstrated that the wear in every case is very much less than any reciprocating engine. Some of these machines have operated during the entire time with practically no repairs, and at the most it has been only a matter of renewing some interchangeable Babbitt bearings which can be removed or replaced without lifting the turbine shaft or the gear shaft from its position, and in an extremely short space of time. Unlike another well-known make of turbine there are no studs or pins about the governor or any other part of the De Laval turbine; these always give more or less trouble, and in the governors and valve motions of all types of reciprocating engines where the centrifugal force makes them difficult to lubricate, they are soon worn flat on one side. There is no valve motion to wear, as in the steam engine, or to cause excessive friction and consequent loss in efficiency, which is a considerable item even in the best so-called balanced valve engine. It is of course necessary that nothing but the very best of materials and workmanship should enter into the construction of the turbine, and nothing has been left undone to make the De Laval steam turbine long-lived and free from accident.

In the De Laval steam turbine running non-condensing, the consumption of steam per horse-power is less at full load than any other condensing steam engine. Condensing, the efficiency is better than any compound condensing engine. Unlike the steam engine, however, the efficiency is nearly the same throughout its entire working range. It has fewer parts, is less liable to get out of order, requires less oil, less care, and. to use the words of Professor R. H. Thurston, it is "the steam engine of maximum simplicity and highest thermal efficiency."

Cleveland Twist Drill Co., New Socket

A NEW socket for holding taper shank twist drills and reamers has recently been patented by the Cleveland Twist Drill Co., of Cleveland, Ohio, and is now manufactured and offered for sale by that company. The manufacturers believe that in this socket they have something that is theoretically and practically correct, and a drift that is shaped right and works right.

Every machinist knows that in the usual form of socket the drift bears on the corner of the drill tang, and cannot bear anywhere else. In this socket it does not. In the old style the drift must be held with one hand while striking it with the other. In the old style three hands are really needed to prevent the drill falling on to the machine platen or the piece being drilled, marring the work or machine or nicking the drill.



In this socket when the drift is placed in position, it stays. It will not jump back, whether it is hit hard or easy. One hand is free to hold the drill. The drift rests flat on the tang. The tangs of drills have a better hold, as they do not have to be beveled off. The accompanying cut gives an accurate idea of the socket.

Notes of the Month

The Standard Pneumatic Tool Co., has issued as a supplement to their catalog "F", circular number two descriptive of their "Little Giant" pneumatic hammers. Handsome half-tone illustrations show their hammers in actual operation, riveting chipping, calking and beading.

Pratt & Whitney Co., Hartford, Conn., manufacturers of taps and dies, die stock sets for bolt and pipe threading, milling cutters, slitting saws, renshaw ratchet drills, lathe tools, tapping heads, boiler punches, reamers, taper pins, etc., also special tools of every description made to order, have issued a catalogue of their Small Tool Department. The catalogue is handsomely gotten up and very conveniently arranged. The manufacturers feel that the book is a distinct advance over anything ever issued in this line and they have a complete collection of all the publications on this subject. No pains or expense has been spaired in compiling it. Any-one interested can secure copies by writing to Pratt & Whitney Company, Hartford, Conn.

The McConway & Tarley Co., of Pittsburg, manufacturers of the well known Janney coupler, have issued for 1901, their catechism on M. C. B. rules for the use and information of car inspectors This edition has been corrected to cover the changes made at the M. C. B. convention, held at Saratoga, June, 1901.

The Washburn Coupler Co., of Minneapolis, manufacturers of freight, passenger, tender and pilot couplers with and without flexible heads, coupler carriers, draft rigging, etc., have just issued a handsome new catalog devoted exclusively to their couplers with flexible heads.

The October number "Book of the Royal Blue," has its entire number devoted to a memorial to President McKinley. The volume contains a composite editorial carefully constructed from editorials of the leading newspapers; a composite sermon from all the noted divine, and a composite eulogy from the many touching tributes of prominent citizens. The intention evidently has been to collect the beautiful thoughts which were expressed and put them together in such a form as to make a valuable memento, and one which every one would desire to keep. Mr. McKinley's last speech at Buffalo and appropriate poems complete the number. It is certainly a memento which will be appreciated by the American people.

A very handily arranged catalogue has just been issued by the Duff Manufacturing Co., of Pittsburg, regarding their "Barrett Jacks," including compound lever jacks, track, automatic lowering, car box and oil well jacks, and different screw jacks.

One of the most important railroad companies in the country, that has recently tested Ajax Plastic Bronze to the extent of 13,400 brasses, on 100,000-lb. capacity cars, makes the statement that, "there has never been a train delayed on account of hot brasses since adopting Ajax Plastic Bronze." This is practically eliminating hot box feature. Independent of this, the brasses have shown nearly 100 per cent more mileage than former specifications. Such a record as this would show a saving of 50 to 100 per cent, covering hot bearings, oil, waste, attention, etc. The Ajax Metal Co., are prepared and have the privilege of furnishing the name of this road to any motive power department that desires full information, or will correspond with them.

Armstrong Brothers Tool Company of Chicago, have recently received an order from Charles Churchill & Co., Limited, London, for 66 gang planer tools. This tool is a recent addition to the line of toolholders by the company.

Mr. P. H. Wilhelm has accepted the agency for the Washburn Coupler, and other railroad devices manufactured by the Washburn Coupler Company, Minneapolis, Minn. Mr. Wilhelm will cover the entire South, and will have his headquarters at Atlanta, Georgia.

President McKinley's last public address, delivered at the Pan- American Exposition, which made such an impression on those who heard it, has been arranged convenient for pocket use, and is sent out with the compliments of M. H. Tarbox, treasurer of the Boston & Lockport Block Co., Boston, Mass. They will be pleased to supply them free to any of their friends who would like one or more copies for their own use.

In the October Review of Reviews there appears an unsigned appreciation of President Theodore Roosevelt. The writer regards Mr. Roosevelt not as a political accident of the Tyler-Fillmore-Johnson-Arthur class, but as a man picked out in advance for the new office to which he now succeeds under most painful and undreamed of conditions. In the writer's view, the spirit of the original constitutional provision regarding the Vice-Presidency has been, for the time being, restored, since the second choice of the electors for President was the man whom they named for Vice-Presidency, and who now, as the result of the assassin's act, becomes President. In other words, Theodore Roosevelt was in fact his party's second choice for the Presidency in 1900.

The Safety Car Heating & Lighting Co. has been awarded a gold medal by the Pan-American Commissioners for their "Pintsch light." The company has recently put into operation plants at St. Paul, Minn., and Los Angles, Cal., and are building at El Paso & San Antonio, Tex., Shreveport, La., Mexico City, Mexico, and Moneton, New Brunswick.

Mr. M. J. Rogers, formerly master mechanic of the Kansas City Belt Railway at Kansas City, Mo., resigned his position on September 30, and will devote all of his time to the manufacture of anti-friction babbitt metals.

The Chicago Pneumatic Tool Co. are sending to their various customers, informing them of the stand which they have taken regarding the Moffet drill patents, the following letter: "Referring to the circular letter of Mr. J. G. Timolat, recently sent you, announcing the decision of the United States Circuit Court in favor of the Moffet Patent No. 369120 on portable drilling machines: This company has, after consultation with leading patent attorneys and a careful examination, become convinced that the portable power drills made by itself, as well as by all other concerns, are infringements on said Moffet patent; and in order to protect its customers from litigation and further expense, has purchased a license under said patent, which protects all drills we have manufactured and sold or shall hereafter manufacture and sell. Trusting you will appreciate the prompt action we took in this matter to protect our customers against expense and inconvenience, we beg to remain."

Mr. H. A. Norton of A. O. Norton, Boston, Mass., manufacturers of lifting jacks, has recently returned from a three months' trip to Europe. Mr. Norton established agencies with P. & W. MacClellan, Glasgow and London, Binton Fils, Paris, and G. Goglio, Turin, Italy.

The fall term of Purdue University opened September 12th with a Freshman class of something over three hundred. By the close of the first week a thousand students were in attendance, indicating that the total enrollment for the year will exceed twelve hundred. Of those already enrolled, seven hundred and sixty-six are taking engineering courses, and three hundred are in the course of mechanical engineering. The special work of this course in locomotive and car design, inaugurated this year under the direction of Professor William Forsyth, is giving promise of flattering success.

The Boston & Lockport Block Co., Boston, Mass., are to move from 142, to 158 and 160 Commercial St., where they will occupy the entire building. This will enable them to carry a still larger stock of blocks to which they will add a line of trucks. This company makes a specialty of large blocks for wrecking and general railroad purposes.

We are informed by Mr. R. G. Ward, manager of construction, that the Cuba Company is now building several hundred miles of railroad in the Island of Cuba, and is in the market for various classes of material and equipment used in railway construction, and also in railway operation. They ask that dealers in construction and railway operation supplies might send them their catalogues. They are especially anxious to secure a good number of large, well-bound and durable catalogues. In sending these catalogues, advertisers should be particular that sufficient stamps are attached, otherwise they may never reach their destination.

The Cleveland Pneumatic Tool Co., Cleveland, Ohio, have just issued a new and very handsome catalogue descriptive of the "Cleveland" pneumatic hammers, drills and pneumatic appliances. The half-tone illustrations are many and unusually fine, showing very completely the various ways in which their tools may be used.

Mr. L. B. Sherman who, for a number of years has held the position of western manager of the Pocket List of Railway Officials, has resigned his position with that publication to become the western manager of the Railroad Gazette. Mr. Sherman's office will be in the Monadnock block on and after November 1st.

A. B. C. of the Telephone

THIS book is a practical Treatise on the Construction and operation of telephonic apparatus, circuits and exchanges, written by James E. Homans, A. M. While giving a distinct idea of the contrivances employed in practical telephony, together with points on construction, the book enters into technical details no more than is positively necessary to insure an understanding of the subject. It is intended for the use of all persons desirous of obtaining an adequate idea of the practical opperation of the telephone industry; how the impulses of the voice are transmitted by the electric current; how telephonic connection between two lines is made at the exchange, together with the various devices there employed for expediting the operation; and the most approved methods of constructing telephone lines and ensuring through conduction of the telephonic currents. The subject of private intercommunicating telephone systems is also fully treated, being illustrated with diagrams of wiring, containing descriptions of the most practical switching devices, and numerous represcntatons of specially constructed apparatus. A careful study of this portion of the book should enable anyone with moderate practical ability to set up such a telephone system in his own house or neighborhood. The book is for sale by Theo. Audel & Co., publishers, 63 Fifth Ave, New York City.

Fall Hunting in the Maine Woods

THE hunting season is now on and sportsmen have already commenced to migrate towards the inexhaustible woodlands and forests of Maine where game in abundance can be found. The reports received this year state that deer are more plentiful than ever before, and during the close season hunters who had gone to camp early so as to get a line on their whereabouts and be able to bag a few deer at the outset, were startled at the great numbers which appeared to be everywhere. From the Moosehead Lake country reports are to the effect that the guides are making ready for more sportsmen than ever before, and scores of moose have been seen in that vicinity. The country along the Penobscot River and the Aroostook region are fairly alive this year with deer, and this is also considered a remarkably good moose territory.

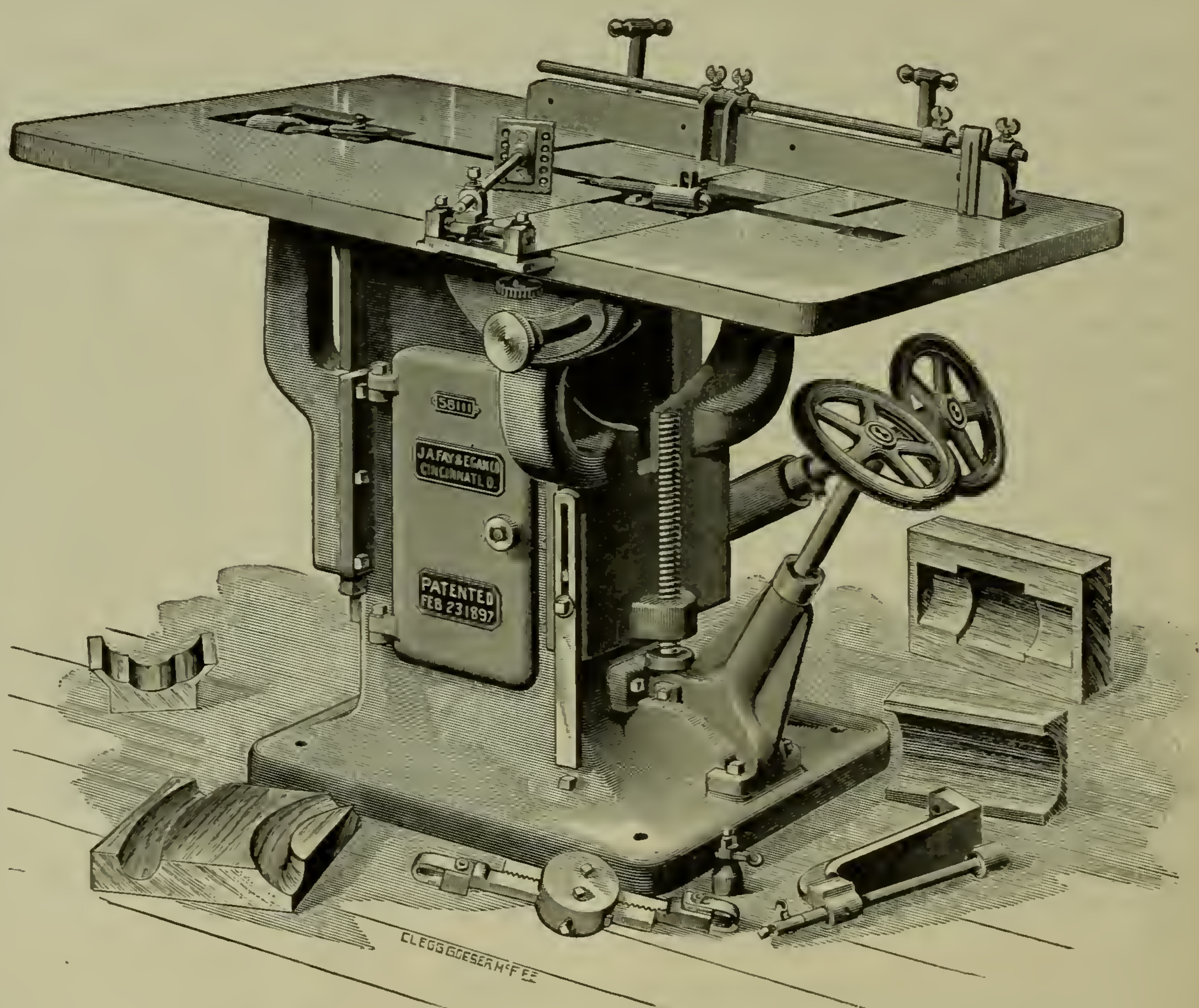
Maine offers scenes and pleasures in the line of fishing and hunting all her own, and in the chase for big game, she has no competitors. Deer are not only more numerous in Maine, but they grow to a much larger size, and the person who knows how to handle a gun at all, is reasonably sure of his full quota of deer and moose. Although deer and moose are usually enough to satisfy the appetite of the average sportsman, still they are by no means the only kinds of game to be found in these vast timberlands. Braces of smaller game, together with a plentiful supply of partridge and quail. have already been brought into camp; and in that section which lies contiguous to the Dead River region, and known as the Rangeley region, the farmers are very much troubled on account of the numerous depredations which have this year been made by bears on the orchards and corn fields. Bears are much more numerous this season than ever before, and to the sportsman who enjoys this exciting sport, this portion of Maine is an especially desirable spot. All ways now lead to Maine, and remember that the Boston & Maine Railroad is the only road out of New England that makes direct connections for the heart of the hunting and fishing region.

Send two-cent stamp to the General Passenger Department, Boston & Maine Railroad, Boston, for their illustrated book called "Fishing and Hunting."

A New Core Box Machine

WE illustrate herewith a new core box machine, in which the makers claim great advantages in speed and accuracy for making all kinds of cored boxes, and work that requires recessing, duplicating, etc. The machine will cut semicircular core boxes of any length, and at from 1 to 20 inches in diameter. Semicircular core boxes closed at the end with recesses of different diameters can be made rapidly and with corners of any desired shape. On patterns with internal curves, such as the inside of staves, coves and cutting out the under side of bosses to fit on rounded patterns, the work can be produced very rapidly. For making large fillets on engine and pump frame, and similar patterns, it is unsurpassed, and is a great saving over the old methods of working the curve.

It is not necessary to use clear lumber when making the cuts on this machine, as owing to the construction of the cutters, knotty lumber, cutting with or across the grain, a smooth surface is secured. A radius attachment



A New Core Box Machine.

is furnished with the machine by the use of which circular core boxes are correctly produced, such as elbows, etc. The heads used may be set for different diameters, they being so made that the bits are adjustable; by this arrangement a fewer number of heads need be used to accomplish a wide range of work. Cut showing the machine, particulars and lowest terms, will be furnished on applying to the manufacturers, J. A. Fay & Egan Co., of No. 145 to 166 West Front street, Cincinnati, Ohio.

Personals

Mr. James Agler has been appointed manager of the Pacific System, vice Mr. J. M. Herbert, resigned.

Mr. J. Kruttschnitt has been appointed assistant to the president of the Southern Pacific Railroad Company.

Mr. W. D. Hollis has been appointed general foreman of the St. Louis & Memphis shops at Caruthersville, Mo.

Mr. H. Mann has been appointed general foreman of the Pere Marquette, with headquarters at Muskegon, Mich.

Mr. Charles Eddington has been appointed general foreman of the Atchison, Topeka & Santa Fe at Trinidad, Colo.

Mr. J. Dalman, Jr., has been appointed master mechanic of the Pennsylvania railroad with headquarters at New Castle, Pa.

Mr. Thomas Fielden, assistant master mechanic of the Missouri Pacific railway at Cypress shops, Kansas City, Kan., has resigned.

Mr. F. M. McNulty has been appointed master mechanic of the Monongahela Connecting, with headquarters at Pittsburg, Pa.

Mr. W. J. Spearman has been appointed general foreman of the Pere Marquette railroad, with headquarters at Port Huron, Mich.

Mr. L. H. Waugh has been appointed master mechanic of the St. Louis & San Francisco railroad, with headquarters at Sapulpa, I. T.

Mr. W. J. Hemphill has been appointed master mechanic of the Santa Fe, Prescott & Phoenix with headquarters at Prescott, Ariz.

Mr. Thomas W. Flannagan has been appointed Storekeeper of the Minneapolis, St. Paul & Sault Ste. Marie, vice Mr. O. W. Applegate, deceased.

Mr. David Anderson, master mechanic of the Northern Ohio, has been appointed foreman of shops of the Lake Erie & Western, at Muncie, Ind.

Mr. S. A. Chamberlain has been appointed acting master mechanic of the Pere Marquette railroad at Ionia, Mich., to succeed Mr. W. T. Rupert, resigned.

Mr. Frank Singer has been appointed master mechanic of the Florence & Cripple Creek, with headquarters at Canyon City, Colo., vice Mr. Robert Patterson.

Mr. A. Harrity has been appointed assistant master mechanic of the Missouri Pacific railroad, with headquarters at Kansas City, Mo., succeeding Mr. T. Fielden, resigned.

Mr. D. W. Cunningham has been appointed master mechanic of the Rock Island & Peoria with headquarters at Peoria, Ills., succeeding Mr. A. McCormick, resigned.

Mr. Jacob N. Barr has resigned as mechanical superintendent of the Baltimore & Ohio, to accept a similar position with the Erie, succeeding Mr. A. E. Mitchell, resigned.

Mr. W. W. Atterbury has been appointed general superintendent of motive power of the Pennsylvania, with headquarters at Altoona, Pa., succeeding Mr. F. D. Casanave, resigned.

Mr. F. D. Casanave, recently appointed superintendent of motive power of the Baltimore & Ohio Rd. Company, has been given jurisdiction over the Cleveland Terminal & Valley railroad and the Pittsburg & Western.

Mr. C. Sonnenberg, who has been foreman of the Northern Pacific coach and cabinet shops at St. Paul for 21 years, has resigned, having been appointed as foreman of the Chicago, Indianapolis & Louisville shops at Lafayette, Ind.

Mr. M. J. Rogers has resigned his position as master mechanic of the Kansas City Belt railroad, and as mechanical engineer of the Peerless Metal Refining Company, will devote his entire time to the manufacture of "Anti-friction Babbitt Metals."

Mr. Mord Roberts, heretofore general master mechanic of the Louisville & Nashville, has been appointed superintendent of motive power and machinery for the Kansas City Southern, with headquarters at Kansas City, Mo., vice Mr. F. Mertsheimer, resigned.

Mr. W. L. Harrison, formerly superintendent of the St. Louis & Southwestern shops at Pine Bluff, Ark., has been appointed superintendent of the Central Railroad of New Jersey locomotive and car shops, at Elizabethport, N. J., vice Mr. R. O. Cumback, resigned.

Mr. I. Bond, heretofore division master mechanic of the Erie at Hornellsville, N. Y., has been appointed master mechanic at Rochester, N. Y., to succeed Mr. F. Tuma, who has been transferred to Port Jervis, N. Y., as master mechanic. Mr. Tuma succeeds Mr. J. Hainen, who becomes master mechanic at Elmira, N. Y.

Mr. D. M. Perrine, heretofore assistant engineer of motive power of the Pennsylvania railroad, has been appointed division master mechanic at Pittsburg, Pa., succeeding Mr. H. M. Carson. Mr. J. T. Wallis, heretofore assistant engineer of motive power at Altoona Pa., succeeds Mr. Perrine, who in turn is succeeded by Mr. I. B. Thomas. Mr. Thomas is succeeded by Mr. E. Sumner as assistant division master mechanic at Renovo, Pa.

Mr. C. H. Wiggin, heretofore master mechanic of the Boston & Maine at Concord, N. H., has been appointed assistant superintendent of motive power of that road, with office at Boston, Mass., succeeding Mr. P. H. Hammett, resigned. Mr. D. E. Davis, general foreman of shops at Boston, has been appointed master mechanic at Concord, succeeding Mr. Wiggin, and Mr. C. B. Smith has been appointed general foreman of the Boston shops.

Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.
Official Organ of the Master Car and Locomotive Painters Association

Salutatory

TO my former readers in the Railroad Car Journal and Railroad Digest, and others "to whom these presents may come," greeting:—I feel "like a cat in a strange garret," or, to ascend to the sublime, I feel much as a pastor is supposed to feel in a new pulpit, where the people may have different notions of heaven and hell, than where he has been holding forth the past eight years, and where he may "make a break" or tread on somebody's theological corns which, by the way, are about as sore on some people's feet as any other kind. However, as he would say, I am here simply to do you all the good I can and, incidentally, to reap a little from what I sow. I have no quarrels with anybody, no grievances to air; no airs to put on or to take off—though I may later have something to say about "air" as applied to paint-shop devices.

The publisher of this paper has kindly made the mistake of his life in inviting me to undertake the editing of the department of railway equipment painting in this paper; and subsequently, by the decision of the committee in charge, it has become the official organ of the Master Car and Locomotive Painters' Association of the United States and Canada, transferring the same from the esteemed Railroad Digest at New York with this issue, instead of with the January number as expected. This proposition has come "so sudden", as the blushing widow said when proposed to, that it finds me quite unprepared, inasmuch as this paper goes to press ten days or so in advance of the Digest; so if this department is not up to what my readers are accustomed to see, and they will put up with this little picked-up meal, I will promise to give them "a roast" later on, figuratively speaking.

CHARLES E. COPP.

The New Official Organ

THIS number of the Railway Master Mechanic will carry the news to almost if not quite all the members of the Master Car and Locomotive Painters Association, except the members of the committee which had it in charge, that it has been chosen as their official organ for the ensuing year. That all may know how this came about and the terms of the agreement made, we will first explain and then subjoin a copy of the agreement over the signatures of the committee, inasmuch as the editor of these columns, who is the writer of this article, was a member of that committee and the secretary thereof.

On my return from the Buffalo convention I found a highly complimentary letter on my desk from the publisher of this paper, whom I never saw before, referring to my "Valedictory" in the "Railroad Digest" and inviting me to take such a department in his paper, regardless of the matter of being the official organ—not mentioning it. I replied that I would perhaps do so beginning with the January issue, as by a new arrangement I was to continue this year out with the Digest, and incidentally I asked if he would like to become our official organ. The reply came that he was to come to New York on business and would later be in Boston and meet the committee and talk the matter over. A meeting was held in President Dane's office, Oct. 15th, he and Chairman Samuel Brown being present, with the writer, when the following agreement was accepted, which later was sent to Messrs. Hutchinson and McKeon, the other members, for their approval.

In explanation of the terms it may be well to state that, being a stranger in Boston and his office a thousand miles away, the publisher of the Railway Master Mechanic thought it would be expensive and impracticable for him to provide a stenographer for our next convention, which is to be held in Boston next September, therefore he preferred that we should employ and pay for the stenographer (which President Dane can do economically) and he would make a discount of 25 cents from each club-rate subscription, bringing it down from 75 to 50 cents, the terms of his paper being the same as the "Digest." On the basis of what was paid to the "Digest" last year in a lump sum, as per the report of Secretary McKeon, for that paper to be sent to all members in good standing, it was thought by all that this liberal discount by the publisher of this paper would cover the expense of the stenographer this year ensuing. In all other respects the terms are identical with those had with the 'Digest."

In the matter of the bound report of the proceedings of the last convention, that is in Secretary McKeon's hands. It having gone so far as to be published in the October issue of the "Digest," that paper ought to be able to publish it cheaper than any one else, as the set-up matter can be transferred to other forms and printed. In this connection it should be stated that it was the sense of the above committee meeting that it is needless to publish two verbatim reports of our conventions —one in the October issue of official organ and another in the bound volume as heretofore. See explanation in the following agreement signed by the committee. But this can be talked up at our coming Advisory Committee meeting and recommendations made to our next convention for action, where also a vote can be taken as to the future policy regarding an official organ and the publication of its proceedings, this committee having then ended its labors for which full power in these premises was given it at the last convention:.

If providence can be said to favor folks as wicked as is the average car and locomotive painter (?) it may be said that this whole arrangement is providential in the light of several facts, to wit: Mr. Phillips' suggestion of this paper as his successor to this committee at Buffalo; the letter from the publisher inviting the writer to take charge of this department; the sentiment of our members at Buffalo preferring a railroad paper to the "Painters' Magazine," which was voted down; and a letter from Samuel Brown, chairman of this committee, to this writer suggesting the Railway Master Mechanic; and all of these things, so far as the writer knows, independent of each other!

In explanation why this transfer was made before the expiration of this year will say that it was understood that Mr. Phillips desired to be relieved with the November issue for reasons best known to himself.

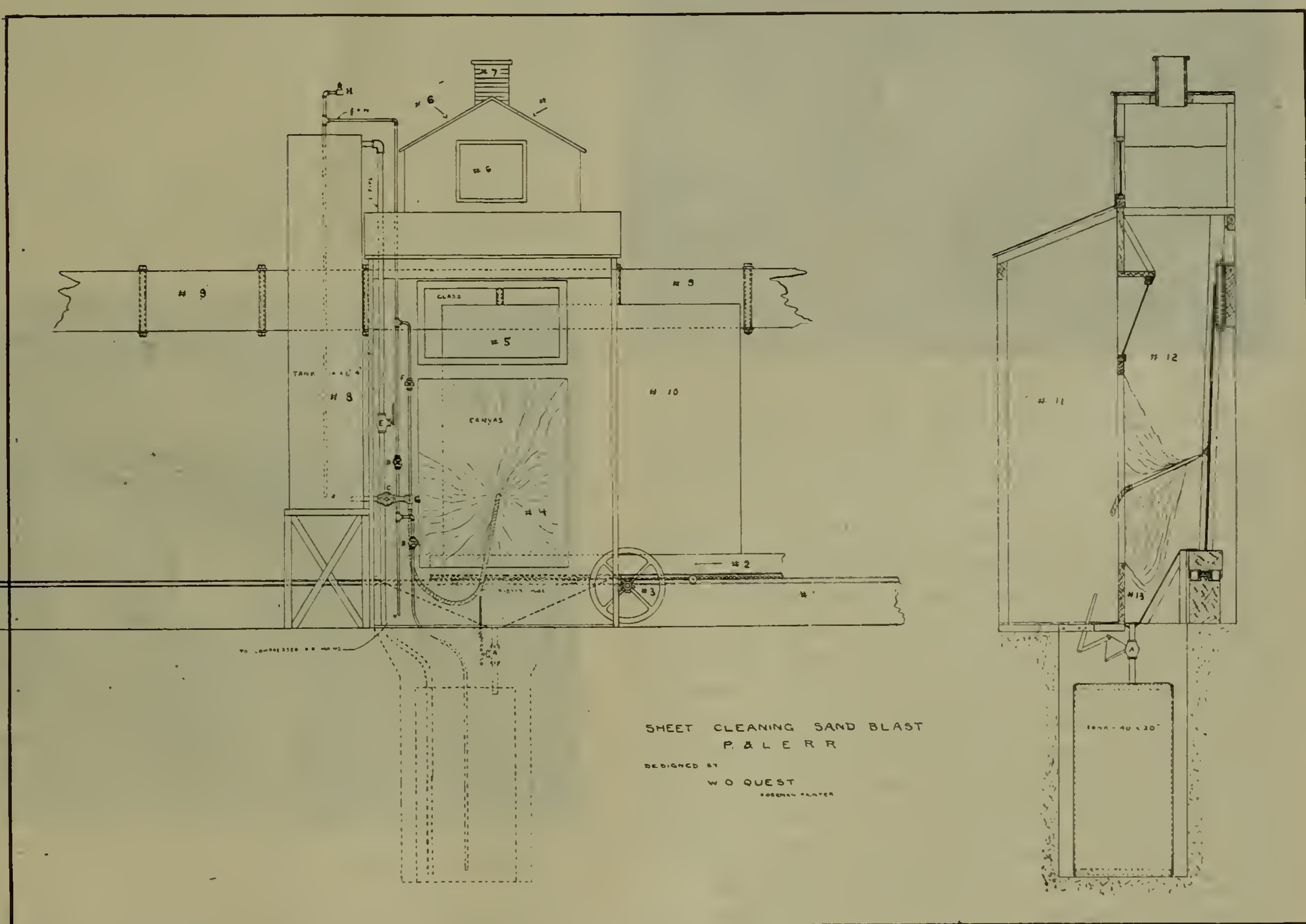
We sincerely trust this arrangement will be for the mutual good of all concerned. Following is a copy of the agreement:

Boston, Mass., Oct. 23, 1901.

Mr. Samuel Brown, Chairman:

Dear Sir—Referring to our verbal agreement of to-day, I would confirm in writing the proposition as made by me and accepted by your committee. The Railway Master Mechanic will be the official organ of your association until and including the next annual meeting of your association. I will furnish to all your members in good standing the Railway Master Mechanic at fifty (50) cents per copy per year, you to pay for the stenographic reports of your annual meeting, all other arrangements to be practically the same as have existed heretofore between your association and the Railroad Digest. The publication of the "Railroad Paint Shop" in the Railway Master Mechanic under the charge of Mr. Copp is to begin with the November issue.

The matter of publishing the bound volume containing the report of the proceedings of the annual meeting is to be referred to the association next September. I will agree to print it, charging you the actual cost to me. As agreed between us this morning, I think it would probably be found more satisfactory to all concerned to publish the verbatim report of the proceedings in book form only, and in the issue of the Railway Master Mechanic following the annual meeting to give more attention to the social side of the convention and more space to editorial comment on what was done in the sessions of the association. I will agree to set up, free of cost to you, the proceedings in full, leaving the



Sheet Cleaning Sand Blast, P. & L. E. R. R.

cost to you same as heretofore, viz., presswork, binding and paper.

Very truly yours,
Bruce V. Crandall,
Publisher.

Accepted:
Samuel Brown,
Charles E. Copp,
Albert P. Dane,
T. J. Hutchinson,
Robert McKeon,
Committee.

Sand Blast Machine for Locomotive Tank Work

McKee's Rocks, Pa., Aug. 29, 1901.

Editor Railroad Paint Shop:

The description of the stationary sand-blast machine, used in the machinery painting department of the Pittsburg & Lake Erie Railroad, according to agreement and promise, should have made its appearance in the columns of our official journal something over a year ago. I have repeatedly regretted my inability to get the matter into shape in order that I might respond to the several individual requests of interested fellow associates for blue prints of this device which I have every reason to believe is the original of its kind, up to date. I would also assert that the interested car painting people will be the gainers owing to this tardiness on my part, from the fact that this specially designed machine for sand-blast cleaning, operated by compressed air, has been greatly improved upon and enlarged since I first mentioned its existence at our St. Paul meeting two years ago.

Sheet Cleaning Sand Blast, P. & L. E. R. R.

This cleaning device, as I now have it rigged up, is simple in construction and easily cared for and operated. I herewith show same by sketch and photograph. I also endeavor to make a pen description of it, which I hope will prove to be of much value to those interested in such shop helps.

The operating control and individual safety of the operator are perfectly assured. I am also in a safe position to claim that if our present machine is intelligently handled, it easily makes one man worth twenty, where cleaning is done the old way. I will further claim, without fear of contradiction, that our experience has taught us that the sand blast is the only perfect and economical method of cleaning all kinds of locomotive structural iron, including the rough castings, etc. Our machine does the work in a thorough manner, so thorough that it cannot be duplicated by hand-grinding, regardless of cutting agents used, which generally includes hard coke, sand stone, the coarse broken emery wheel, etc., which cleans only by abrasion, necessitating extra labor and material in surfacing-up process.

Those who are familiar will know that the sand blast only will make a smooth surface to receive paint. The sand blast is the only sure cure for the flash and scale deposit, usually found on the surface of all sheet iron and steel, commercially ranging from the armored plate down to stove-pipe iron.

Until the coming of the sand blast, the only cheap cure for the flash nuisance was to rot it off by the elements. The sand blast removes this flash, or hard iron oxide, by striking it a blow, from the fact that each and every grain of sand is driven against the brittle substance with such tremendous force as to cause the useless dross to crack off from the true iron or steel substance underneath.

In a series of hand-cleaning tests versus compressed air machine, we found that our best men, using broken emery wheel, could scale but three square feet per hour,

Sheet Cleaning Sand Blast, P. & L. E. R. R.

while one of the same men has repeatedly machine-scaled a locomotive side tank sheet, containing seventy square feet, in forty minutes.

To prevent rust accumulation we prime-coat the cleaned-up sheet of iron, which is then kept in stock until needed for tank and other structural purposes. Our company's foreman of boiler-makers has assured us that this priming of the sheets does not interfere in the least with the laying out and building operations.

Structural sheet iron and steel cleaned with the sand blast, dating back for years, have never given us the least trouble from the scaling-off nuisance.

The following is a descriptive sketch which, for convenience, we have lettered and numbered to better facilitate our explanation:

"A"—A one-inch Westinghouse straight cut-out cock, lever-rigged to drop sand from hopper into lower pressure tank, which permits sand to be used over and over.

"B"—A three-eighths-inch globe valve used to control air pressure in lower tank, which forces sand up into sand-delivery pressure tank.

"C"—A one-inch Westinghouse straight cut-out cock, connected from delivery tank to one-inch delivery hose equipped with a three-eighths-inch pipe, nozzle contracted to a three-sixteenths-inch opening on delivery end, for forcible ejection of sand.

"D"—A three-eighths-inch globe valve to control back air pressure in sand-delivery pressure tank.

"E"—A one-inch Westinghouse cut-out cock, used for passing the sand from lower tank into delivery tank.

"F"—A three-eighths-inch globe valve to regulate air pressure to "G," which is a syphon-rigged auxiliary air pressure force, leading into delivery hose with nozzle attachment.

"H"—A one-half-inch globe valve converted into a spring-rigged safety device, to regulate back air pressure in sand-delivery tank.

No. 1—The flat railed base for movable carriage.

No. 2—A movable sprocket-rigged carriage 18 ft. long.

No. 3—Twenty-inch wheel attached to gear wheel, which actuates movable carriage.

No. 4—A canvas dust protection for operator, arranged to permit free use of nozzle from corner to corner.

No. 5—Glass window which permits operator to control sand force on object to be cleaned.

No. 6—Glass for shedding light into back operating chamber—A, light well.

No. 7—Ventilator for release of fine dust.

No. 8—Sand-delivery pressure tank.

No. 9—A back roller rest for large sheets of iron in cleaning process 40 ft. long.

No. 10—A sheet of iron in position.

No. 11—The darkened chamber for operator.

No. 12—The top-lighted back operating chamber.

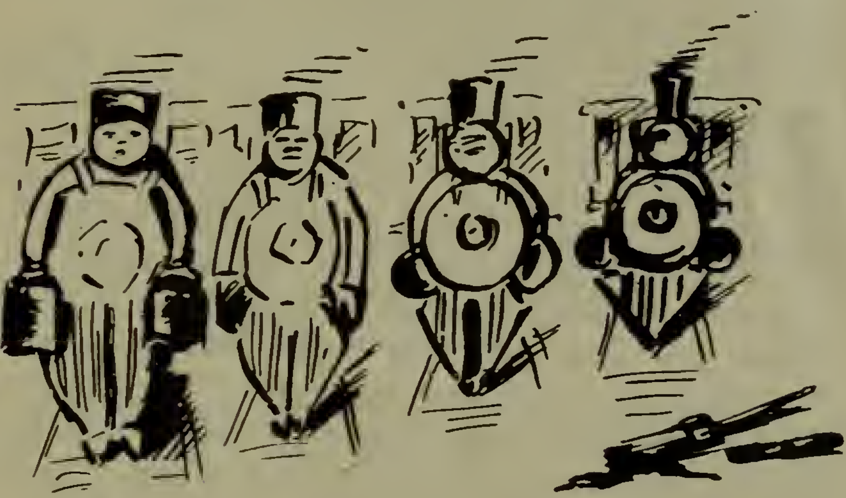
No. 13—The sand hopper with connection into lower pressure tank.

In conclusion I will say that there are all kinds and conditions of sand blasts: there is the kind that does service on the great bridge structures, which was so ably explained by Editor Copp in the August Number of the Railroad Digest, also the expensive exhaustion chamber variety used in the large metal manufacturing concerns and, last but not least, the many and useful kinds of the railway car shop, of which we hope the Pittsburg & Lake Erie variety, as herewith explained, will prove to be, as a sand blast, the right thing in the right place.

W. O. Quest.
Master Painter, P. & L. E. R. R. Co.

Evolution of the Locomotive Painter

THE sketch is "not so bad", from the pen of Mr. J. T. Hartnagle, manager of the Eureka Solvent and Eureka Rubbing Stone Companies, made hastily on the



Evolution of the Locomotive Painter.

back of his card enclosed in a personal letter to me on business. He has been an artistic brush-wielder in his day and a clever pen and pencil artist, working once with the late "Joe" Murphy at the L. & N. shops, Louisville, Ky., I understand.

Painting Galvanized Iron

IN the March number of "Railroad Digest" Mr. Brazier, Asst. Supt. Rolling Stock, N. Y. C. & H. R. asks this question, "What is the best method of painting galvanized iron?" Replying to Mr. Brazier will say that subject was up for discussion at our New York convention in 1896 and two pages (pp. 51 and 52) of the bound volume of the proceedings give the debate in detail, which was opened by a paper by Mr. E. A. Cole, late of J. G. Brill Car Co., Philadelphia, Pa., which unfortunately did not contain the most vital point connected with the subject, namely, the formula of the primer used, it being the property of other parties. In the discussion that followed, however, Mr. Putz of the Wisconsin Central said that he got better results from using finishing varnish, after cleaning thoroughly, for a primer on galvanized iron than anything else and that it wears pretty well. This tallies nearly with my own experience. I had tried about everything with exasperating results until some five years ago, in burning off some old cars, including decks which had panels covered with galvanized iron, which inevitably peeled, when the men come to me and asked if they should put the Flood & Conklin No. 1 primer, or surfacer, which they were using upon the wood, upon the galvanized iron also, I answered, "Yes, it cannot be any worse than what we have been using," though it was against my notions of painting then, as it contained no pigment, being a transparent, varnishlike substance; and I have had no trouble with peeling wherever it was applied. But it strikes me that a coat of good, elastic, oily, finishing varnish might, as Mr. Putz says, work about as well for this purpose as a foundation for the regular succeeding coats of surfacers, color and coats of varnish to follow.

Do not understand me, however, to advocate a varnish primer, without pigment, for the woodwork also, for I do not. I believe that galvanized iron requires a special treatment or primer of its own to get the best results; and experience confirms this belief.

I cannot close this article, however, without saying to Mr. Brazier, and to all others who have the construction and care of cars under their supervision, Do not use any galvanized iron at all about the exterior construction of cars, expecting it to be painted, unless absolutely necessary on account of soldering. For any other purpose use unfinished American iron and then regular primers and paint will wear equally well upon it in comparison with any other material. It has been my practice to advocate this with all whom I have had business dealings until the use of this objectionable material, that is also so rough from the galvanizing that it is difficult to get a passable surface upon it, has been well-nigh done away with, though too much of it is already upon the cars. Galvanized-iron is not intended to be painted; that is the reason it is galvanized—to protect the iron from the weather with a metal that will not rust. If an article must be painted for appearance sake then keep the galvanizing off by all means, unless, as before said, it is necessary to prepare the surface of the iron for soldering. If you will look into the matter thoughtfully and let past practice go to the dogs you will see that little or no galvanized iron is needed in car or engine construction where painting is necessary.

Discovery of White Lead

According to V. B. Grinnell, in a former number of the Western Painter, the following is the tradition among the Dutch how white lead by that well-known process was not invented but rather discovered:

Many years ago an old Dutch farmer had a pretty daughter living at his home, and, as a matter of course, she had a lover, and that lover was a landscape and portrait painter of some note, employed by the farmer, Stratingh, to paint a landscape of his farm and the surrounding view, to make sketches of his favorite cattle, and portraits of himself and family, including the lovely daughter, whom old Stratingh thought must be a hard subject to paint because it took so long to do the work. One day the previous autumn the farmer noticed he had a lame horse in the stable, and took out a lead mug full of vinegar, his favorite bath for lame animals. After using part of the vinegar he set the cup down on the manure-pile outside the door and forgot it, and it was subsequently covered up with litter from the stable and buried deeper and deeper from day to day, until spring came, when in removing the pile of litter the buried cup was found. The vinegar was gone and a white, flaky substance was found encrusting the entire interior of the cup, which was taken to the mansion as a curiosity. The artist, who happened to be present at the time, had an eye to the main chance, as all painters should have, and soon discovered that it was white lead far superior to the natural carbonate he had been using for putting on high lights. The fact of this discovery having been demonstrated to the old farmer, he gave the artist a good job and permission to pay his addresses to the young lady of the mansion. Old farmer Stratingh had an eye to business also, besides being a hustler. He bought all the manure-piles and lead mugs possible within a profitable distance, and the next fall, after his crop was off, planted his entire farm to lead mugs half filled with home-made vinegar. The next spring he realized a crop of several hundred pounds of white lead, worth ten dollars per pound. The next Spring the old man went to Amsterdam for more mugs, and the next autumn planted his farm with them, and so on, from year to year, until he was immensely rich. As white lead became more plentiful the price went down and farmer Stratingh sold his secret to an English tourist.

Removing Old Varnish from Car Interiors

The only objection against most varnish removers is their terrific odor. They are enough to drive a dog out of a tanyard. If some wide-awake chemist will devise one devoid of this objectionable feature there is a field for it and the paintshop men will pronounce blessings on his head instead of the opposite. Formerly our cars were made so plain in wood work and ran so long with so many renewals of interior varnish that a cabinet-scraper was considered as practicable as anything for this work, removing the varnish dry, from whence it would fly like meal. But in later years the interior wood design of cars took on a more ornate description in carving, fluting, moulding, etc., which makes it decidedly impracticable to divest them of accumulated varnish and grime with the scraper in the old way; and this class of cars are now fast coming to the point where their interiors have got to be renovated and the time is ripe for a varnish remover that will fill the bill and not burn or discolor the wood or hurt one's hands, which anything containing alkalis will do.

Wood head linings, adopted in recent years, are also at that stage where they should have the old varnish and stenciled designs removed and be again refinished. This should be done even if they are to have painted grounds, as it removes the old figures that are in ridges and the old varnish, letting the priming coat of paint get a firm hold of the wood.

Then, again, these cars of the present day of ornate design in wood become much sooner grimed up in the corners, carvings, etc., and require the varnish to be removed much sooner than their plain and simple predecessors, in spite of all that we can do to keep them in good shape. They are like a man's chapped hands, dirt will work into them.

Wooden seats, more expensive in the first place, are also more so to maintain than their iron brothers. Of course, most of them are detachable, like much other wood work, and can be put in a tank of liquid varnish-remover that is kept outside of the shop in some shed, or old condemned car used for this purpose, where the odor will not be an objectionable feature. Even the cars themselves, if they can have the varnish remover used in them while out of doors, having the windows removed, this question of the odor is largely if not wholly obviated. Still, this is not always convenient—or possible. The fact is, an inoffensive remover should be "devised and bequeathed" to "the mourners" that can be used anywhere and still retain its strength after being uncovered in the can while using, which some do not that are somewhat odorless that have come under our observation.

Wherever work can be laid down flat and covered with cloths saturated with wood alcohol and covered with glass to prevent evaporation, this will be found a quick and economical way to remove old varnish.

Application of Vermilion

THE following from an exchange are good hints on this subject. Years ago the B. & M. passenger cars were striped with vermilion, the body color being yellow. We got the best results by mixing it to a paste with varnish and thinning to working consistency with turpentine, and not grinding it in a metal mill. We used the genuine English, pale shade. It dried flat, of course, but was varnished with the car. "The brightest and best work done with vermilion is turned from the hands of the carriage painter, and he is careful to use no oil in the 'color' he employs. His work stands better—that is, retains its brilliancy or does not darken; while the house painter, on the contrary, uses oil freely in the paint, and the color soon turns to a dark Indian red shade. Vermilion should be mixed with the lightest colored and quickest drying carriage varnish obtainable, to a stiff paste, then thinned with turpentine to a consistency for spreading nicely with a brush. No oil under any circumstances should be added, and the finest grades of English and Chinese vermilion require to be mixed in glass or earthern vessels to retain their purity, for metal, as tin or even the steel of the palette knife, will darken it quickly."

Notes and Comments

IT is expected that this and all subsequent issues for the coming year will be promptly mailed to all members of the M. C. & L. P. A. in good standing, as by the terms of the committee's agreement with the publisher in another column it is to be paid for from the Association's treasury. If any member does not receive it he should write to Secretary McKeon at Kent, Ohio, at once to ascertain his standing and why he does not get it. If he is behind in his dues he should pay up promptly in justice to his association "for the good of the order," if for nothing more, and incidentally get his paper free. There may be foreman painters who are not members who would be glad to subscribe. Speak to them about it. As it is now a profit-sharing arrangement by our new terms, it is plain that the more members in good standing who receive it the better it will be mutually between the Association and the publisher, for all above the 25 cents discount per copy necessary to pay our stenographer is clear gain over last year, which we think ought to be considerable. Let the list be swelled. It is to be hoped that many delinquents will be reached somehow and their dues turned into Secretary McKeon and the Association's treasury thus swelled, and they thus receive this paper and all be happy. Roll up the list, "boys."

ONE reputable travelling man for paint supplies recently told us that when "hard up" for a shave a good piece of well-surfaced lump pumice stone would do the trick, rubbing your face in the soap-lather as you would a car panel with water. This is "a new one" and we were at first inclined to call it "a drummer's yarn," but were assured it was not. At any rate, if any belated customer finds the barber shop closed and is troubled with a shaky hand it might be well enough to give it a trial. We are of the opinion, however, that, as with the lawn-mower, it won't work well with the grass too high.

THE New York, New Haven & Hartford R. R. has lately adopted a gold colored lead paint for the lettering and striping of its passenger equipment in lieu of the gold leaf heretofore used, exempting only parlors, sleepers, diners and private cars from this order. The body color is dark green and two coats are necessary on all stripes and letters. There is a triple stripe—a large one in the center and a small one on either side of it—across the car horizontally near the bottom and again near the belt rail under windows, or six stripes around car, both sides. We are sorry that we cannot agree with our neighbors as to the wisdom of this move and its economy. What is saved in gold must nearly, if not quite, be put out in labor with a loss in appearance, besides there is such a protrusion of paint accumulated with two coats of this heavy paint that it makes repainting the car over the old paint a problem, unless these ridges are first cut down with lump pumice, or the figures put back in the same places, if possible (?) only to increase the trouble. We suggest to our esteemed contemporaries that they drop off two-thirds of the striping and run the "rapid fire" gilding wheel over the rest as a better scheme of economy, if they will pardon us for this criticism.

The Car Foremen's Association of Chicago

October Meeting

THE annual meeting of the Car Foremen's Association of Chicago was held Oct. 9, 1901, in room 209, Masonic Temple. Pres. Sharp called the meeting to order at 8:00 p. m. Among those present were the following: J. Ackerman, G. M. Bates, J. H. Ball, Theodore Blohm, J. M. Borrowdale, William M. Brown, J. W. Bourell, J. P. Callahan, Frank Chambers, W. C. Cook, Roy J. Cook, W. A. Carter, F. J. Cooledge, F. D. Casgrain, James Depue, Ralph Earle, W. H. Evans, William F. Fries, J. C. Grieb, Charles Grundlach, William Hagge, H. H. Harvey, E. Hedrick, E. Husband, T. B. Hunt, A. F. Johnson, R. R. Jones, A. Johannes, F. C. Kroff, Aaron Kline, J. A. Kershaw, William Konze, William Kramer, A. F. Kalas, C. F. Keebler, J. H. Kennedy, B. A. Keeler, S. J. Kidder, A. Lindseth, H. La Rue, Joseph Lutz, T. R. Morris, G. W. Miller, James Monahan, T. Murphy, Hugh Marsh, J. Mattes, N. M. Maine, T. J. Mullally, Charles Nordquist, Frank Norman, Frederick Nissen, L. Olsen, Joseph Opie, C. R. Powell, George Plunkett, P. Parke, LeG. Parish, A. F. Peterson, G. T. Rohrback, F. B. Reinhard, W. E. Sharp, August Schultz, Jacob Swenka, F. C. Schultz, J. K. Skilling, J. B. Scott, Charles Spohnholtz, H. A. Stewart, C. Schoeneberg, S. Shannon, William Tomlinson, E. J. Trudeau, O. N. Terry, Charles Vandrake, Henry Weschler, W. W. Wessell, G. S. Wood, Thomas Williams and C. E. Walinder.

Pres. Sharp: The first order of business is the reading of the minutes of the pervious meeting. As they have been printed in the Railway Master Mechanic and distributed among the members, if there are no objections they will stand approved.

Secretary Kline: The following have made application for membership: R. R. Bradley, mechanical engineer, C., M. & St. P. Ry., West Milwaukee, Wis.; William M. Brown, clerk, C., M. & St. P. Ry., Chicago, Ill.; William Bruce, carpenter, L. S. & M. S. Ry., Chicago, Ill.: M. J. Baldwin, air-brake man, Swift & Co., Chicago, Ill.; C. E. Curtis, clerk, C., M. & St. P. Ry., West Milwaukee, Wis.; F. P. Donahoe, draughtsman, Swift & Co., Chicago, Ill.; J. H. Johnson, draughtsman, C., M. & St. P. Ry., West Milwaikee, Wis.; A. J. Kroha, clerk, C., M. & St. P. Ry., West Milwaukee, Wis.; N. M. Maine, general foreman, C., M. & St. P. Ry., West Milwaukee, Wis.; Guy M. Miller, clerk, C., M. & St. P. Ry., West Milwaukee, Wis.; George T. Phelps, foreman pass yard, C. & A. R. R., Chicago, Ill.; Joseph P. Schneider, stenographer, C., M. & St. P. Ry., West Milwaukee, Wis.

Pres. Sharp: These several names as read have been approved by the Board of Directors, and if there are no objections they will be enrolled as members.

Secretary Kline: I have here a letter from Mr. Brazier, of the New York Central, which I am sure you will all be glad to hear.

New York, Oct. 7, 1901.

Mr. Aaron Kline, Secretary of the Car Foremen's Association, Chicago, Ill.

Dear Sir—Enclosed please find one dollar for my annual dues.

I trust that the association will continue to be as useful as it has been in the past. I read with a great deal of pleasure your reports in the "Master Mechanic" and other magazines, and I think the questions that you discuss are very beneficial, and in a degree save considerable time in the Master Car Builders and other associations from discussing many of the questions, as they are so fully gone over by many of the numbers. While it is impossible for me to meet with you, still you have my hearty co-operation and support. Yours truly,

F. W. BRAZIER, Assistant Superintendent R. S.

Pres. Sharp: We are glad to receive such letters, which speak so well for our association. The same will be placed on file. This being the annual meeting, we will now have the reports of the officers. We will first listen to the Secretary's report:

Secretary's Report, year ending Oct. 1, 1901: The meetings of the Car Foremen's Association of Chicago have been held regularly each month, in October and November, 1900, in room 1741, Monadnock building, and since that date in room 209, Masonic Temple, and have been well attended. At the last annual meeting the membership numbered 269. During the year we have taken in 184 new members and have lost by reason of lapse of dues, resignation, etc., 33. The present membership is 420. There is attached to this report a list of companies represented and the membership of each company; also a list of members classified by occupation. The receipts and disbursements have been as follows:

RECEIPTS.

Cash on Hand Oct. 1, 1900	$ 51.30
From Renewal of Dues	137.34
From New Members	184.00
Contributed by Railroads	225.00
From Railway Master Mechanic	55.00
From Excursion Fund	8.63
Total	$661.27

DISBURSEMENTS.

For Rental	$115.00
For Secretary's Salary	150.00
For Stenographer	73.85
For Stationary	49.97
For Postage	69.30
To Railway Master Mechanic (Subscriptions)	143.50
Surety Bond, Secretary	5.00
Miscellaneous	7.30
Total	$613.92
Cash on Hand, October 1, 1901	$47.35

The arrears of unpaid dues to October, 1901, amount to $40.06. There is also due from the Railway Master Mechanic, $15.00. There are no unpaid bills.

The railroads and private car companies who contributed to the financial support of the association during the year are as follows:

Armour Car Lines, Swift & Co., Provision Dealers' Despatch, Con. Cattle Car Co., Baltimore & Ohio R. R., Chicago, Rock Island & Pacific, Nelson, Morris & Co., Michigan Central Ry., American Ref. Transit Co., Wisconsin Central Ry., Illinois Central Ry.; Chicago, Milwaukee & St. Paul Ry., American Ref. Transit Co., Wisconsin Central Ry., Chicago, Indianapolis & Louisville Ry., American Cotton Oil Co., Anglo-American Ref. Car Co., Pennsylvania Co., Grand Trunk Ry., Chicago & Alton Ry., Lake Shore & Michigan Southern Ry., Burton Stock Car Co., Canada Cattle Car Co. A total of 21 companies, each company contributing $10.00 with the exception of the Provision Dealers' Despatch who contributed $25.00.

NUMBER OF MEMBERS PER COMPANIES.

Armour Car Lines	22
Anglo Am. Ref. Car Co	2

American Cotton Oil Co	1
A. T. & S. F. Ry	2
Arms Palace H. C. Co	1
Am. Ref. Transit Co	2
B. & O. R. R	22
Belt Ry	11
Burton S. C. Co	1
Canda Cattle Car Co	3
C. M. & St. P. Ry	86
C. B. & Q. Ry	24
Con. Cattle Car Co	2
C. & E. Ry	15
C. J. Ry	3
C. & A. Ry	2
C. & N. W. Ry	6
C. R. I. & P. Ry	6
C. L. S. & E. Ry	18
C. T. T. Ry	6
C. & G. T. Ry	3
C. & E. I. Ry	2
C. N. Y. & B. Ref. Co	2
I. C. R. R	20
L. S. & M. S. Ry	12
Lipton Ref. Line	3
Live Poultry T. Co	2
Libby, McN. & Libby	1
M. C. R. R	3
Mather H. & S. C. Co	1
N. Y. C. & St. L. Ry	4
Nelson, Morris & Co	1
Prov. Dealers' Desp	4
Penna. Co	10
Plant System	1
Swift Ref. Line	20
Streets Western S. C	5
Wabash Ry	3
Wis. Cent. Ry	1
C. I. & L. Ry	2
N. Y. C. & H. R. R. R	2
D. L. & W. Ry	5
D. S. S. & A. Ry	1
Minn. Trans. Ry	1
U. P. Ry	1
E. J. & E. Ry	2
Commerce Desp. Line	1
Shippers Ref. Car Co	1
N. Y. O. & W. Ry	1
P. C. C. & St. L. Ry	6
Erie & Wyoming Valley	1
D. & H. R. R	1
C. B. & W. Ry	1
M. K. & T	1
Ill. Northern	1
S. F. & S. J. Ry	1
B. & M. R. R	1
Standard Oil Co	1
Supply Men	55
Total membership	420
Railroad Companies	287
Private Lines	77
Supply Men	56

CLASSIFIED BY OCCUPATION.

General Manager	1
Supt. Motive Power	5
Asst. Supt. Motive Power	2
Master Car Builder	17
Master Mechanic	10
General Foremen	19
Foremen	119
Clerks	48
Chief Inspectors	5
Car Inspectors	138
Supply Men	56

On the 21st of September the association gave its annual excursion, a trip being taken to Lockport and Joliet, about 170 persons in all, the ladies being taken along. The A. T. & S. F. Ry. very kindly attached extra coaches to their regular train leaving Chicago at 7:58 a. m., dropping us off at the controlling works of the drainage canal. After viewing the operation of the dam 'busses were provided to take the ladies to the street car line in Lockport (the gentlemen preferring to walk), where special cars were provided to take the party to Joliet. After a sumptuous banquet in Castle Hall the party was taken to the State Penitentiary where guards escorted us through the various buildings of that institution, a very interesting sight indeed. The special cars were again attached to the regular train leaving Joliet at 3:40 p. m., and all arrived home safely. Respectfully submitted. Aaron Kline, Secy. Motion carried that the Secretary's report be adopted.

Pres. Sharp: We will now have the treasurer's report. Is Mr. Deen present or has he sent his report by any one? As the secretary's report shows the financial condition of the association, it will not be necessary to wait for the treasurer's report. The Auditing Committee then reported as follows: To the President: The committee appointed to audit the books of the secretary have to report that a careful and thorough examination of same shows them to be correct in every particular. T. R. Morris, G. M. Bates, C. C. Cather, committee.

Pres. Sharp: In accordance with our constitution we held the annual meeting of the Board of Directors in this hall this afternoon and in accordance with Article IV and V of that Constitution, appointed a committee to nominate officers for the ensuing year. That committee has reported and the report has been approved by the Board of Directors. I will ask the secretary to read the report.

Sec'y Kline: This committee, which consisted of Messrs. E. Hedrick, T. R. Morris and G. M. Bates, knowing that it was Mr. Sharp's desire to retire from the office of president, have reported as follows: For president, J. C. Grieb; vice-president, O. M. Stimson; secretary, Aaron Kline; treasurer, LeGrand Parish.

Mr. Hunt: I move that the rules be suspended and that the officers be elected by acclamation. Seconded and carried. Moved and seconded that the names presented by the nominating committee be elected as the officers for the coming year. Carried unanimously.

Pres. Sharp: I suppose under this head of reports of officers I am supposed, according to well established custom, to make my retiring address, and I can assure you that if I were an orator, I would not impose upon you, in view of the interesting program that has been prepared for this evening's meeting. I would however, briefly refer to the progress of our association which is tonight four years old. And if you will here pardon a personal allusion, I am proud of the honors conferred upon me, and for the distinction which I enjoy, as being the only one so far upon whom you have conferred the honor of the several offices, from high private to the office of president. Beginning as a charter member, I have watched with pleasure the steady progress of the association, and its welfare. And I do not believe I am selfish when I say that the past year has been the best year in its history. And that with the same, or better; yet renewed effort on the part of the officers and members, the coming year will be more profitable than the past.

Our membership has grown from 269 of one year ago to 420 at the present time, and if each member will do his duty, before another year has passed, it will reach 600. The personality of our membership, as shown in our secretary's report, is of the highest character. We have a large percentage of Superintendents and Assistant Superintendents of Motive Power, Master Car Builders, etc., who are interested in the association's welfare. Our finances are in good shape. That the railroads and car companies contribute so liberally for this work, is evidence to me of their faith in the organization.

That we are destined to occupy a higher place in the question of car building and car interchange is a certainty. The social features can be improved. Upon this feature, largely depends our success. The annual excursion, which was mentioned by our secretary, was unquestionably a success. The Santa Fe people very kindly granted the use of a train and the supply people were on hand, as they usually are to contributed to the day's enjoyment by preparing a very elaborate banquet and in other ways providing for our comfort of the day, and I, for one, would recommend the continuance of these annual outings.

Then gentlemen, let us each and everyone assist in promoting the good of our association by attending the meetings and taking part in the discussions. I would emphasize the last sentence, "taking part in the discussions. We are accustomed, a great many of us, to go to places where we enjoy it and are benefitted by it, but we say we come to hear rather than to be heard from. In numerous cases what you think, but what you do not say is just what the committee or other persons who are talking, are trying to draw out. I think at our last annual meeting, which was held over in the Monadnock Building, we were having an overflow testimony meeting, one of our members remarked that when he first began to attend the meetings of this association he could not speak well in public, but by that time he had become quite an orator. We might use this as a school of oratory and let everybody come and take part in these discussions. Gentlemen, I thank you for your faithful attendance during my term of office. I thank the committees for their untiring efforts, and the officers for their assistance afforded me in carrying forward this wok. And I now take great pleasure in commending you to my successor in office, as I am confident you will give him the same support which has in so large a measure made possible the present prosperous conditions. Assuring you that I still maintain the deepest interest in all the association's work, I again thank you. I now have the pleasure of introducing your new president, Mr. Grieb.

Pres. Grieb: Gentlemen of the Car Foremen's Association, I thank you for the honor conferred upon me in electing me to the position of president. It came very sudden, rather unexpected, and I have not prepared a speech. I will endeavor to show my appreciation of your confidence in me by renewed efforts to promote the welfare of your association to the best of my ability.

Mr. Casgrain: I think we ought to extend a vote of thanks to Mr. Sharp for the interest taken by him during the past year and for the impartial way in which he has conducted the meetings of the association.

Pres. Grieb: I have no hesitation in saying that that sentiment is felt by every member and that every act of our latest ex-president was intended for the interest of this association. I will ask the secretary to record that as a unanimous vote unless there are objections.

Mr. La Rue: I do not think we ought to let the A. T. & S. F. Company go without a vote of thanks, although I was not able to attend the annual outing.

Mr. Sharp: I would suggest that you amend the motion to take in the supply men and all who conributed to the enjoyment of the day. Motion carried unanimously.

Pres. Grieb: The secretary will please write the general manager of the Santa Fe system, conveying to him the thanks of this association for his kindness in providing transportation on the occasion of our annual outing.

There is one other officer who has earned an expression of gratitude from this association by reason of the neatness of his work, the high character of his services and the great amount of zeal manifested by his prompt and regular attendance to the business of our association. It is largely due to his untiring efforts that the association has been brought to its present standard, and I would like to see this sentiment expressed in the minutes of our meeting. I refer to our worthy secretary, Mr. Kline.

Mr. Sharp: I was just going to make that motion. I would move that the association extend its thanks to Secretary Kline for his untiring efforts and for the very able manner in which he has performed the duties of his office during the past year. Seconded and carried unanimously.

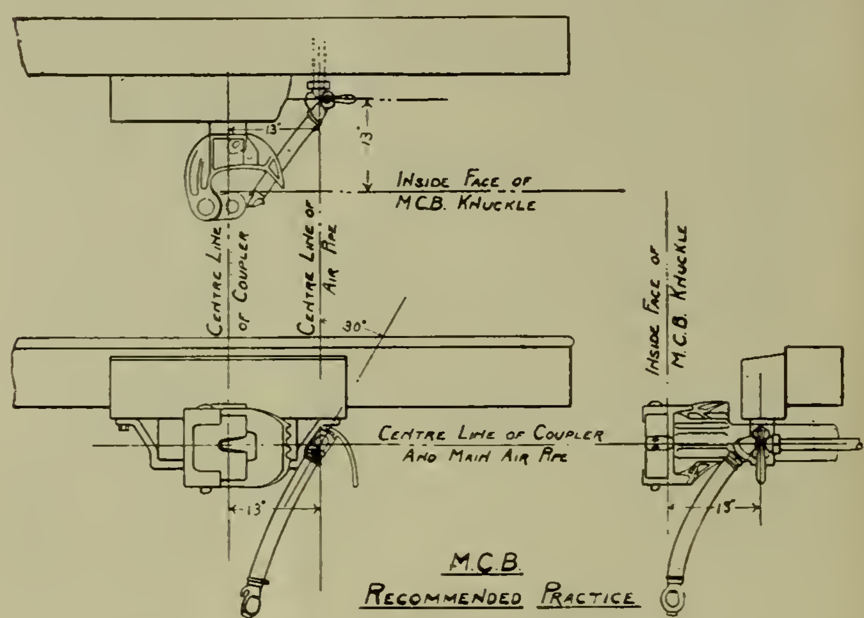
Secretary Kline: Gentlemen, I thank you for your kind expression. I have tried to do my work well. I have felt that the work was such that it was worthy of my best efforts. If you do not get your notices, or your Master Mechanic does not come regularly and promptly, do not hesitate to notify me and I will try and see that everything is properly straightened out.

Pres. Grieb: There are some standing committees, one in particular which the chair regards as most important, namely, the committee on subjects. Its chairman has rendered exceptionally good service in this matter, and it certainly is of vital importance to have one who will give so much attention and use good judgment in the introduction of subjects that form the discussions of our evenings. I refer to Mr. G. M. Bates.

We will now take up the report of the committees on Defective Air Brakes. This committee has confined its report to the following: Loose and defective train pipe, train pipe brackets, angle cocks, air hose, air hose clamps, air hose nipples, air hose couplings, gaskets, or features which may contribute to damage to any of these parts. Mr. Parish is chairman of this committee.

REPORT OF COMMITTEE ON DEFECTIVE AIR BRAKES.

Your committee in reporting on the subject of air brakes finds the subject so broad that in order to to do justice to it, the subject should be confined to what we consider the most important matter at this time; therefore, it has been decided to report on ruptured air hose and allied parts, and its causes. The number of accidents and delays due to this condition of air



hose, has assumed such proportions that the cause must be found and a remedy applied. In opening this subject, we have decided to report on the train pipe, train pipe brackets, angle cocks, air hose clamp, air hose nipple, hose, hose coupling and gasket, and any other feature which may contribute to the damage or abuse of these parts.

We find on trucks with outside hung brake beams that the truck levers at times interfere with the train pipe when the brakes are applied. This is a very common defect. It is found to exist with outside hung brake beams, but it is not observed on cars with inside hung brakes. It is also observed that the train pipe hangers under the end sills are almost invariably bent outward instead of toward the center of the track, which is apparently contrary to what might be expected. The usual cause of this is that when brakes are applied, the live levers assume a somewhat more vertical position than when the brakes are on the release, bringing the top of the levers nearly or quite under either the train pipe, pipe hanger or the angle cock; then, owing to the lost motion at the two ends of the brake beam hangers, the beam is lifted perhaps one inch or more, causing the truck levers to come in contact with the underside of the train pipe, hanger, or angle cock, bending the train pipe and hanger. The lost motion in loop brake hangers on wood brake beams is increased by the hanger wearing into the brake beam. This can be remedied if a plate is placed between the hanger and beam. Train pipe should be so located that it will not be struck by truck lever when brakes are applied.

We find that repairmen frequently bend the train pipe bracket outwardly in order to apply front lug castings. Also, that the brackets are not put back into proper position when broken draft timbers and end sills are renewed.

Sheet "I" M. C. B. Recommended Practice recommends that center of train pipe be located 13 ins. from center line of car. When the American continuous draft rigging is used it is sometimes necessary to locate the train pipe 13½ ins. or 14 ins. from the center line of car, on account of the cross key. The rule as given, i. e. 13 ins. from the center line of car, should invariably be followed when possible to do so, even if slight changes have to be made in the plan of the car. We think it most desirable in designing of cars, that provision be made, when possible, to permit of proper location of the train pipe.

Among the train pipe defects incident to loose hangers are numerous leakages, resulting from the vibration of the pipe, which causes leaks in the union and pipe connections, also the shifting of the train pipe under the car. This throws violent strains on the triple valve, contributing to leakages of both the triple valve union and check valve case gaskets.

We also find that the angle cock in a large percentage of cases, is not located the proper distance back from the inside face of knuckle. This distance as shown on Sheet "I" M. C. B. Recommended Practice is 13 ins. This improper location is found to result from two causes. First: The improper location of the angle cock on the end of car when it is erected. Second: The shifting of the train pipe as a result of switching cars without parting hose by hand, or shocks from coming violently together. In these latter events, assuming that the pipes and angle cocks were originally located correctly, and from the fact that the loose hangers permitted the pipe to shift longitudinally, say 2 ins., the angle cock would be 15 ins. from the inside face of knuckle at one end of car, and at the other end 11 ins.

The question will now be asked, how are we to correct these conditions?

It is the practice on one or more roads to require inspectors at interchange points, to straighten all hose couplings so that the coupling will register without twisting the hose, and turn all vertical angle cocks into their proper position, and also to do such other work as may be consistent with the force at hand. This practice has not resulted in any material increase of force. In order that a better understanding may be had of the conditions of cars in service at the present time, the attached statement of condition of 100 cars taken in one of the Chicago terminal yards will be of interest. The percentage of cars found in defective condition and good order, is as follows:

Angle cocks, from center line of car: 33 per cent, 13 ins.; 58½ per cent, over 13 ins.; 8½ per cent, under 13 ins.

Angle cocks at the proper angle: 30½ per cent.

Vertical angle cocks, 39½ per cent.

Turned toward track 10 degrees or over, 12½ per cent.

Turned towards proper position to degree to 20 degrees, 17½ per cent.

Total out of position, 69½ per cent.

Distance from center of train pipe to center line of coupler: Correct position, 48 per cent.

Car No.	Initials	Location	Angle cock distance from center line of car	Angle cock vertical	Angle cock 30°	Angle cock turn'd toward rail	Angle cock 20° or less	Distance of center of train pipe from center line of coupler	Bent train pipe brackets	Position of hose coupling	Loose train pipe	Train pipe shifted
		a	15 in.		1			2½ in. high		O. K.	No	No
20795	B. A. T. Ry.	b	15 in.				1	2½ in. high		O. K.	No	No
		a	12 in.	1				O. K.		B. O.	No	No
61236	C. M. & St. P.	b	12 in.	1				O. K.		B. O.	No	No
		a	13 in.				1	1½ in. low		O. K.	No	No
14795	C. N. R.	b	14 in.	1				O. K.		O. K.	No	No
		a	13½ in.	1				O. K.		O. K.	No	No
25368	Mo. Pac.	b	14 in.	1				O. K.		O. K.	No	No
		a	13 in.				1	O. K.		B. O.	No	No
15592	C. St. P. M. & O.	b	12 in.	1				O. K.		B. O.	No	No
		a	12 in.			1		O. K.		O. K.	No	No
49542	C. & N. W.	b	12 in.			1		1 in. low		O. K.	No	No
		a	12 in.	1				1 in. high		B. O.	No	No
62820	C. & N. W.	b	13 in.	1				1 in. high		B. O.	No	No
		a	15 in.		1			4 in. low		B. O.	No	No
30007	P. R. R.	b	13 in.				1	1½ in. low		O. K.	No	No
		a	16½ in.		1			1 in. low		O. K.	No	No
240	C. & E. I.	b	15½ in.		1			2 in. low		B. O.	No	No
		a	15 in.	1				1 in. low		B. O.	No	No
9458	L. S. & M. S.	b	18 in.		1			1 in. low		B. O.	No	No
		a	13½ in.	1				O. K.		O. K.	No	No
69056	C. & N. W.	b	13 in.	1				O. K.		O. K.	No	No
		a	15 in.		1			2 in. low		B. O.	No	No
17891	A. T. & S. F.	b	15 in.		1			O. K.	1	O. K.	No	No
		a	15 in.	1				O. K.	1	O. K.	No	No
9982	C. & O.	b	13 in.		1			O. K.	1	O. K.	No	No
		a	14 in.	1				1 in. high		O. K.	No	No
16127	C. & A.	b	14½ in.		1			O. K.		B. O.	No	No
		a	13 in.		1			1 in. low		O. K.	Yes	Yes
20525	A. T. & S. F.	b	16 in.				1	O. K.		O. K.	Yes	Yes
		a	17 in.				1	1 in. low	1	O. K.	No	No
19927	A. T. & S. F.	b	13½ in.		1			2 in. low	1	B. O.	No	No
		a	14½ in.	1				3½ in. low	1	B. O.	No	No
9408	L. & N.	b	14 in.				1	3½ in. low		B. O.	No	No
		a	16 in.	1				1 in. low		B. O.	No	No
3698	M. StP. & S. S. M.	b	14 in.	1				O. K.		O. K.	No	No
		a	13 in.			1		O. K.		B. O.	No	No
10720	W. C.	b	18 in.	1				O. K.		O. K.	No	No
		a	15 in.	1				O. K.		B. O.	No	No
24002	I. C.	b	14 in.		1			O. K.		B. O.	No	No
		a	13 in.				1	2 in. low	1	O. K.	No	No
5928	B. & A.	b	12 in.		1			3 in. low		B. O.	No	No
		a	14 in.	1				1 in. high		B. O.	No	No
5913	C. L. S. & E.	b	17 in.		1			O. K.	1	B. O.	No	No
		a	13½ in.				1	O. K.		O. K.	No	No
25303	N. Y. C. & H.	b	15½ in.	1				2 in. low		O. K.	No	No
		a	13 in.	1				O. K.		B. O.	No	No
51790	C. M. & St. P.	b	13 in.	1				O. K.		B. O.	No	No
		a	13 in.				1	1 in. low		O. K.	Yes	Yes
63398	Empire Line	b	13 in.		1			O. K.		B. O.	Yes	Yes
		a	14 in.	1				1 in. low		O. K.	No	No
20717	C. B. & Q.	b	14 in.	1				1 in. low		O. K.	No	No
		a	15 in.	1				O. K.		O. K.	No	No
3060	S. W. S. C. L.	b	14½ in.	1				1 in. high		O. K.	No	No
		a	15 in.	1				1 in. high		B. O.	No	No

Car No.	Initials	Location	Angle cock distance from center line of car	Angle cock vertical	Angle cock 30°	Angle cock turn'd toward rail	Angle cock 20° or less	Distance of center of train pipe from center line of coupler	Bent train pipe brackets	Position of hose coupling	Loose train pipe	Train pipe shifted
407	S. W. S. C. L.	b	14½ in.	1				O. K.		B. O.	No	No
		a	14½ in.	1				1 in. high		O. K.	No	No
2066	S. W. S. C. L.	b	15 in.			1		1 in. high		B. O.	No	No
		a	16 in.	1				2 in. high		O. K.	Yes	Yes
2204	S. W. S. C. L.	b	17 in.			1		1 in. high		O. K.	Yes	Yes
		a	19 in.			1		3 in. high		B. O.	No	No
410	V. T. Co.	b	20 in.			1		3 in. high		B. O.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
01832	Ia. C.	b	13 in.		1			O. K.		O. K.	No	No
		a	14 in.	1				O. K.		O. K.	No	No
55421	C. R. I. & P.	b	13 in.		1			O. K.		B. O.	No	No
		a	15½ in.			1		2 in. low	1	B. O.	No	No
59946	N. Y. C. & H.	b	14 in.	1				2 in. low		B. O.	No	No
		a	13 in.	1				1½ in. low		O. K.	No	No
7330	C. & N. W.	b	13 in.			1		O. K.		O. K.	No	No
		a	12½ in.	1				O. K.		O. K.	No	No
50787	C. R. I. & P.	b	12½ in.			1		O. K.		B. O.	No	No
		a	12 in.	1				1½ in. low		O. K.	No	No
78294	P. R. R.	b	13 in.	1				1½ in. low		O. K.	No	No
		a	14½ in.				1	2 in. low	1	O. K.	No	No
72294	P. R. R.	b	15 in.			1		O. K.	1	B. O.	No	No
		a	17 in.		1			O. K.		O. K.	No	No
756	P. M.	b	14 in.			1		1 in. low		B. O.	No	No
		a	13½ in.				1	1 in. low		B. O.	No	No
6613	B. C. R. & N.	b	14 in.	1				1½ in. low	1	B. O.	No	No
		a	13 in.	1				2 in. low		O. K.	No	No
1146	P. Y. & A.	b	13 in.	1				2 in. low		O. K.	No	No
		a	13 in.	1				2 in. low		O. K.	Yes	Yes
79765	Anchor Line	b	13 in.	1				2 in. low		B. O.	Yes	Yes
		a	13 in.			1		1 in. low		O. K.	No	No
89855	L. V.	b	15 in.				1	2 in. low		B. O.	No	No
		a	13 in.			1		2 in. low	1	B. O.	No	No
5681	P. C. C. & St. L.	b	12 in.		1			2 in. low		O. K.	No	No
		a	13 in.	1				2 in. low		O. K.	No	No
10282	P. F. W. & C.	b	11 in.	1				O. K.		O. K.	No	No
		a	15 in.				1	2½ In low		O. K.	No	No
6381	W. N. Y. & P.	b	16 in.		1			2 in. low		O. K.	No	No
		a	13 in.	1				O. K.		O. K.	No	No
15119	P. F. W. & C.	b	13 in.	1				1½ in. low		B. O.	No	No
		a	12 in.	1				O. K.		O. K.	No	No
2806	E. J. & E.	b	14 in.				1	1 in. low		O. K.	No	No
		a	13 in.				1	1 in. low		O. K.	No	No
5086	T. St. L. & W.	b	13 in.	1				1 in. low		O. K.	No	No
		a	18 in.	1				2 in. low	1	O. K.	No	No
19246	L. S. & M. S.	b	13½ in.				1	2 in. low		O. K.	No	No
		a	14 in.			1		1 in. low		O. K.	No	No
26285	Southern	b	15 in.	1				O. K.		O. K.	No	No
		a	14 in.	1				1 in. low		B. O.	No	No
5738	L. E. & W.	b	15 in.	1				1 in. low		O. K.	No	No
		a	13½ in.	1				3 in. low		B. O.	No	No
34712	C. R. R. of N. J.	b	14½ in.	1				3 in. low		O. K.	No	No
		a	14 in.		1			2 in. low		B. O.	No	No
224	C. of Ga.	b	14 in.		1			2 in. low		B. O.	No	No
		a	13 in.				1	1 in. low		O. K.	No	No
23441	L. S. & M. S.	b	13 in.	1				O. K.		O. K.	No	No
		a	11 in.		1			O. K.		O. K.	No	No
45074	N. & W.	b	11 in.		1			O. K.		O. K.	No	No
		a	15½ in.				1	2 in. low		O. K.	No	No
21679	N. & W.	b	15 in.				1	1 in. low	1	O. K.	No	No
		a	13 in.	1				2 in. low	1	O. K.	No	No
344	N. Y. P. & N.	b	14 in.		1			O. K.		O. K.	No	No
		a	13½ in.			1		2 in. low		B. O.	No	No
59762	C. & N. W.	b	14 in.	1				1 in. low		B. O.	No	No
		a	15 in.		1			O. K.		O. K.	No	No
27789	C. B. & Q.	b	14 in.			1		1 in. low		O. K.	No	No
		a	13 in.				1	O. K.		O. K.	No	No
64186	C. M. & St. P.	b	13 in.				1	O. K.		O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
62543	Wabash	b	13 in.		1			O. K.		O. K.	No	No
		a	13 in.	1				O. K.		O. K.	No	No
44939	M. C.	b	13 in.				1	O. K.		O. K.	No	No
		a	16 in.	1				2 in. low	1	O. K.	No	No

Car No.	Initials	Location	Angle cock distance from center line of car	Angle cock vertical	Angle cock 30°	Angle cock turn'd toward rail	Angle cock 20° or less	Distance of center of train pipe from center line of coupler	Bent train pipe brackets	Position of hose coupling	Loose train pipe	Train pipe shifted
8213	N. R. T. Co.	b	13 in.				1	O. K.	1	O. K.	No	No
		a	14 in.	1				1 in. low		B. O.	Yes	Yes
13146	M. D. T. Co.	b	14 in.	1				2 in. low		O. K.	Yes	Yes
		a	13½ in.		1			1 in. low		O. K.	No	No
9384	M. D. T. Co.	b	14 in.		1			O. K.		O. K.	No	No
		a	16 in.	1				O. K.		B. O.	No	No
81519	B. & O.	b	16 in.	1				O. K.		O. K.	No	No
		a	15 in.				1	2 in. low		B. O.	No	No
4746	Big Four	b	15 in.	1				2 in. low		B. O.	No	No
		a	14 in.	1				3 in. low		O. K.	No	No
14646	T. & O. C.	b	14½ in.				1	2 in. low		O. K.	No	No
		a	15 in.	1				O. K.		O. K.	No	No
11026	H. V.	b	14½ in.	1				O. K.		B. O.	No	No
		a	13 in.	1				O. K.		B. O.	No	No
12618	M. C.	b	13 in.				1	O. K.		O. K.	No	No
		a	13 in.			1		O. K.		O. K.	No	No
91961	B. & O.	b	14 in.			1		O. K.		O. K.	No	No
		a	14½ in.		1			O. K.		O. K.	No	No
745	C. & E. I.	b	15 in.	1				1½ in. high		B. O.	No	No
		a	15 in.		1			O. K.		O. K.	No	No
684	C. & E. I.	b	15 in.	1				1 in. high	1	O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
89806	L. V.	b	13 in.		1			O. K.	1	O. K.	No	No
		a	17 in.		1			2 in. low	1	O. K.	No	No
18010	M. S. C.	b	15 in.		1			2 in. low	1	O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
89953	L. V.	b	13 in.		1			O. K.		O. K.	No	No
		a	15 in.		1			O. K.	1	O. K.	No	No
824	M. S. C.	b	13 in.		1			2 in. low		O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
46	A. L. S. T. Co.	b	15 in.		1			2 in. high	1	O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
379	A. L. S. T. Co.	b	13½ in.		1			O. K.		O. K.	No	No
		a	12 in.				1	O. K.		O. K.	No	No
40313	W. L. S. Ex.	b	15 in.	1				1 in. low	1	B. O.	No	No
		a	12 in.			1		O. K.		B. O.	No	No
10497	P. S. E.	b	13 in.	1				1 in. low		O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
3127	L. L. S. T. Co.	b	13 in.		1			O. K.		O. K.	No	No
		a	13 in.		1			O. K.		O. K.	Yes	Yes
3162	L. L. S. T. Co.	b	14 in.		1			1½ in. low	1	O. K.	Yes	Yes
		a	15 in.			1		O. K.		B. O.	No	No
80001	E. R. R.	b	17 in.		1			O. K.		O. K.	No	No
		a	14 in.	1				1½ in. low		B. O.	No	No
9140	G. T.	b	14½ in.	1				O. K.		O. K.	No	No
		a	13 in.	1				O. K.		O. K.	No	No
4290	C. H. & D.	b	13 in.			1		O. K.		O. K.	No	No
		a	14 in.		1			O. K.		O. K.	No	No
64718	Wabash	b	14 in.				1	O. K.		O. K.	No	No
		a	13 in.	1				O. K.		O. K.	No	No
20419	K. C. F. X.	b	13 in.				1	O. K.		O. K.	No	No
		a	18 in.		1			O. K.	1	O. K.	No	No
2797	E. & T. H.	b	15 in.		1			O. K.	1	O. K.	No	No
		a	15 in.	1				O. K.		O. K.	No	No
16158	W. S.	b	14 in.				1	O. K.		O. K.	No	No
		a	14 in.				1	2 in. low		B. O.	No	No
7485	G. T.	b	15 in.				1	2 in. low		O. K.	No	No
		a	13 in.		1			2 in. low		O. K.	No	No
15089	W. S.	b	15 in.			1		2 in. low	1	O. K.	No	No
		a	13½ in.		1			O. K.		O. K.	No	No
72731	E. R. R.	b	14 in.		1			1 in. low		O. K.	No	No
		a	13 in.		1			O. K.		O. K.	No	No
8653	A. R. L.	b	13 in.		1			O. K.		O. K.	No	No
		a	13½ in.		1			O. K.		O. K.	No	No
2110	S. R. L.	b	14 in.	1				O. K.		O. K.	No	No
		a	13 in.	1				3 in. low		O. K.	No	No
3044	P. C. Co.	b	13 in.				1	3 in. low		O. K.	No	No
		a	14 in.		1			O. K.		O. K.	No	No
19880	A. T. & S. F.	b	14 in.	1				O. K.		O. K.	No	No
		a	13 in.				1	1 in. low		O. K.	No	No
22048	D. L. & W.	b	13½ in.		1			1 in. low		O. K.	No	No
		a	13 in.			1		2 in. low		O. K.	No	No
355	C. & P.	b	13 in.			1		2 in. low		B. O.	No	No

Below center line of coupler, 43½ per cent.
Above center line of coupler, 8½ per cent.
Condition of pipe brackets:
Proper position, 85 per cent.
Bent outward, 15 per cent.
Condition of train pipe:
Proper position, 94 per cent.
Train pipe shifted, 6 per cent.

These cars were taken in regular order on the tracks with few exceptions. Cars which were examined at other times in much worse condition than those on attached report.

A large percentage of angle cocks are not located the proper distance from top of rail. The recommendation of the M. C. B. Association requires that the center of train pipe be located

34½ ins. from top of rail. This measurement, however, is to an extent deceptive, owing to the varying heights of the car body when loaded or empty, or other possible conditions, and the recommendations of this committee are that the center of train pipe be of same height as the center of coupler.

It is apparent that very little attention is being paid to the recommended practice of locating angle cock at a 30 degrees angle. This is a very important matter and should receive careful attention. Your committee feels that the injury done to air brake hose account of improper degree of angle cock has not been given proper consideration by the car owners. This, in connection with the improper location of angle cock from center line of car, is the cause of a large percentage of ruptured air hose.

We find that old air nipples are not properly smoothed up in most cases, before hose are applied. Where railroad companies allow their employes to take an old hose from nipple or hose coupling by using a hammer and chisel, it frequently leaves a burr, which if not properly smoothed down will cut itself into the lining of the hose. The improper hanging of an angle cock so that the hose is twisted in making the coupling, is liable to open such places as this in the tube; whereas, if the hose is hung at the proper angle, it will be sometime before this defect would be noticed.

In a great many instances the hose clamp is of improper length when placed in position on the hose. As a remedy for this we would suggest that hose clamps of proper dimensions be used on hose of a standard diameter when mounted on the nipple. Perhaps the most important and undesirable result attending the use of hose clamps under the conditions above cited, is the damage done to new hose. It is found that very frequently where clamps are used that are too short, they are clamped so tightly around the hose as to destroy the rubber cover, thereby exposing the duck to moisture, which very materially contributes to its disintegration. We also find that in the coupling if hose and attaching of clamp, many times the lip on the clamp will be bent up in such a manner that it abuts the lug on the opposite end of clamp. The men in charge of fitting up have been known to use a hammer and cold chisel driving this lip down into the hose, frequently into one or two ply of the material. This has a tendency to weaken the hose at this point and any undue strain would be apt to tear the hose off at nipple near the clamp. Would suggest, that in couplings and clamping of air brake hose, care be taken to place the couplings and nipples in the hose in such a manner that when the clamp is attached, the opening of the clamp will come away from the lap of the cover. This would prevent the lap from opening when the coupling and nipple are inserted in the hose, providing the material has been properly manufactured. We find many instances where the hose clamp is applied, that the projection on the sleeve of the nipple is between the hose clamp and the hexagon portion of the nipple; thus losing all of the advantages to be derived from having a raised portion on the nipple sleeve.

The proper location of the clamp is in all cases, between the raised portion on the nipple and the hexagon portion of it. This same rule is equally applicable in applying clamps to the opposite or hose coupling end of the hose.

In the use of clamps it might be suggesttd that care should be exercised to see that clamps are not of such light structure or soft material as to be susceptible to stretching when applied to hose. W find that a large percentage of hose applied to cars have the hose couplings distorted, and they will not couple without twisting the hose. There is no possible excuse to be offered for this state of affairs. It is simply a question of turning the nipple in the angle cock until the hose coupling assumes its proper position. It has been proven by test that a hose which is twisted by improper location of hose couplings will burst much quicker than one which has been properly coupled. This abuse can be readily observed by watching the hose on air brake cars in service on trains. It frequently occurs that a new hose is applied to one car and there is an old hose on the other car to which it is coupled. In this case, the strain all comes in the weakest place in the old hose.

It is quite a common practice in terminal yards to switch cars without uncoupling hose by hand. It is not necessary to call the attention of the members of this club to the fact that this is one of he most destructive practices with which we have to contend. The hose are strained at the nipple when this is done; it will show evil effects the first or second time it is strained in this manner. No air hose are manufactured that will stand this treatment, and it should always be borne in mind that with reasonably fair usage a hose will perform the work intended, of conveying air to the different parts of the air brake

system. The failing to uncouple hose couplings by hand results in stretching the fibre of the hose, cutting hose at the nipple end, further disrupting hose if it has previously been cut by the hose clamp being put on too tight, and also has an unwinding tendency, particularly if the hose has not been applied to car with the face of hose couplings in the proper position. This is almost sure to result in hose being badly injured or torn off the nipple or hose coupling, providing the lips on the couplings have been bent out of their normal position in an attempt to correct leakage between hose coupling gaskets. It also would enlarge or open any embrasions of the tube made from improper coupling at the nipple and coupling end where air machines are used for this purpose. The hose at this time may receive internal injury which cannot be observed by the inspector, causing a liability of burst air hose in trains. The strain is so great when cars are switched without parting hose by hand, that when they let go, hose fly back with great force, striking the brake beams or other parts of the car, causing the hose and coupling heads to be more or less damaged. A large percentage of hose removed on account of bursting, have a gcod outside appearance, and the inspector would not be warranted in removing them before bursting. Among those not having such appearance may be mentioned hose recently found where, in an endeavor to remove the dates of application, the knife had cut entirely through the outside rubber cover, exposing the duck. The object of the manufacturer in making raised figures and letters when branding the hose, is to make provision for their obliteration without cutting sufficiently deep to in any way damage the hose.

It is found that by giving all of the air hose attachments careful attention that there is an increase in the number of defective air hose removed. Your committee do not think it necessary at this time to outline any method of inspection of air hose. The efficiency of the inspection is governed by conditions at interchange points. We believe that if air hose are given the same inspection as that given to car wheels, there will be a marked decrease in the number of burst air hose, as there is no doubt but what a great many hose are allowed to remain on cars which should be removed.

There are some roads who consider it good practice to splice hose. When this is done, we would recommend that they be spliced in the center. Our attention has been called to hose which have a short splice at nipple end. A splice of this kind is not desirable at this point, account of the liability of excessive bending strains. Your committee also recommends that no hose be used for splicing which is over 18 months old.

While the use of dummy couplings has been discarded by some railroads as an objectionable adjunct to air hose, careful inquiry and observation has satisfied this committee that the present standard dummy when properly located, does not contribute to kinking, or other injury to the hose; but rather, protects it when not in use.

The attention of the different members of the committee has been called at divers times, to various devices intended as a substitute for dummy couplings; but so far as our knowledge extends, none of them have proved effective when exhaustively tested under the many varying conditions of weather, etc., but to the contrary, have contained elements of danger.

Your committee also desires to call attention to the practice of using hose coupling packing rings which are purchased from other than the manufacturer of air brake apparatus. Care should be taken to see that they are of proper dimensions, as cases have been known where packing rings were furnished to railroads which were not of proper dimensions. We deem it of great importance at this time to go on record as opposed to trimming or cutting off to a taper, the top or bottom side of the coupling packing ring, which is done at times in order to make the ring enter the groove, in order that the coupling packing ring may be inserted without being mutilated. By such practice little trouble will be realized in introducing rings into the groove, providing the former are of proper and standard dimensions.

While the subject matter of this report has referred solely to the air equipment of cars, it is also equally applicable to locomotive tenders. Your committee hope the suggestions contained in their report will have some effect in correcting the abuses cited.

In closing this report, your committee desires to call attention to the fact that the introduction of heavy power has brought about a condition where it is absolutely necessary to know that the air hose and its connections are in both proper position and condition. The 22-ins. hose now in common use will perform its part of the work if it is not subjected to the abuses above enumerated, and the distance between the angle cocks is not too great. Your committee believes that if careful attention is given to this matter, the results obtained will be most desirable.

Edward Parish, Chairman; A. J. Kidder, C. M. Mileham, Hugh Marsh, H. La Rue, G. S. Wood.

Pres. Grieb: The report of the committee is now before the meeting for discussion, and I take occasion to say that I think this report is by far the best that has ever been presented to this association. There is a wealth of thought and research denoted by the facts and conditions brought forth on a subject which we all realize is of most vital importance; one upon which railroads have lavished a large amount of money and from which to-day they do not derive the full benefit simply because it is not kept in proper condition and repair. The Association certainly owes Mr. Parish and his committee thanks for their efforts. I think it augurs well to open the new year with such a valuable acquiisition in the shape of a report. The members will please feel no reticence in expressing their viws on the subject.

Mr. Kidder (W. A. B. Co.): I would suggest that Mr. Parish take some of those samples and explain their defects before the members. I think we will possibly get better results in doing it that way than if we all tried to get around the desk. He has very significant samples of mutilated hose and I think he can call attention to the individual examples and the members will get more benefit from it than if they went up there to look at them.

In regard to what has just been said about the committees report, I want to add just a word, and that is that the commitee, of which Mr. Parish is chairman, all took off their coats and went to work. The great trouble has usually been, when I have been assigned to a committee, particularly as chairman of it, that I did nearly or quite all the work myself and simply added the names of the other members to the committee report, but I know, from personal knowledge, that every member of the committee connected with Mr. Parish took right hold and worked hard to get all the views and facts to be obtained in regard to air hose, and so far as I was individually concerned, I felt and I think they all felt the same as I did, that we had a subject to work on that had never been developed. We have frequently read statements made by members of the Master Car Builders' Association and others about bursted hose and emergency action and all that, but so far as my knowledge extends no committee or individual has prior to this time made a careful study of the causes contributing to hose rupture. We have satisfied ourselves, as members of the committee, that in a great many cases it is improper workmanship to begin with, because we found new hose mutilated in putting the parts together.

Pres. Grieb: The chair will be pleased to have Mr. Parish take up the samples individually and explain their special features. As to what the representative of the Westinghouse Company has said about the work of this committee I think those who have had the pleasure of listening to it have found in its thoroughness and fullness the best evidence of hard and assiduous work.

Mr. Parish (L. S. & M. S.): In No. 1 I have a specimen which you will probably all recognize. This was the result of switching cars without uncoupling hose by hand. This is a new hose, and the attempt was evidently made to use it for an M. C. B. coupler.

No. 2: Damaged by removal of truck when run from under car when on repair track. Also end of hose showing short splice.

No. 3: Nipple punctured through lining. This would be classed as a leaky hose.

No. 4: Clamp at the nipple end set over bead of nipple showing clamp has no way of performing work intended for it.

No. 5: Coupling head showing packing ring made too large. which has buckled in trying to get it into its proper shape. It would be impossible to make a good coupling with this gasket.

No. 6: In one part of our report we referred to the fact that we have found that a hose would burst much quicker when twisted than when in its natural position. This hose was removed from a car and put into the testing machine and given 100 lb. pressure without showing any indications of bursting. It was then twisted ¼ turn and hose burst at the same pressure. We bring up this point for this reason. When the hose are coupled between the cars and the coupling heads do not register properly, it is necessary to twist the hose to make the coupling. In doing so we put an undue strain on the weakest point of the hose. I have noticed recently on 75 car trains, that we are having more burst air hose than we had before our trains were so large. In order to find the cause of this condition, I watched some of our heavy trains in service and noticed that when the engines started, that every bit of slack in the train was taken up. If the hose were twisted and the angle cocks in wrong position, the result will be that the hose is not long enough to couple properly between the two angle cocks without danger of rupturing the hose. These conditions, I understand, are still worse in cold weather, due to the fact that a hose if frozen is very stiff and to some extent is shortened.

No. 7: Shows method of winding of canvas on air brake hose. The piece of hose shown here is classed as "Green" hose, not being vulcanized.

Nos. 8 and 9: Short piece of hose cut from old hose to be used for splice. It will be noticed that the other end of the spliced hose shows a better grade and is still in good condition.

No. 10: Showing the hose burst at nipple end, either through the application of the coupling, or from a blow. Either would show same defect.

No. 11: Torn while switching. We would refer to No. 1 as other condition from failure to uncouple by hand when switching.

No. 12: Inside lining burst. This hose shows no defect on the outside cover; hose, however, will leak air, putting it through the soapsuds test.

Nos. 13 and 14: Improper mode of clamping, showing where clamps have cut through the covering and into 1 and 2 ply of the duck. A hose damaged in this manner is very soon weakened, on account of the water damaging the duck.

Nos. 15 and 16: Show improper mode of inserting the nipple and couplings which have cut entirely through the lining of the hose and into the duck, thus rendering the hose unfit for service.

In connection with this subject I think it will be of interest to the Association to read an extract from the report of the committee on specifications for air brake hose, read before the last Master Car Builders' Convention:

"Question No. 9: Do you have burst air hose in trains? If so, to what extent and to what cause is same most attributed? Question No. 10: What percentage of all hose removed from service are removed on account of defects due to unfair usage? Fourteen replies were received to question No. 9. Nine stated 'Due to age and quality'; three stated 'Due to hose being defective near the nipple'; two stated 'Due to poor quality of rubber:"

Replies to question No. 10. Nine replied as follows:

One road	½ of 1 per cent.
One road	56½ per cent.
Two roads	90 per cent.
One road	40 per cent.
One road	50 per cent.
One road	2 per cent.
One road	10 per cent.
One road	23 per cent.

Referring to these replies, committee made the following report: "It will be noted from the replies received from a number of the roads, that a very large percentage of hose is removed on account of unfair usage, and while the committee was not furnished data to show on what point on the hose the failures occurred, we have had access to records which have been carefully kept for the past two or three years which show that fully 80 per cent. of all hose renewed has failed through chafing or cutting of the inner tube at the end of the nipple or coupling. Very few roads throughout the country have any device in use, or have made any provision to overcome this chafing action on the inner tube of the hose, and in view of the committee's findings in this respect, we would recommend that some suitable device be used to prevent the injury to the inner tube at the coupling and nipple end."

I had the pleasure of talking with one of the committee relative to this report, and he assured me that the records to which they had access had been carefully kept for two or three years, and that the number of failures was fully 80 per cent. I would like to have our friend, Mr. Wood, explain to the association the manufacture of an air hose. He has some very good specimens.

Mr. Wood (W. H. Salisbury & Co.): In the manufacture of air brake hose the manufacturer first rolls the rubber for his tube. It is then folded over a mandrel and joined together so as to make the hose smooth on the inside without showing a seam. The duck is first frictioned,—frictioned means driving the rubber into the duck, so as to make it adhere well to the tube and cover. It is then wound around the tube which is on the mandrel, smoothed down,—wrinkles all rolled out. The cover is then put on and rolled until it is perfectly smooth, the lap of the cover joined thoroughly, careful attention being given to see that no sulphur or other foreign matter in any way gets into the rubber. It is then cut to lengths. If for short air brake hose it is cut to whatever length is desired. If the ends are to be enlarged the ends are upset by a ferrule inserted in under the ends, thus enlarging the ends a trifle above the body of the hose. If in 50 ft. lengths the process would be the same, with the exception of enlarging the ends. The hose then is wrapped carefully in muslin, covered thoroughly with sulphur, then placed in a vulcanizer and vulcanized, or what we are led to believe is ordinarily called curing. This is done by steam and heat. The brands, the A and R dating and the name plates are all put on while the hose is green. The ends are capped with rubber while the hose is still green, thus finishing the hose complete before being vulcanized. For your information we submit herewith a piece of green air brake hose. When vulcanized the red part of the hose will turn black and the black part will turn a bluish color.

This gives a little idea of the general construction of a piece of air brake hose. The duck is wound on the hose what we call spirally,—that is, it is put in in such a way that it brings it in a spiral winding, thus making a hose that is claimed to be the best for the service intended.

Speaking of the subject of gaskets, or what are called packing rings for air brake couplings, unless great care is shown in the manufacture of this class of material, manufacturers are apt to get these gaskets or packing rings too large, which necessitates the car repairers cutting them down to fit the coupling, as you will note has been done with this sample which I have. The Westinghouse Air Brake Co., at a great deal of expense, got out a gasket intended to fit the coupling head, and unless that gasket is made as true as a hair you cannot get it in. Instances have been known where railroad companies would even cut the regular Westinghouse gaskets rather than clean out the little recess in the couplings with the proper tools; also many have found trouble in the manufacture of air brake gaskets on account of not having the proper gaskets of templates sent them to manufacture these by. If the Westinghouse Air Brake Co. would furnish template for packing ring and clamp, also with the instructions as to the proper grade of material to be used in packing rings, better results would be had by the railroad companies and better material would be furnished them, as we know that many cheap grades of gaskets are sold on the market. You will note by the piece of hose that is being passed around this evening how the packing ring will buckle where it is not made of the proper dimensions and the recess in the coupling not properly cleaned out.

Mr. Kidder: I would like to emphasize everything that has been said in that report. In a very large majority of cases, the result of somebody's neglect, or carelessness in the assembling of the parts of the hose, or their application to the car, permitting the train pipe to get loose, or lack of care and improper location of the air brake apparatus under a car, is what contributes very largely to the trouble experienced. I would like to say that the numerous loose train pipes we found indicated a great degree of inattention. On a lot of cars we looked over one day we found the pipe clamps loose and on some of them the lag screws were gone. That of course contributed to a good deal of trouble with the triple valve. It is not unusual to hear complaints of the check valve case gasket and union nut leaking. I attribute it almost solely to the loose shifting train pipe. With a train pipe extending through a car and a branch pipe at right angles to it several feet in length, rigidly attached to it, and the triple valve, if the train pipe shifts the check valve case is subjected to an excessive twisting strain which must be met by the cap screws and this strain is responsible for many of the leakages at the union nut and check valve case gasket. Another point already pointed out is the importance of locating the angle cock and train pipe in the proper position on the end of the car. I presume to say that you can go into any railroad yard or into any round house and find those pipes, instead of being located 13 ins. from the center line of car, anywhere from 16 to 23 ins., because I have in my own experience in visiting round houses seen cases where the pipes were located these distances from the center line of the tender and they had a short hose 8 or 10 ins. long with hose couplings at either end so as to make provision for the hose connection, and in these same instances there was nothing in the world to prevent locating the train pipe in the proper position. The locating of the angle clock 34½ ins. from the rail, is all right, but I believe the suggestion of the committee to locate it at the center of the draw bar better, because we all know there is quite a variation in the height of the car under different conditions and if we take the center of the draw bar as the proper location for the train pipe we are always going to get it right, regardless of whether the car is high or low. I would like to hear some of the members of the association here tell us what they do not like about the report or wherein it can be improved, as we probably have not fully covered the subject. We endeavored to do so but no doubt some of the members here have run across things that we have overlooked and they can reinforce the report if they bring them up, thus adding to its value.

Mr. Opie (C., M. & St. P.): This is a matter, I think, that is worthy of a great deal of thought and attention on our part. While the matter has been thoroughly reviewed here, this gentleman said about 80 per cent of the cases was poor construction and rough usage. In this last day or two I have made this matter which we have under discussion, a subject for close study and observation, and the question arises as to what the cost would be for separating the hose by hand in switching. It has become a question to me as to whether the cost would be very serious. Taking, for instance, one thing I saw a few days ago. There was a train of 60 cars coming into the yard and the switching crew was on hand with their engine standing around waiting for the inspectors to get through with the train, it being a through train that would be re-distributed at that point. Now the switching had all been arranged. Some 16 or 18 cuts were to be made in the train. The question was raised as to whether it would not cost something or be an additional expense to separate the hose by hand in switching in yards. Now in this case the whole switching crew stood idle while the yard master had designated every point that the train would be cut before the cars were inspected. It seems to me there was time enough there for the hose to be cut. There would be one case in which there would not be any expense in cutting the hose. I believe, from my own observation, I can safely say a good deal of damage and breaking of the inside lining of the hose is due very materially to the neglect to uncouple the hose by hand. I have not only found it so in cars, but frequently find it on tenders, where it is reported when the brakeman fails to observe the order.

Pres. Grieb: Gentlemen, I hope you will all assist the chair and come forward unsolicited with any remarks you may desire to make. Unfortunately I have not the personal acquaintance of a very large number of the gentlemen present, and do not know who has made this subject one of special consideration and study, so do not have any hesitation to volunteer and avoid the necessity of my calling on you.

Mr. Hunt (P. Co.): I think the report very full and complete. Mr. Kidder says he would like to hear somebody say something about the bad points about it, but I have not discovered bad points in the report. There is one thing that occurs to me that is very important, which is the injuring of the inner tube when applying the nipple or hose coupling. Now, as stated in the report, it very frequently occurs that these nipples are cut with a cold chisel in getting off the old hose, and I think in many cases there is no more attention paid to that cut. It certainly raises a burr or edge that is bound to do some damage when that coupling is again replaced on a new hose. It occurred to me that it would be a good thing, in applying hose, to first go over the old couplings and nipples and see that there is nothing on them that would injure the hose. Now I do not suppose there is very much attention at the present time paid to that. This stock is purchased and examined to some extent and perhaps in that particular, not very much, and they are put on the hose. There may be rough places on the new castings and I think that a close inspection of those parts would be very beneficial indeed, especially with old ones. Many of them will have these cuts from the tools used to cut them and in that condition will cut the hose and produce defects that will cause bursted hose, no doubt.

Mr. Sharp (A. C. L.): I would like to emphasize what was said in the beginning by the chair and others, in the way of commending the work of this committee. It happened to be my pleasure to meet with the committee on one occasion and see them pass through the Stock Yards and other places hunting for this information. When I went away from their meeting over in Mr. Parish's office I came to the conclusion there were a great many of us in the same position as the members of the committee of the Master Car Builders' Association, as is manifested in the report Mr. Parish has read here tonight. I resolved on the way home that I would find out the cause of certain defects in the air hose, and in order to do that I took our shop foreman and started through the shop, inspecting the hose on the cars as they were on the repair track. We first went over the repair track where the repairs had not been made, and the conditions were about as shown and explained in the committee's report. We then went to a repair track where the work had been completed and the cars ready to switch out. We discovered on the hose on that track a defect about 2 ins. below the end of the nipple. The indications were that the hose had been struck and skinned down. We found this danger was done by running the trucks in under the car. The truck bolster will strike the hose two or three inches below the nipple. It has been said by good authority on air brake hose such as our worthy friend, Mr. Rhodes, and others, that hose should not be fitted up with an air machine. We practice that. We have our hose fitted up with an air machine. We remove the couplings first with an air machine, so there is no cutting off or breaking of the coupling or putting a burr on it to damage the hose or bruise it. By pressing the couplings into the hose rubber to a gauge there can be no bad effects. We have made considerable investigation and fail to find where the hose had failed, indicating that it was caused by any improper fitting on the machine, and it is found to be economy, and I for one would advocate the continuance of fitting up air brake hose with the machine.

Mr. Bates (C., B. & Q.): From my observation I believe that a good many of the burst hose are due to the causes set forth by the committee. The angle cocks are not properly placed on the cars, and many train pipes are not fastened securely enough to prevent them from shifting, which shortens the hose at one end. There are also a good many hose which are not turned so that they will couple without twisting and when these cars are parted, if the switchmen do not uncouple the hose by hand the hose is frequently pulled in two. I remember a few years ago on our line there were very strict orders issued to the switchmen and trainmen to part the hose by hand, but now that is practically a dead letter. You may go through the yard but you cannot see anybody following the instructions, and I think probably this will stir the thing up a little. Of course the switchmen usually object, saying that it takes time to do this, but I do not think it takes very much extra time, as they stand around a good bit when they might just as well be parting hose.

Mr. Opie: I would like to ask the committee their opinion, if the angle cock was applied at the proper angle and the train pipe located properly on the car without uncoupling, would there be great danger of rupturing the inside lining of the hose, if the cars were parted without the hose being uncoupled by hand?

Mr. Parish: I would say there would be a great deal of danger of damaging the inner tube.

Mr. Sharp: If it is proper, I would like to have the chair ask the question, Is it the practice in any railroad yards in Chicago to uncouple the hose by hand. The reason I ask that question is that previous speakers have made the point that the hose are damaged to a large extent as a result of not being uncoupled by hand before switching. If this is a fact with which we all agree, would it not be economy to go to that extra expense and uncouple the hose by hand, which is a very small matter compared with the cost of air brake hose that are bursted.

Pres. Grieb: We will endeavor to procure the information for reply to Mr. Sharp's inquiry, beginning with the first row. Will each representative give the practice on his road, stating whether in switching cars they cut the air hose at the same time that the cars are parted or allow the hose to do it of itself.

Mr. Callahan (C. L. S. & E.): On our line the common practice is to pull them apart.

Mr. Ball (C. I. & L.): That is the same practice on our road.

Mr. Krump (Wab.): They uncouple the hose by hand on our line when they have lots of time. When they do not have time they pull them apart.

A Member (C. R. I. & P.): They uncouple the hose by hand.

Mr. Parish (L. S. & M. S.): The practice on our road today is to uncouple the hose by hand. In other words, when we commenced to stir up this matter I conferred with our division superintendent and told him that the order in our air brake book of rules in regard to parting hose by hand, was practically a dead letter. He said he would look into the matter and see that the practice of pulling the hose apart was stopped, and I am glad to say it is practically stopped.

Mr. Hunt (P. Co.): The instructions are, on our road, that the hose be parted by hand, but I am afraid they are not always parted that way.

Mr. Husband (Belt Ry.): The hose are pulled apart on our road.

Mr. Kramer (P. Co.): On our line the inspectors on the trains coming in off the road cut the hose by hand, that is when they have time enough to do it, and in case the train gets switched before the inspector gets around, the trainmen do not cut any hose.

A Member (C. & E.): On the C. & E. the car inspectors cut all the hose, if they get through before the switchmen start to switch the train.

Mr. Evans (B. & O.): I think on the B. & O. they are mostly pulled apart. I will say this, that some time ago we had a rule that the car inspectors was to cut the hose, particularly on the fast freight trains, thereby facilitating the switching of same, but that is being done away with, as it was decided that that was the work of the switchmen. I would like to ask if Mr. Parish's car inspectors cut the hose.

Mr. Parish: No, sir, they do not. The switching crew cuts the hose.

Mr. Evans: It is my opinion, Mr. President, that the matter of separating the hose by hand is really the business of the switchmen, because the car inspectors know nothing about the cuts to be made or how the cars are to be switched.

Mr. Morris (C. M. & St. P.): The switchmen have orders to cut the hose on our line, but the orders are not always obeyed. There are very few hose cut by hand.

Mr. Hunt: Would it not be well to ask the sense of the meeting whether it is or is not, or should be or should not be the duty of the switchmen to cut the hose, and if it is the duty of the switchmen to cut the hose, why? That is, why it should be the switchmen's duty?

Mr. Opie: In regard to the gentleman's remarks, I will just simply add a word. In regard to the inspectors cutting the hose, it seems to me that their time in all yards, or wherever I have gone, is very valuable, more valuable than the man who is being paid for standing by and looking at them. That would be one of the chief reasons as to why the car inspectors should not be expected to cut the hose. In the second place the inspectors do not know where the cars are to be cut. It is frequently the case in the yard that cars are switched, eight or ten or more are thrown out of the train in one lot. If the car inspector has to cut the hose I cannot see but what he would have to cut every car. If the men who are handling the cars, whose duty it seems to me is to cut the cars, the trainmen and switchmen, it seems to me we would have more benefit of the labor of the car inspector, which is always needed, against the man who is standing looking at him.

Mr. Kroff: I think myself it would be the duty of the switchmen and trainmen to cut the hose, for if they do not make a ruling of that kind we will have to send inspectors out with the locals to cut air hose.

Mr. Parish: I move you that it is the sense of this meeting that it is the duty of the switchmen and trainmen to cut the air hose.

Mr. Evans: It is very evident that there are not many switchmen here tonight. I think that this matter would really bear a little more discussion on several points of view. Personally I think that it would be to the advantage of the railroad companies if the matter of separating the hose was left to the car inspector, for this reason. The car inspector, from my point of view, is usually a more reliable person and is more interested in the money value and cost of the air hose and would naturally take a greater interest in observing whether the air hose was being damaged or not, but as a matter of fact when it comes to laying the responsibility for separating the air hose on the car inspector, just as the gentleman has said, nine times out of ten the entire train crew, which sometimes consists of eight or ten men following an engine, will be waiting for one car inspector to go over the train and make the cuts for them. I merely state the matter from the fact that the ordinary trainman takes very little interest in the points which Mr. Parish has brought out this evening. Possibly if we were in a convention of switchmen and Mr. Parish would present his report they would take a different view. However, I am in favor of the motion that it is the province of the switchman to cut the hose.

Mr. Sharp: I would like to offer an amendment to the motion that it is the sense of this meeting that all air hose should be parted by hand before the cars are switched. There seems to be a difference of opinion here as to whether this is practicable or not, in view of the testimony we have had, there is a very small per cent of the members able to report what they do at the present time about parting the hose.

Pres. Grieb: The original motion has been amended by Mr.

Sharp to make it obligatory upon the switchmen to part the hose by hand. Motion seconded and carried.

Mr. Evans: I would like to ask Mr. Woods if the separation of the air hose as indicated in the spiral form, could be taken as primary evidence that the hose was bursted; or, placing it another way, if the hose was separated square across could that be taken as positive evidence that the hose had been cut with a knife? What I mean to get at is whether a hose bursted from the inside out will partake of the spiral fracture.

Mr. Woods: A hose that is cut through with a knife will show a clean cut. It will be a very smooth cut. A hose that is bursted will show a ragged edge. I never saw a hose that was burst, with a perfect smooth cut clean through. It must be a ragged edge.

Mr. Evans: What I want to get at is whether the hose will always burst in the spiral form from the pressure inside out.

Mr. Woods: It is liable to burst any way. It comes from weakness in the duck and will burst out the weakest point.

Mr. Parish: My attention was recently called to a letter written to one of the air brake manufacturers by a railway company, asking if they would include in their specifications for air hose, one strong enough to pull a car. There is one other point to which I desire to call your attention in closing, which is very important. It has been brought to the attention of this committee that in one case a railroad was purchasing a cheap grade of hose for application to foreign cars and a better grade of hose for application to its own cars. This is a dangerous practice and such work cannot be too severely condemned. Another question that has been brought up, and brought to my attention several times, is this, that if we should ask our neighbors if they had any burst air hose on trains, without going into the matter thoroughly, they would say that they had no trouble. On the road with which I am connected we handle at times about 80 per cent foreign cars and we have hose burst on trains and we find about the same percentage burst on L. S. & M. S. and foreign cars; therefore, it is reasonable to suppose that we are not the only ones that have burst hose on our trains. I also found, by taking the matter up with the transportation department, that a very small percentage of burst hose are reported to the division superintendent or despatcher. We found that the train crews reported only such cases as caused delay to trains. It might be interesting to know that commencing with the date of the records which I have been keeping it is found that in the last forty days we have had 23 cars of burst hose that caused more or less damage. I have received in my office, 127 hose which have been ruptured, taken off by trainmen, inspectors, and in the repair yards. This would indicate that if we should ask our neighbors if they had trouble on their road we would probably find that the trainmen report only such cases to the superintendent that cause delay. As a matter of fact, there is a large per cent of the burst hose which do not cause delay to trains. I hope this report will be the means of all of us looking a little deeper in the matter, because I know very well we have not covered the ground, and everyone can add something to this report if it should be brought up in our next meeting.

Mr. Opie: I would move that this discussion be carried over to our next meeting.

Pres. Grieb: In connection with that I would say by the kindness of Mr. Sharp, who has offered to take photographs of the various hose which have been exhibited here, we hope to be able to have them reproduced in the Railway Master Mechanic. While there is a large attendance here this evening, it represents but 20 per cent of our membership. Not only the members who are discussing it are interested, but everyone connected with railroads, and, while it would seem that the committee had exhausted the subject, there are undoubtedly some persons who after further reflection will have something to add. This leads me to suggest the advisability of considering the proposition of having reports of such importance as presented by the committee on defective air hose this evening, printed and distributed among the mumbers in advance so we can all come to the meetings better prepared and a little more willing to take part in the discussion. If this be done it would certainly make the discussions more interesting, and would also relieve the chair in some measure, of the embarrassment he feels in calling upon you

Mr. Sharp: Before you put that motion, with all due respect to the committee and recognizing that a great deal more can be said along this line, yet I hardly think it proper to carry this discussion over. I know that this committee has put in several days in getting up this report, and if we continue this subject we are continuing this committee, and while they are no doubt willing to serve the association, yet I hardly think that they would appreciate being kept at work any longer, and I would rather suggest that later on we take up the other parts of the air brake. We have only taken up the air hose tonight. There are other parts of the air brake that are just as important.

Mr. Powell: In view of the remarks made by Mr. Sharp I would suggest that the motion be withdrawn and another motion made instead.

Mr. Opie: Under the conditions stated by Mr. Sharp I would withdraw my motion in favor of that made by Mr. Sharp.

Mr. Powell: I would make the motion that the report of the committee be accepted and the committee discharged. Seconded and carried.

Meeting adjourned.

In accordance with Section 3 of Article IV, which provides that the Board of Directors shall consist of one member from each railroad company and private car line represented in membership, the President has appointed the following for the current fiscal year: W. E. Sharp, Armour Car Lines; F. R. Northam, A. A. P. Co.; J. R. Cardwell, A. C. O. Tank Line; F. B. Reinhard, A. T. & S. F. Ry.; E. Graessle, Arms Palace H. C. Co.; J. R. Huff, Am. Ref. Trans. Co.; W. H. Evans, Balt. & Ohio R. R.; P. H. Peck, Belt Ry.; Chas. Shearman, Burton Stock Car Co.; F. H. Stoimker, B. & M. R. R. R.; T. R. Morris, C. M. & St. P. Ry.; G. M. Bates, C. B. & Q. R. R.; J. Buker; Con. Cattle Car Co.; M. Mercatoris, C. & E. Ry.; C. Deen, C. J. Ry.; Geo. T. Phelps, C. & A. R. R.; R. Wharton, C. & N. W. Ry.; H. La Rue, C. R. I. & P. Ry.; J. F. Callahan, C. L. S. & E. Ry.; J. B. Julian, C. T. T. Ry.; John Peters, C. & G. T. Ry.; Jas. Prickett, C. & E. I. Ry.; Hugh Marsh, C. N. Y. & B. Ref. Co.; J. H. Ball, C. I. & L. Ry.; W. H. Emerich, Com. Desp. Line; L. T. Canfield, D. L. & W. Ry.; H. Bitters, D. S. S. & A. Ry.; J. H. Orchard, D. & H. Co.; J. Horrigan, E. J. & E. Ry.; Wm. Miller, E. & W. V. Ry.; C. C. Cather, Ill. Central R. R.; J. H. Kennedy, Ill. Northern R. R.; Le Grand Parish, L. S. & M. S. Ry.; W. T. Willets, Lipton Ref. Line; W. F. Fries, Live Poultry Trans. Co.; C. Schoeneberg, Libby, McNeill & Libby; H. McCrudden, M. C. Ry.; W. B. Hall, Mather S. C. Co.; Wm. O'Herin, M. K. & T. Ry.; R. S. Miller, N. Y. C. & St. L. Ry.; J. B. Watson, Nelson Morris & Co.; F. W. Brazier, N. Y. C. & H. R. R. R.; Geo. K. Edwards, N. Y. O. & W. Ry.; Ralph Earle, Prov. Dealers Desp.; T. B. Hunt, Penna. Co.; W. E. Symons, Plant System; O. M. Stimson, Swift & Co.; C. M. Mileham, Streets W. S. C. Line; M. Shaw, S. F. & S. J. V. R. R.; Chas. Shoemaker, Standard Oil Co.; John Elkin, Shippers Ref. Car Co.; A. M. Collett, U. P. Ry.; J. Hirlehay, Wabash R. R.; H. H. Manthey, W. C. Ry.

Pres. Grieb has appointed the following as members of the Committee on Subjects: G. M. Bates, Chairman; W. H. Evans, C. C. Cather, H. La Rue, T. R. Morris, O. M. Stimson. Also the following as members of the Committee on Introductions and Welcome: J. R. Cardwell, Chairman; F. C. Schultz, H. V. Kuhlman.

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Vol. XXV. CHICAGO, DECEMBER, 1901. No. 12.

THE past year has seen many changes in the railway world and most of them are seemingly for the better. The year of 1901 has seen vast improvements in railway rolling stock, and in track and maintenance of way, an unusual number of cars and locomotives have been ordered, miles of new track constructed and old road beds bettered. New bridges, new stations and new shops, all have created an enormous demand for railway supplies of every description. With a promise of an even larger demand for the coming year, it seemed that a statement from some of the leading railway supply companies as to the year that is ending might be of interest to our readers. We publish in another part of this issue, under the heading "The Year 1901," something regarding the past year as seen from a manufacturer's standpoint.

THE members of the Western Railway Club were particularly fortunate in the papers provided for the November meeting. All dealt with subjects of the first importance to railway companies and the interesting discussions aroused showed very plainly the appreciation of the members in attendance.

THE papers of Mr. E. M. Herr, on Problems Arising from Rapid Increase in Air Brake Equipment, and Mr. T. W. Demarest on the Maintenance of Air Brake Equipment on Freight Cars, were discussed together, as they dealt with slightly different phases of the same general subject and supplemented one another admirably. The maintenance of air brakes is a comparatively new subject and its importance has been made generally manifest by the large increase in the number of air brake cars during the past four or five years. With trains controlled by air brakes, the condition of the brakes is naturally a matter of great importance and the evolution of triple valve repair plants and testing facilities is one in which much interest has recently been taken. The pioneers in this work seem now to comprehend the requirements of the air brake and to be in a position to successfully minister to them. The action taken at the last convention of the M. C. B. Association, in raising the price of cleaning air brake equipment, is bound to result in closer attention to this very important matter. The papers read show very clearly, however, that it is, not by any means, sufficient to send cars out of repair yards with clean triple valves and brake cylinders but that there are other parts of equal importance which must at least receive a careful inspection.

THE action of the Western Railway Club in appointing a committee to supplement the work of the M. C. B. committee on draft gear is characteristic of the club and likely to prove of great assistance in promoting better construction of freight car equipment. The scope of the M. C. B. committee is somewhat limited, though no one doubts that they have enough to do, while the committee of the Western Railway Club, not having an extensive series of tests to attend to, and having perhaps, more liberal instructions or no instructions at all, will be able to make a more general survey of the question of car construction. The M. C. B. committee has no easy task in outlining a fair and satisfactory plan for their comparative tests of draft attachments, though the results of their recent open meeting in Chicago show that the subject has been carefully and comprehensively considered. It is now proposed in the drop test to begin with a drop of one foot, increasing the height of each successive drop by one foot until the destruction of the gear. The date by which draft gear intended for test must be furnished has been extended to Feb. 1st. It remains to be seen whether the test proposed will discriminate closely enough to weed out the unworthy and avoid doing injustice to the worthy samples of draft gear submitted. It is probably not posssible to make tests of draft attachments approaching in scientific accuracy the M. C. B. air brake tests or even perhaps the brake shoe tests, since it is so much more difficult to realize the conditions of actual service. The margin between success and failure is very small in the case of more than one device now on the market, but so long as the device successfully meets the requirements it is entitled to consideration.

THE matter of fuel economy and combustion is one now occupying a great deal of attention on the part of motive power officials, and there is no necessity for dwelling now on its importance, as all are more or less familiar with the relative cost of operating expense, as well as with the increased fuel consumption due to the heavy traffic of the past two or three years and the general increase in the cost of coal. The situation has led many railway companies to take up the question of fuel economy in a particularly careful way and the fireman is naturally the man to whom attention is directed and of whom better things are expected. His efficiency depends upon his natural intelligence and the knowledge he may have acquired before or after entering the railway service. The matter of efficiency depends, therefore, first, upon the hiring of men who are capable of learning, and, second, of teaching them enough of the principles of combustion to enable them to fire intelligently. An occasional restatement of these principles is a good thing, therefore, for all concerned, not only for such firemen as were able to listen to the paper read by Professor Shepherd before the Western Railway Club, but for road foremen, master mechanics and superintendents of motive power who have to deal with this question and to whom its presentation is always a matter of interest. Professor Shepherd did not attempt to say how firing should be done in any particular case, but laid down the essential requirements of economical combustion, leaving his hearers to apply them to the varying conditions which they may encounter.

JOSEPH RAMSEY, JR.,
PRESIDENT WABASH RAILROAD.

Mr. Ramsey began his railroad career in the engineering department, and from there he has risen to his present position as president of the Wabash Railroad, having held at various times the offices of chief engineer, superintendent, general manager, and vice-president.

BY the time this issue reaches our readers the Boston & Maine R. R. expects to have its first oil-burning locomotive in service in the famous Hoosac Tunnel of the Fitchburg division. The Hoosac Tunnel is 4¾ miles long and efforts to provide adequate ventilation have only in a measure as yet proved successful. With this in view the management are giving the oil-burning locomotives a trial as another step toward a solution of this problem. The locomotive in question is to be used as a helper on the heavy freights whose engines will burn off most of their smoke before entering the tunnel and will run through without further firing with the assistance of the oil-burning engine. This locomotive is a large Baldwin four cylinder compound of the Vauclain type and is being fitted for oil burning at the Keene (N. H.) shops. The fire box is being lined with fire brick as a protection to the metal, and a sheet iron tank capable of holding 900 gallons of oil is being built to fit in the coal space on the tender. This tank is to be kept under pressure in order to insure a steady flow of oil, and it will also contain heating coils for warming the oil in cold weather. In order to be successful in reducing the smoke, more or less experience will be required in handling the jet, as improper regulation will cause as much smoke to be generated as from coal, but where the combustion is perfect there will be practically no smoke or odor. This will be the first oil-burning locomotive in use in New England and results will be watched for with great interest by railroad men in that section. It is doubtful whether oil-burning locomotives will ever take the place of coal in ordinary service in the New England states on account of the cheapness of coal at tide water and the limited supply of oil.

THROUGH the co-operation of the mechanical and the engineering departments of the New York Central & Hudson River Railway, Purdue University is in receipt of an exhibit of primitive railway track. The materials in question were exposed in the course of certain excavations which have recently been in progress on the line of the old Mohawk & Hudson Railroad. Notwithstanding the fact that the track had been so long covered that everybody connected with the road appears to have entirely forgotten its existence, it was found to be in a fair state of preservation. The exhibit consists of stone sleepers, stringers and rails, and altogether weighs 2,700 pounds. This section of primitive track the State of New York will supplement an exhibit of the so-called "bull-rail" track, representing a somewhat later date, taken from the Central Railway of Georgia, and deposited with Purdue University through the courtesy of Mr. Theo. D. Kline, General Superintendent.

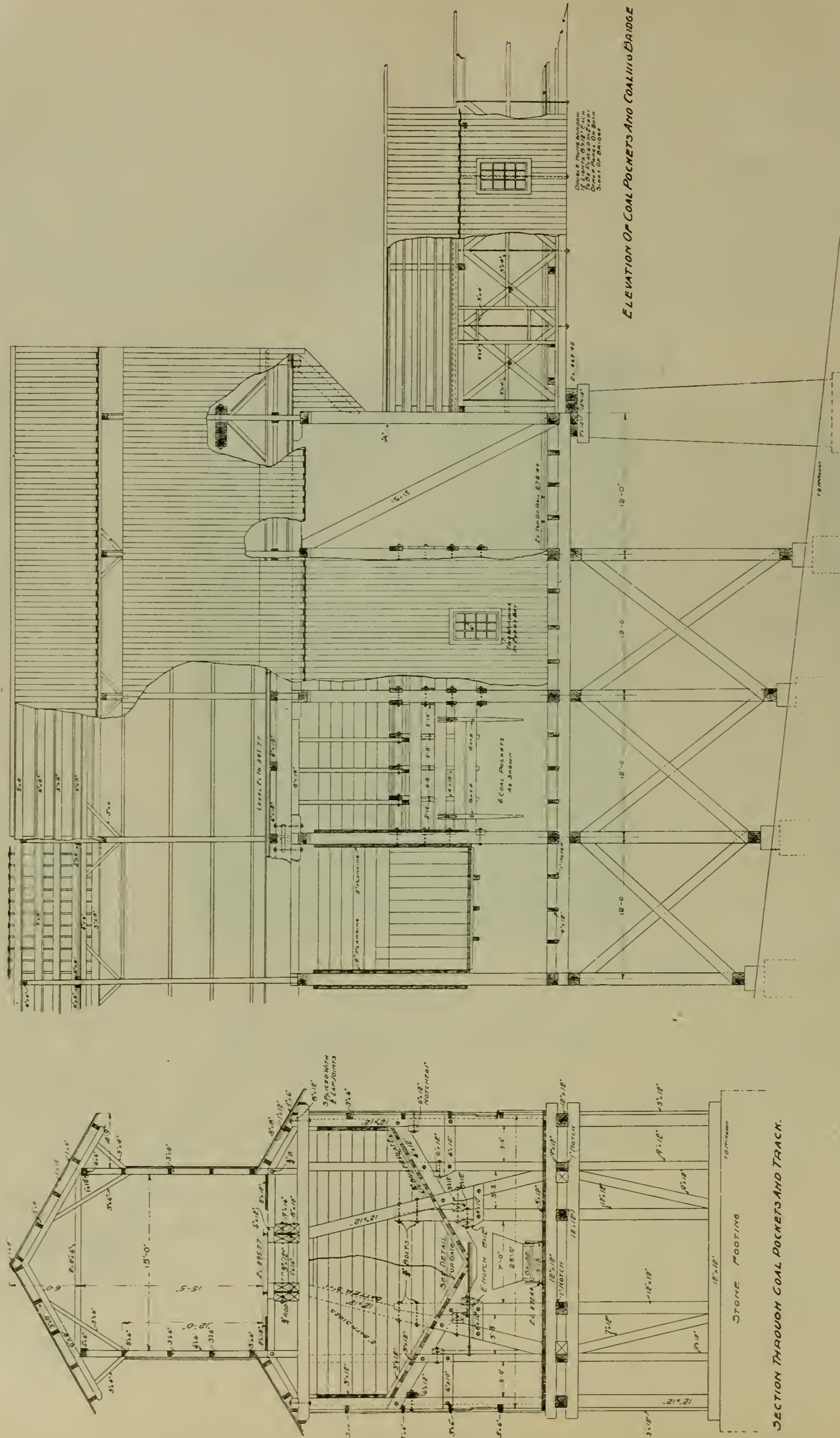
MR. ROBERT S. S. BERGH, Consul at Gothenburg, writes the Department of State: Sweden imports yearly large quantities of coal and coke, and this trade increases steadily, in pace with the industrial activity and the building of new railroads. Several millions of dollars are annually paid out to foreign countries for fuel. This has caused the authorities to consider whether Sweden could be made more independent in this respect. It has been suggested that the State railroads could get their motive power partly from waterfalls, and experiments will probably be made in this line. The managers of the State railroads have been instructed to make trials of peat, peat charcoal, and peat briquettes as fuel for locomotives. The intention is to construct a special locomotive to be used in these experiments, and if they are successful other engines will undoubtedly be built, because peat is abundant in this country. The navy and the State railroads have also tried to use Swedish coal, but without much success; the efforts will be continued, however. A Gothenburg newspaper reports today as follows: "In the new briquette factory at Elmhult, belonging to the State, experiments will be made this fall in the production of a cheap and practical fuel for Swedish railroads. In locomotive furnaces, Swedish coal can not be used alone, because it contains too much scrap and incombustible substances, which are not consumed, but form offal and ashes. It must therefore be mixed with English coal, but this is becoming more and more expensive. The possibility of using Swedish coal alone is therefore ideal, and the above-mentioned factory has been built to be employed in the attempts to make or refine Swedish coal into a good fuel.

Reading Belt R. R. Coaling Station

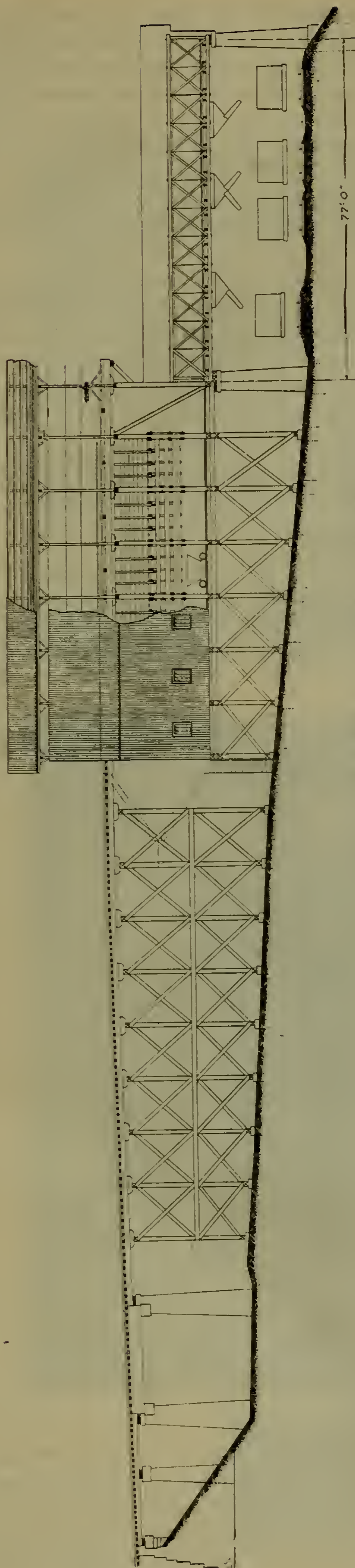
JUST west of the Schuylkill river bridge the Lebanon Valley branch of the Philadelphia & Reading Railway runs above and at an angle of about 55 degrees to the Reading Belt Railroad. At this point the Philadelphia & Reading is erecting a new coaling station for the Reading Belt Railroad. The accompanying drawings, as shown in Figs. 1, 2 and 3, show the location of the tracks and the general design and pian of the station. For the blue prints from which the description and illustrations are taken we are indebted to Mr. W. Hunter, chief engineer of the road.

The lead to the coaling station is taken from the Lebanon Valley branch, using a 12 degree curve, the incline having one track with 3 per cent grade. The coaling station, it will be noticed, lays at right angles to the Belt Railroad tracks. The storage capacity of the large pockets, if side dump cars are used, is 50 tons per panel of 12 feet, or a total of 300 tons for the 6 panels. The bottom of the pockets slope toward the center from both sides, and at the bottom and center are provided with sliding gates, two gates to each panel,

READING BELT R. R. COALING STATION—FIG. 1.



Reading Belt R. R. Coaling Station—Fig. 2.



— SIDE ELEVATION OF TRESTLE, COAL POCKETS & COALING BRIDGE —

READING BELT R. R. COALING STATION—FIG. 3.

through which the coal is dumped or dropped into small dump cars, which run on a track directly under these pockets and carry and deposit the coal into the smaller coal pockets, supported from the floor of the coaling bridge. This bridge has a span of 76 feet and has a double track for the small cars, under each track are 3 of these pockets or 6 in all, which supply the coaling on 4 tracks. The capacity of each pocket is one and a half tons. The center pockets are arranged to supply two tracks, having aprons on each side.

The construction throughout the work is of heavy yellow pine posts and beams, and the coaling bridge and coal chute are entirely enclosed with 12-inch sheathing and 6-inch battens, both for siding and roof, and of hemlock. Bents for incline are 12 ft. centers, except that portion which crosses Tulpenhocken Road, where a space of 20 ft. is made.

Communication

Tremont, New York City, Nov. 15th, 1901.

To the Editor of the Railway Master Mechanic:

Your correspondents in commenting so flatteringly upon the Lake Shore's six coupled, pony truck, trailer engine, claim the design is superior to all heavy fast passenger engines, and that it is a pattern all roads must shortly follow to handle their heavy fast passenger service. Now, being a great admirer of the Atlantic type engine for high speed passenger work, both heavy and light, suppose I venture a few comparisons:

The Lake Shore, over which these engines were designed to run, has one of the finest road-beds in the world; it is the western half of the New York Central (both roads forming the Vanderbilt system), and the through trains handled by both roads are practically the same. Mr. Waitt handles the trains over the Central with Atlantic type engines of about the same general dimensions, and which of the two will do the same work most economically?

The increased adhesion obtained by the extra pair of drivers is of no value after starting the train (except on a road having a continuance of bad grades), and when the train has been raised into speed they simply form an additional revolving weight which makes 252.1 revolutions per mile, carrying with a pair of heavy side rods, all of which is below the springs and increases the pounding effect upon the rails. The three pairs of coupled drivers increase the rigid wheel base, which on curves means an increase of flange friction—one of the most power absorbing factors in railroad operation. It's a question whether a greater number of 2-inch tubes somewhat shorter would not produce a better steamer than the lesser number of 2¼-inch by about 20 feet tubes. The best tube heating surface is about the first two or three feet from the furnace flue sheet, and the greater amount of tube surface you get in there the better steamer you will have. Mr. Smith speaks of the "useless four-wheeled truck." I don't know about that; four-wheeled trucks to guide high speed engines are pretty good things. The pony truck centers forward of the cylinders, instead of centrally under the saddle, this increases the rigidity of the engine unless a swing or radial pair is used, and the employment of the latter on a high speed engine is simply murderous to the road-bed, as it throws the tangents all out of line.

An Atlantic type engine such as used on the New York Central, having a traction increaser which throws a portion of the weight from the trailers to the drivers when starting, will start and keep in motion at the same velocity as the six-coupled engine, trains as heavy as run on either the Lake Shore or Central. After the train is under way we have a pair of trailers to carry their proportion of weight not connected with the reciprocating motion and with no heavy side rods attached to pound the rails, no crank pins to get hot, bent, keep turned, fit brasses to, etc., and comparatively small wheels which cost less to construct and less to turn and renew the tires. It requires considerable extra power to keep a pair of 80-inch drivers with a heavy pair of side rods revolving at 65 miles per hour or 273.1 revolutions per minute; this extra power means more steam on the pistons, which in turn means more coal burnt on the grates. Now, that extra pair of 80-inch drivers with their side rods form a stored up energy which has to be overcome by the brakes before we can come to a stop; this means extra wear and tear and will to some extent increase our stopping distance.

Mr. Marshall has designed an extremely handsome engine, the symmetrical lines of design are beautiful and the engine has an exceptionally fleet and businesslike appearance; but on a level road I fail to find the advantages of a six-coupled engine over an Atlantic type equipped with a traction increaser and I believe its superior has yet to be designed.

P. Emerson Waddell.

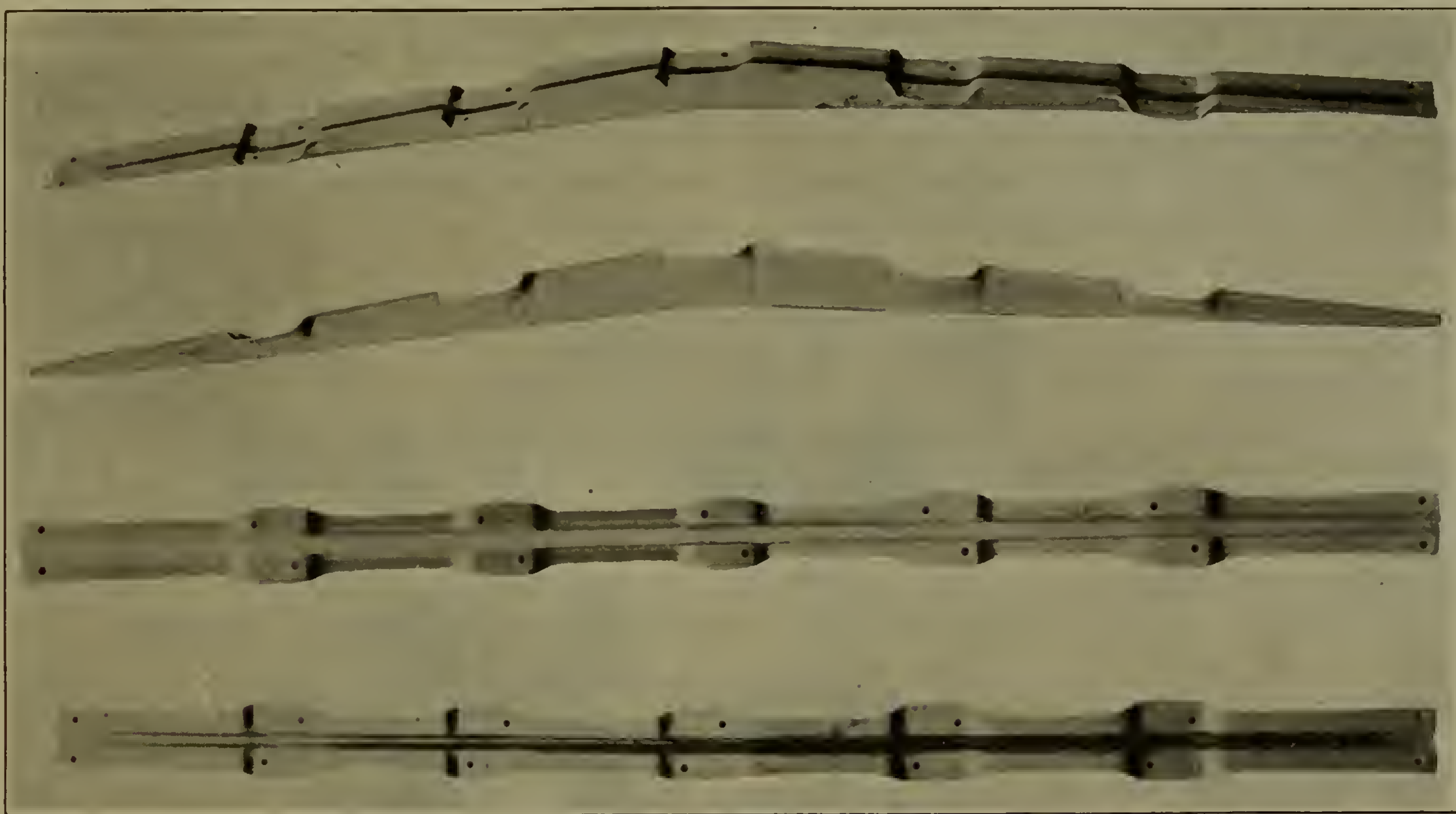
Pressed Steel Carline

THE rapid progress made in modern freight car construction has received an additional impetus in the recent invention of the Pressed Steel Carline. The mechanical departments of our railroads have been greatly puzzled as to how they were to meet the demands made upon them for an increase of cubical feet of space in box and furniture cars, especially so where they had reached the limits of eave heights and widths. In fact to a great many the only course left open was to reduce the depth of the wood carline, which has been done until now the wood carline is not of sufficient strength to support the roof properly or give the necessary stiffness to the upper framing of the car body.

The accompanying photographs illustrate the Pressed Steel Carline as made and applied to five hundred 38-ft. box cars, recently built for the Pere Marquette Railroad Co. at the Chicago plant of the American Car & Foundry Co., the carlines being made of 3-16 in. steel pressed into a U-shaped section, having the metal of its side members turned outwardly at top and at center and points between its center and ends the flanges have recesses for supporting the ridge pole and purlines, and to which they are

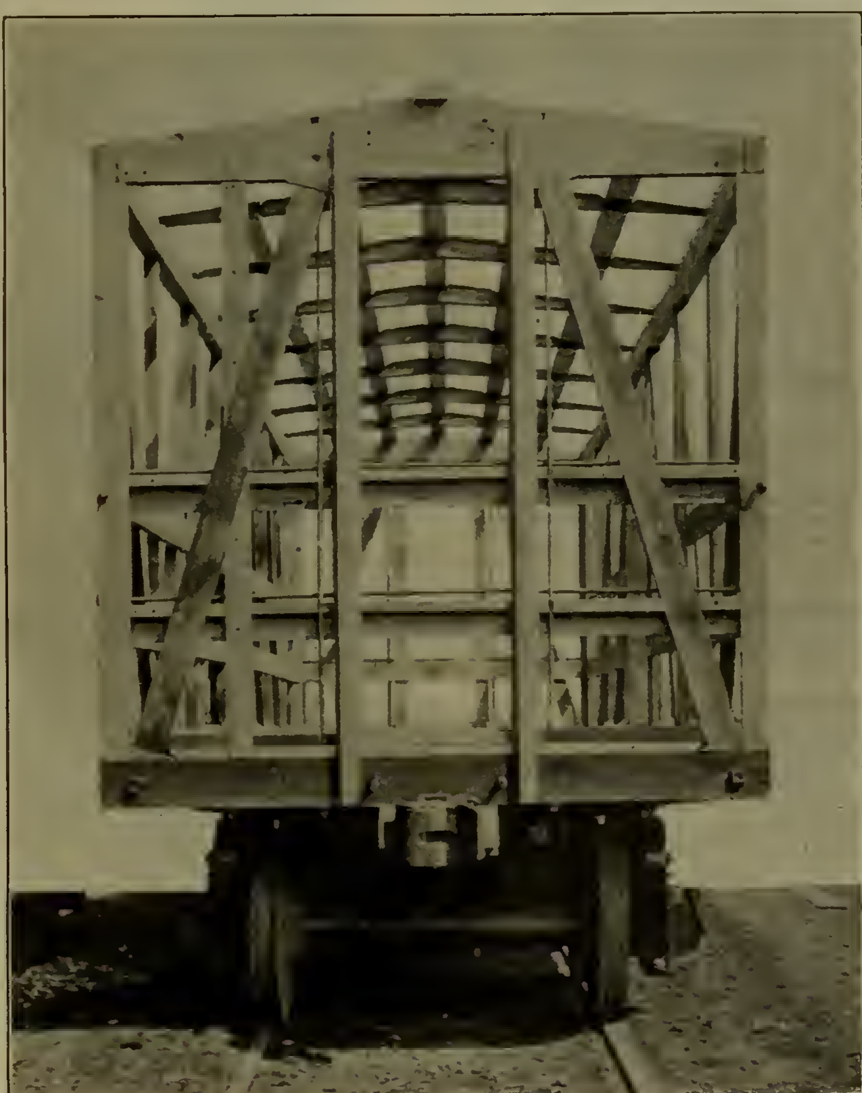
Pressed Steel Carline.

secured by two ½-in. carriage bolts and to side plates by two ½-in. bolts. Seven carlines per car, spaced 4 ft. 9 in. apart center to center and weighing 50 lbs. each, a saving in dead weight of 200 lbs. per car over the wood carlines, with an increase of 2 ins. to 3 ins. clear height at side plates and 5 ins. to 6 ins. at center of car over the wood carline; a decided advantage where trimming of car is necessary, as in loading grains, etc.



Pressed Steel Carline.

A test was made of one of the cars equipped with the steel carlines to ascertain if any permanent set would be given the carlines if a reasonably heavy load were placed on the roof. Seven and a half tons of pig iron was evenly distributed on the running board of a car from end to end, the deflection being ⅜ in. in carlines. This load was allowed to remain a few hours and was then removed, when it was found that the carline had not taken any permanent set. A load of 7½ tons is more than any car roof will have to sustain. This load would represent on the inside of the car an outward pressure at the side plates of over 15 tons, and it is fair to presume that a load as great as this will never be brought to bear on the middle of a car up as high as the side plates. The expense of the steel carlines as applied to these cars is the same, all points considered, as the present form of wood construction, for the reason that in a 36-ft. or 38-ft. car but seven steel carlines are required instead of 11 or 13 wood carlines with the necessary cross-tie rods. On the 38-ft. car referred to, a gain of 54 cu. ft. of space was gained by the use of the pressed steel carlines. If the standard box-car dimensions are adopted as recommended by the American Railway Association at their recent meeting, being 36 ft. long, 8 ft. 6 ins. wide and 8 ft. high, inside measurements, would give eave height of 12 ft. 6 ins. with wood carlines, whereas with the steel carline (the inside height being maintained) the eave height would be 12 ft. 4 ins. This is a decided advantage to the railroad companies, as the siding can be cut from 18 ft. lengths, where if the wood carline is used, siding will have to be cut from 20 ft. lengths. The American Car & Foundry Co. have secured exclusive control of the patents on the steel arline and will cheerfuly furnish any further information desired.



Pressed Steel Carline.

Draft Gear Tests

A CIRCULAR in regard to draft gear tests was recently sent out by the committee of the Master Car Builders' Association. After stating the history of work accomplished they announced a meeting to be held November 20 of draft gear manufacturers and members interested to discuss the plan as set forth. At this meeting certain amendments were made to the original plan. Among the more important changes were the replacing of a part which might fail from defect of material which did not indicate a bad design; the requirement that the gear be fitted up by the manufacturer and not by the committee, and the requiring of exact drawings of the appliance to be sent on or before December 15 to Mr. J. W. Taylor, The Rookery, Chicago. The appliances are to be sent charges prepaid to Mr. A. W. Gibbs, Asst. Mech. Engr., Pennsylvania R. R., Altoona, Pa. The parts should be sent just as though they were to be furnished to a car builder and the gears will be mounted as shown by Fig. 1 of the accompanying drawing. Those riggings approved by the committee and received up to February 1, 1902, and which conform to the general requirements of the test will be accepted by the committee. Each maker will be required to pay for the work of assembling his gears and a sum covering the cost of this work shall be deposited with the secretary of the association before the test is begun.

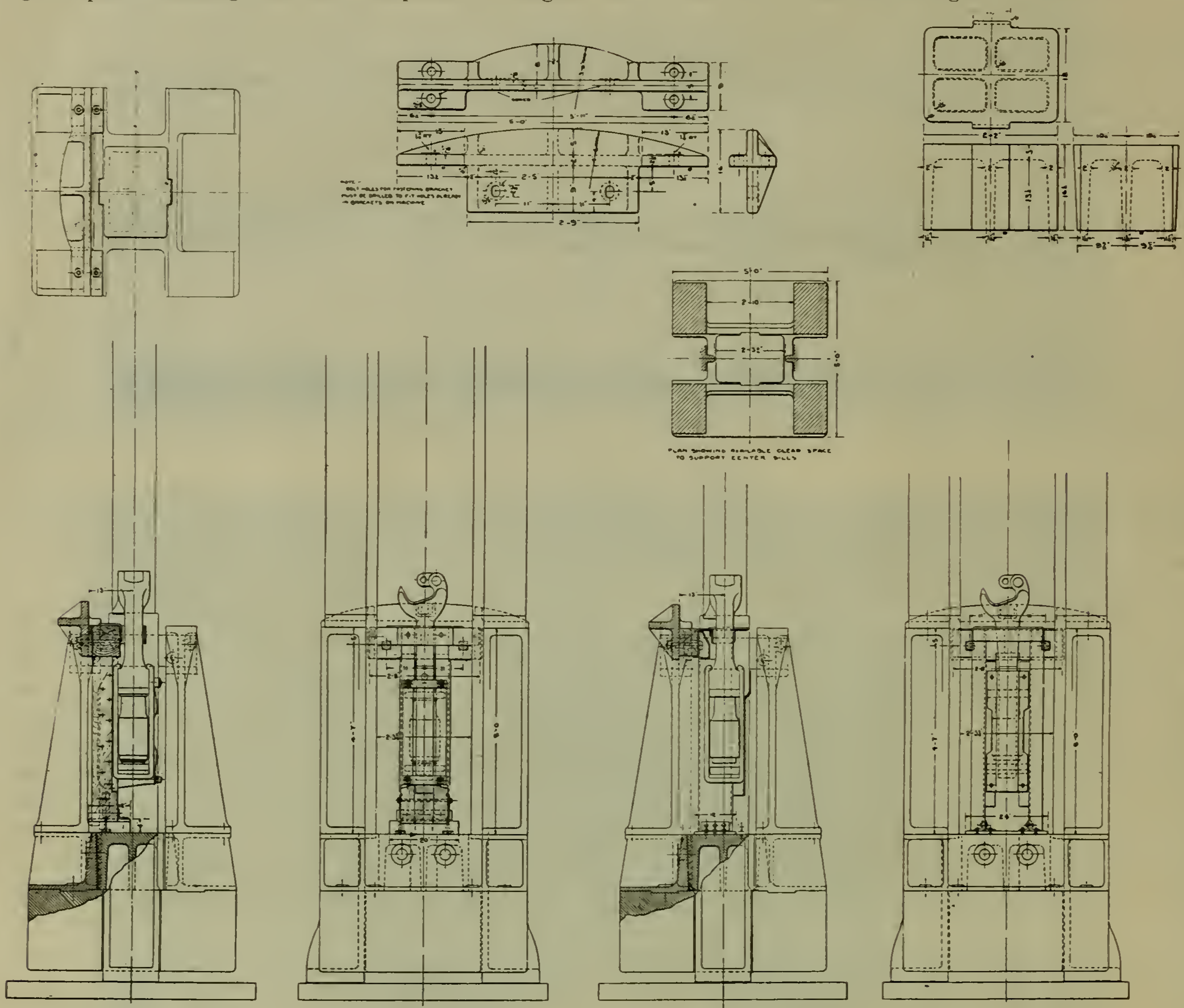


FIG. 1

In the Altoona tests, the gear will be blocked in place with the ends of the draft timbers or metal sills resting on the base of the machine, mounted as shown in Fig. 1. A weight of 1,640 lbs. will be allowed to strike a dummy coupler or block which will be used in place of the coupler. In the circular sent out by the committee it was stated that five blows would be given from each height of drop, the drop ranging by intervals of five feet, or by smaller intervals as may be found desirable. This has been changed, and it has been decided to begin with a drop from a height of one foot and increase the blow by successive increases of one foot in height at each blow. The test will be continued until some vital part of the gear is destroyed. In this test the breakage or distortion of couplers, yokes, followers, etc., will be noted as well as failure of the attachments, with a view to determining the strength of these parts relative to the attachments. A record will be kept of the blow required to exhaust the yielding resistance of the gear, and the amount of the recoil of the drop under the various conditions.

In the tensile and compression tests the same changes are approved for test by the committee. In this case the makers must supply all the parts anr pay for assembling them according to the drawings and specifications herewith.

The Purdue experiments will consist of testing one gear of each kind in compression and the other in tension, noting distortion or failures. These tests will be carried to the capacity of the machine, 300,000 lbs., provided the gears do not previously fail. Curves will be obtained showing the relation between the load and the movement of the followers. This is a Riehle screw

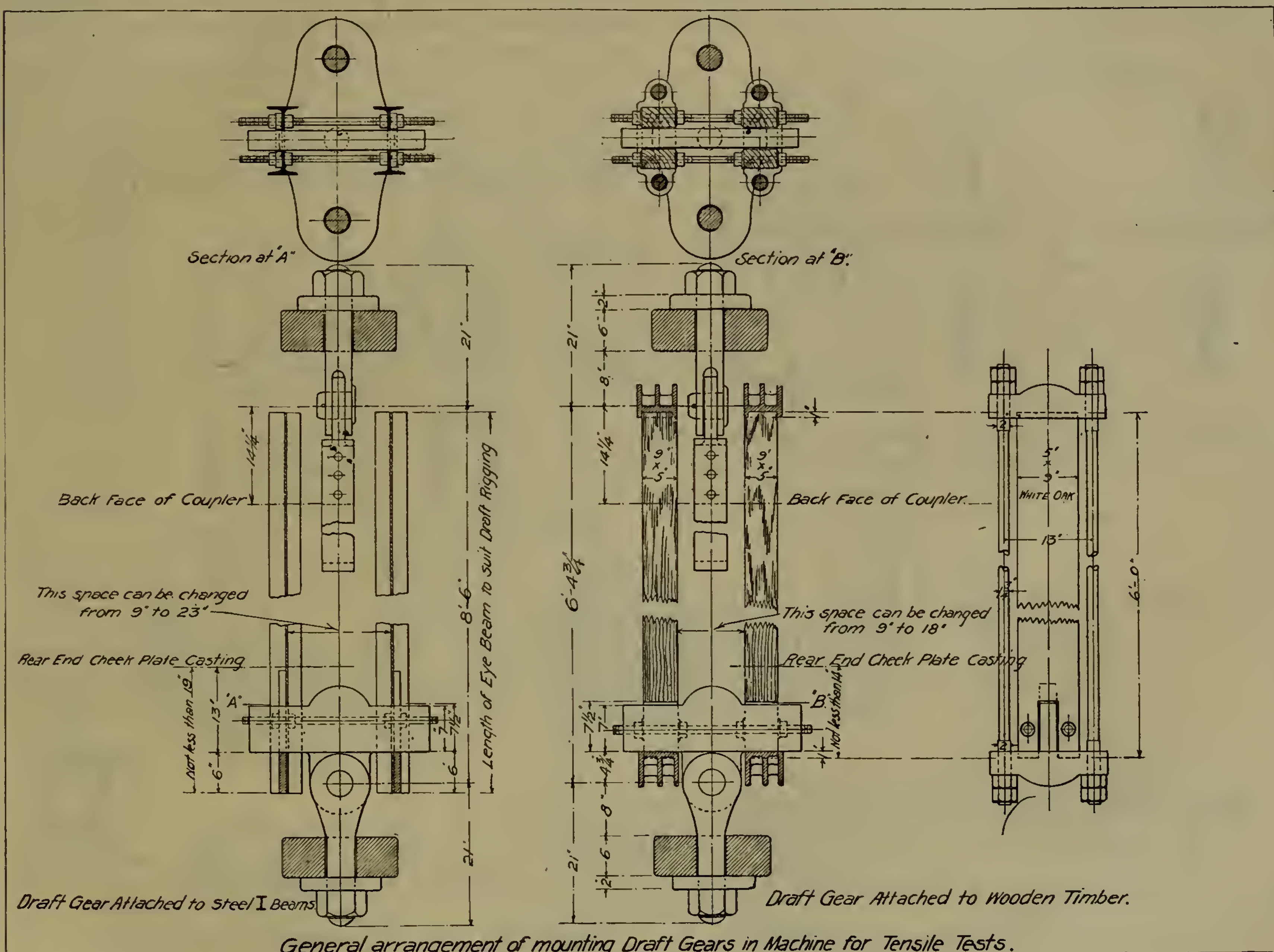


FIG. 2

regarding dates and conditions obtain. Slight changes have been made in the drawings covering the requirements as to adopting the gear for the test machine. A revised circular will be issued by the secretary covering all changes. The original requirements were that samples like those for the drop test would be used. Duplicate riggings (two) should be sent, charges prepaid, to Mr. William Forsyth, Purdue University, Lafayette, Ind. These gears, including the dummy coupler, spring, etc., complete, shall be mounted as shown by Figs. 2 and 3 of the accompanying drawing. Those riggings will be accepted which are received up to December 15, 1901 (changed to February 1, 1902), and which conform to the general requirements of the test and which machine of 300,000-lbs. capacity, with automatic beam of such dimensions as to allow tensional and compressional tests to be made on specimens 8 feet long and less.

From Fig. 2 it will be seen that the gears may be attached to either steel I-beams or to 5x9-in. oak timbers, the spread varying from 9 to 23 in. for the steel beams and from 9 to 18 in. for the wooden construction. In these tests any length of draft gear which can be put on a car is within the limit of the Purdue machine. The maker in fitting up gears for these tests is only obliged to conform strictly to the drawings in the matter of the slot and reinforcing plate of the I-beams. The object in designing the fittings for the tensile testing machine is to allow the maker plenty of room so none will be prevented from participating in the tests due to limitations, now present on cars.

At the committee meeting it was stated that the committee had decided to use the words "draft rigging" as a general term applied to the whole apparatus, "draft attachments" is to be used for the parts attached to the car, and "coupler attachments" for the parts inside of the yokes. After the revised plan had been read the representatives of the manufacturers were invited to make criticisms and to ask questions. There was a very free discussion, participated in by Mr. Street, of the Dayton Malleable Iron Co.; Mr. Herr, of the Westinghouse Air Brake Co.; Mr. Thornburg, of the Thornburg Coupler Attachment Co.; Mr. Post, of the Standard Coupler Co.; Mr. Hinson, of the National Coupler Co., and Mr. Jones, of the Railroad Supply Co. In addition to these there were present representatives of the Miner draft rigging, Gould draft rigging, and the Piper draft rigging. The discussion turned upon the difference between friction draft gear and other draft rigging. Inasmuch as the principal object of the test of the friction draft rigging is to determine how much of the shock or energy is absorbed by the gear before it is transmitted to the attachments, it was deemed wise, if possible, that manufacturers of friction draft gear should agree upon some uniform method of attachment for test purposes. The committee declined to prepare or recommend any design of attachment for this purpose and suggested that the friction draft gear manufacturers might get together and consider this subject among themselves. Such a conference was held later in the day and arrangements were made for a uniform method of attachment. As a result of the conference it became very clear that the manufacturers were well satisfied with the intelligent action and fairness of the committee. This was expressed by an unanimous vote.

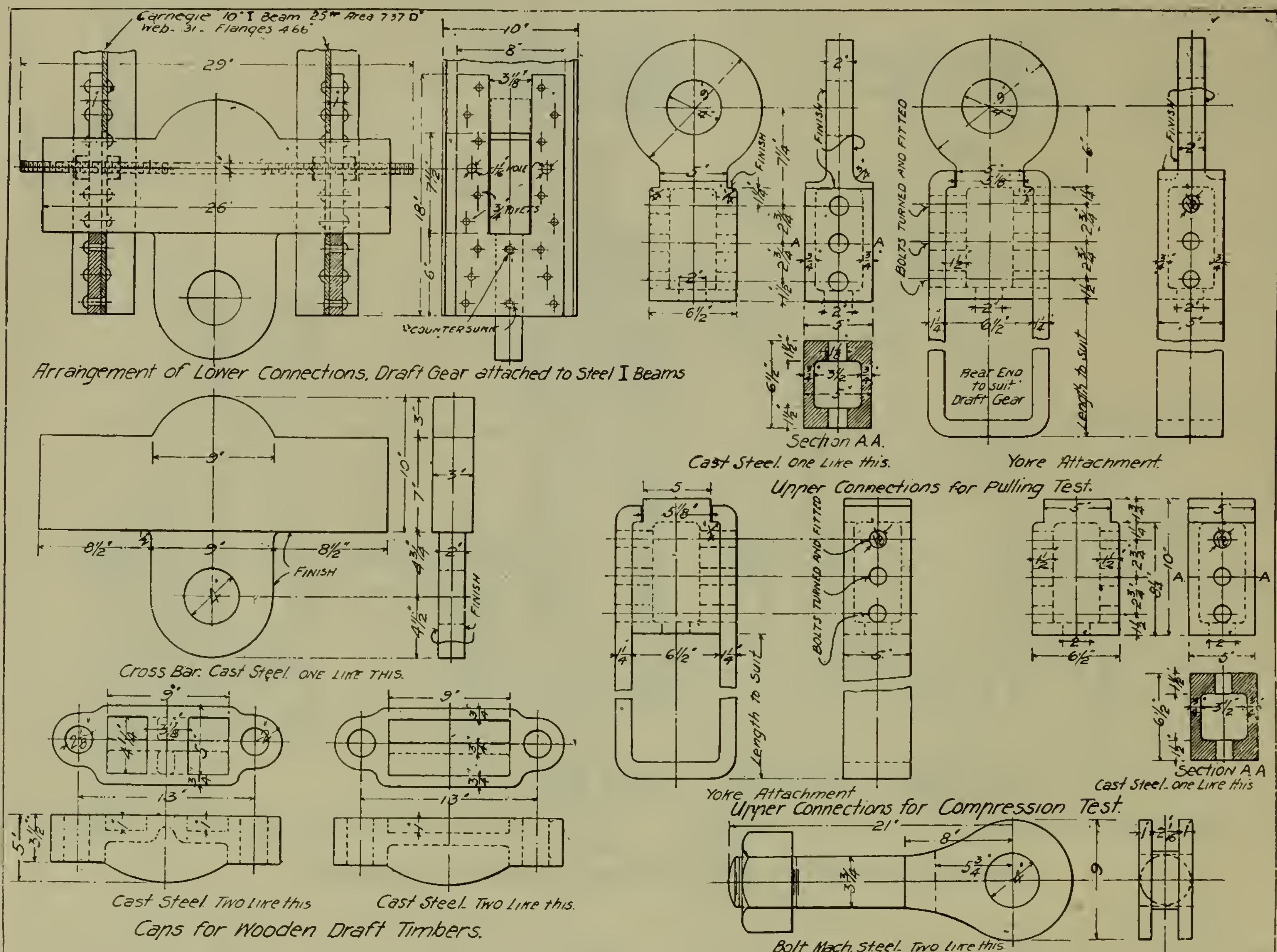


FIG. 3

A New Friction Draft Gear

THE Sessions-Standard Friction Draft Gear, manufactured by the Standard Coupler Co., is not a draft attachment, but belongs to that class of devices in which friction is used as a substitute for or supplement to spring resistance. While our drawings (Figures 1 and 2) show it as attached to steel and wooden sills, the draft gear itself is complete as shown in Fig. 3, with the exception that a portion of the case was cut out before photographing, so as to show the relation of the parts. The spring projects slightly from the near end of the malleable iron case, so that the spring must receive some compressive force before the friction parts come into operation. This interval is considered necessary to prevent the otherwise almost continuous action of the friction parts when the car is moving and consequent rapid wear. The compression is received upon the bases of two wedge-shaped blocks (a a). One side of each wedge operates against a friction plate fixed on the inside of the case (b b). The other side of the wedge operates against a third piece (c) which bears directly against the spring. The recoil of the spring pushes the piece (c) against the two wedges, and these against the friction plates. The separate parts are shown in detail in Fig. 1.

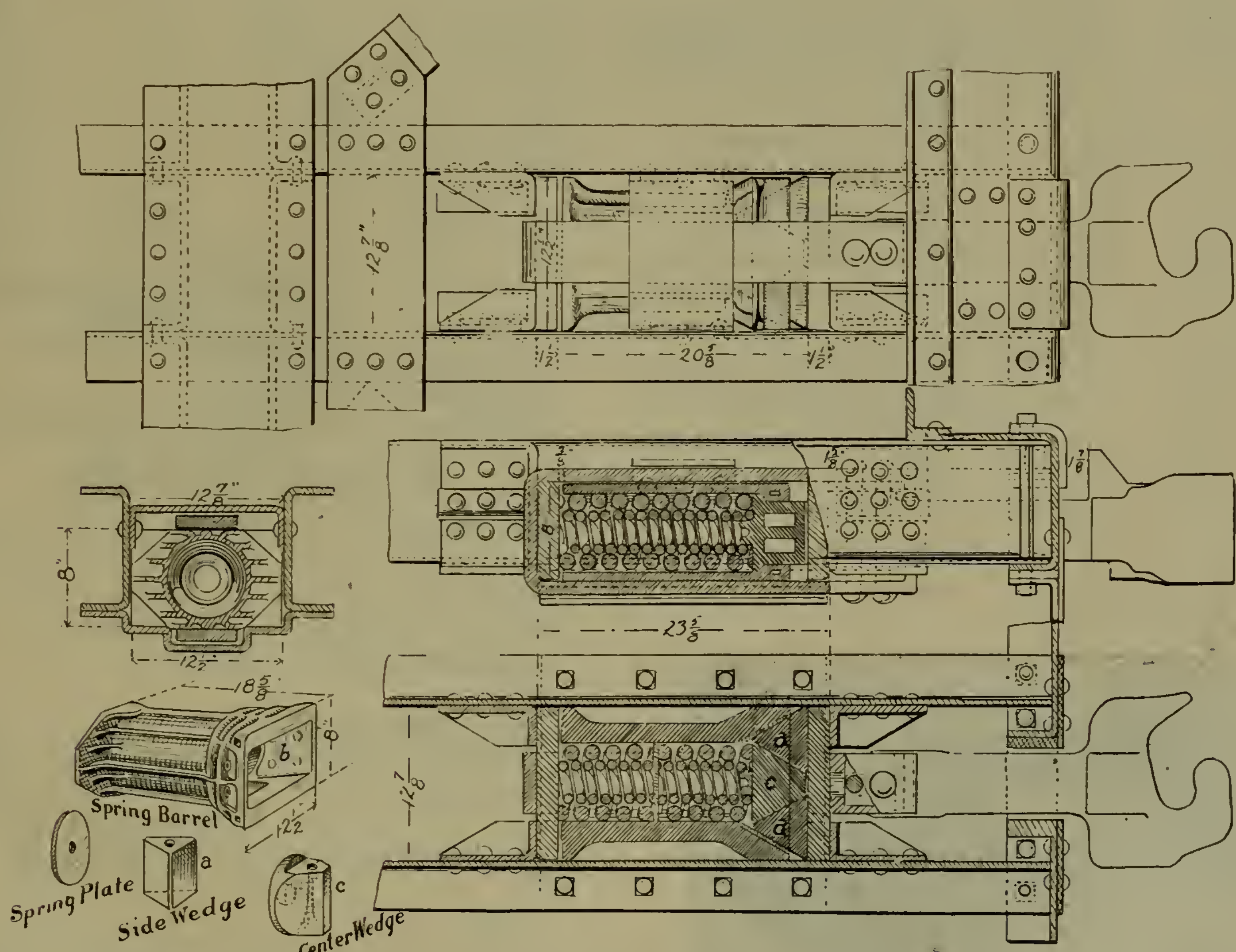


Fig. 2—Sessions-Standard Friction Draft Gear as Applied to Steel Under-Framing.

We are permitted to publish the reports of two tests recently made. The first was made at the company's shops at Bridgeport, Conn., in the presence of the mechanical engineer of an eastern road. It was a drop test comparing the friction gear with a twin spring rigging, both being attached to pressed steel sills.

Comparative test under drop of Sessions-Standard Friction Draft Gear, and a Twin Spring Gear. Both mounted in Pressed Steel Sills. Weight of Tup 1,640 pounds:

TWIN SPRING GEAR.

No. of Blow.	Height drop, feet.	Remarks.
1	2	Spring closed solid.
2	3	
3	4	
4	5	Channels commenced to fail.
5	5	Channel failure increased.
6	6	Channel failure increased.
7	6	Channel failure much greater.
8	7	One side damaged so as to cause gear to lean out of plumb.
9	7	Damage continued as above.
10	8	Condition of channels about the same as when removed at end of test with Sessions gear.

SESSIONS-STANDARD FRICTION DRAFT GEAR.

No. of Blow.	Height drop, ft.-in.	Movement of followers, in.	
1	5	1 9-16	Preliminary to loosen parts to working condition.
2	5	1 9-16	Ditto.
3	1	⅝	
4	2	1	
5	3	1 3-16	
6	4	1 ⅜	
7	5	1 9-16	
8	5	1 9-16	
9	6	1 ¾	
10	6	1 ¾	
11	7	1 ⅞	
12	7	1 ⅞	Slight buckling of web at lug visible on one side.
13	8	2	Gear closed, no change apparent.
14	9	2	Both sides showed slight buckling of channel web.
15	10	2	No change apparent.
16	11	2	Web buckled ⅜ in.; flange contracted ½ in.
17	12 3	2	Webs buckled 7-16 in.; flanges contracted 9-16 in.
18	12 3	2	Webs buckled 9-16 in., flanges contracted 9-16 in., and buckled vertically.
19	12 3	2	Sills badly distorted, equivalent to bad wreck.

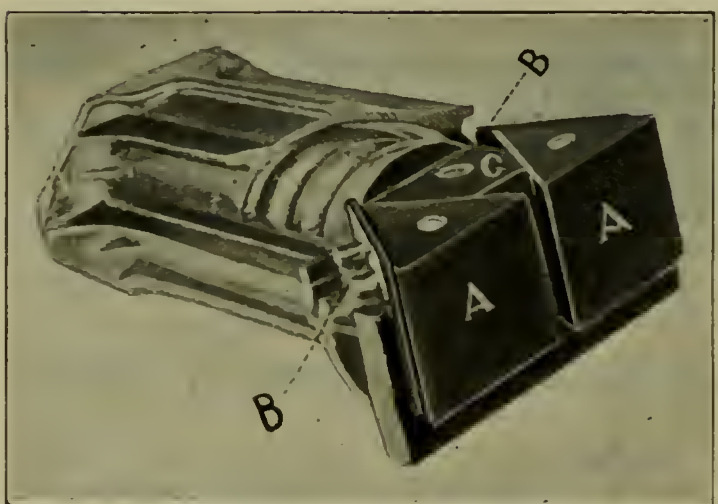


Fig. 3—Sessions-Standard Friction Draft Gear.

CONDITION OF SILLS AT END OF BOTH TESTS.

Channels badly crippled, notwithstanding they were held by numerous clamps from buckling or spreading. A clamp was located 11½ in. below the face of each draft lug to prevent spreading, and there was another 4 in. above each draft lug to prevent buckling. The ends of sills where they rested on the anvil were badly crushed. The test was equivalent to a collision that would have wrecked a steel car underframing. The friction gear when removed was in perfect condition.

On account of the construction of the friction gear, it is impossible to close the springs solid, as before they quite reach that point the force is taken by the main casting; it is, therefore, impossible to damage the springs if they are correctly made to M. C. B. specifications.

Curve Showing Elastic Resistance of Sessions-Standard Friction Draft Gear Made in Riehle 300,000-lb. Testing Machine, Nov. 22, 1901, by Robt. W. Hunt & Co. Test Made With M. C. B. Standard Springs, 6¼"x8".

The other test was made on a Riehle testing machine by Robert W. Hunt & Co., of Chicago, whose report is as follows:

Chicago, November 22, 1901.

Standard Coupler Co., No. 160 Broadway, New York City.

Gentlemen: We beg to submit the following report on a test of your Sessions-Standard Friction Draft Gear:

The Draft Gear was placed in the Riehle 300,000 lb. Testing Machine and observations were made of the loads at each ⅛ in. deflection.

The wedge blocks were in the back and bore against smooth steel follower plates.

Several loadings to the full capacity of the Draft Gear were made before the observations were taken in order to bring the bearing surfaces to a working condition.

The following results are the average of four tests:

Movement of Follower, inches.	Load, lbs.
0	2,600
⅛	5,500
¼	15,400

⅜	24,300
½	31,600
⅝	39,400
¾	45,900
⅞	52,400
1	60,200
1⅛	67,900
1¼	74,800
1⅜	82,600
1½	90,800
1⅝	97,700
1¾	105,300
1⅞	115,900
2	125,200

2 M. C. B. Standard 6¼-in. by 8-in. springs were used in the draft gear.

At a load of 125,200 pounds the springs were not closed and the elastic limit of the device was not quite reached.

The device was then closed solid, the spring-barrel taking the lead which was increased to 300,000 pounds, the limit of the machine.

A careful examination of the barrel showed it to be in perfect condition.

Respectfully submitted,
Robert W. Hunt & Co.

This test is also shown in the diagram Figure 4.

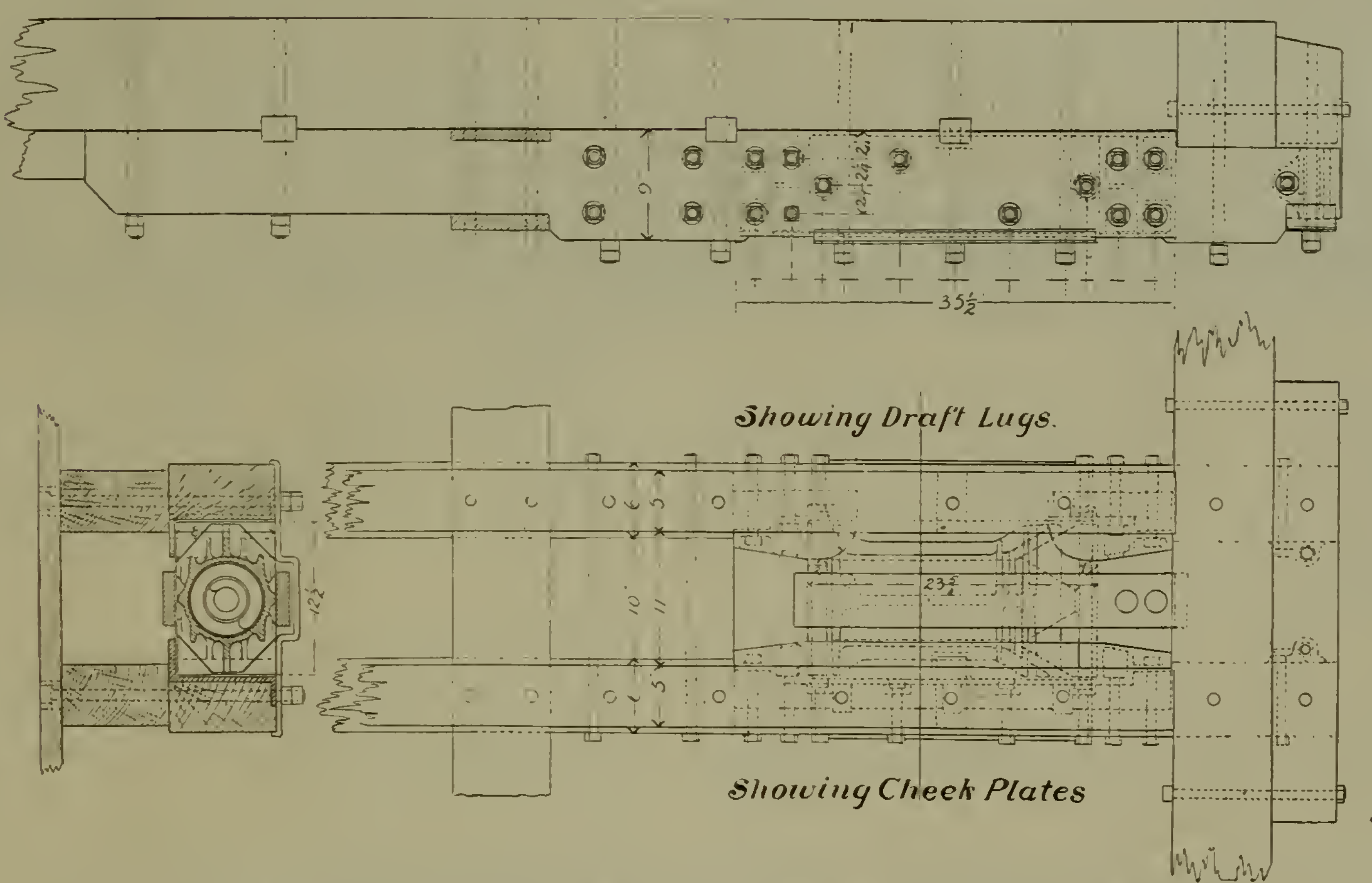
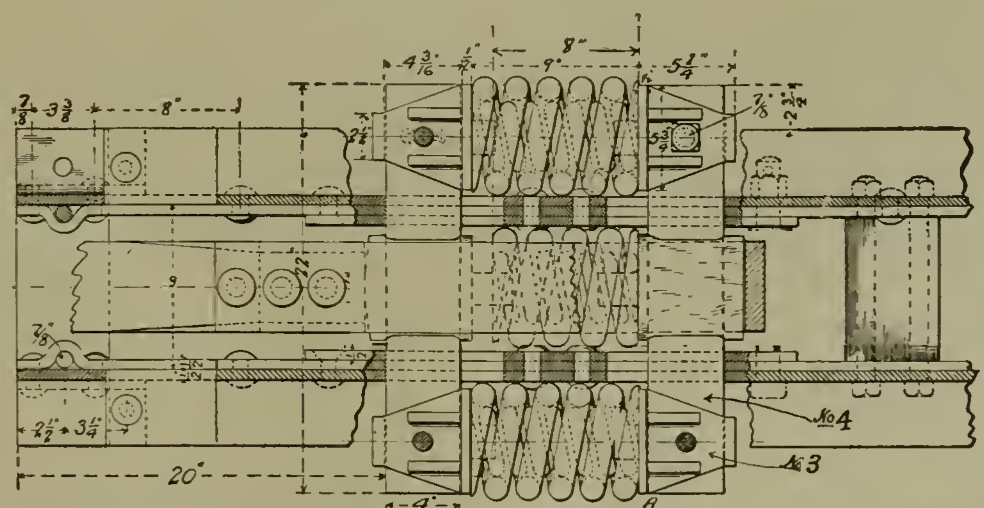


Fig. 1—Sessions-Standard Friction Draft Gear as Applied to Wooden Sills.

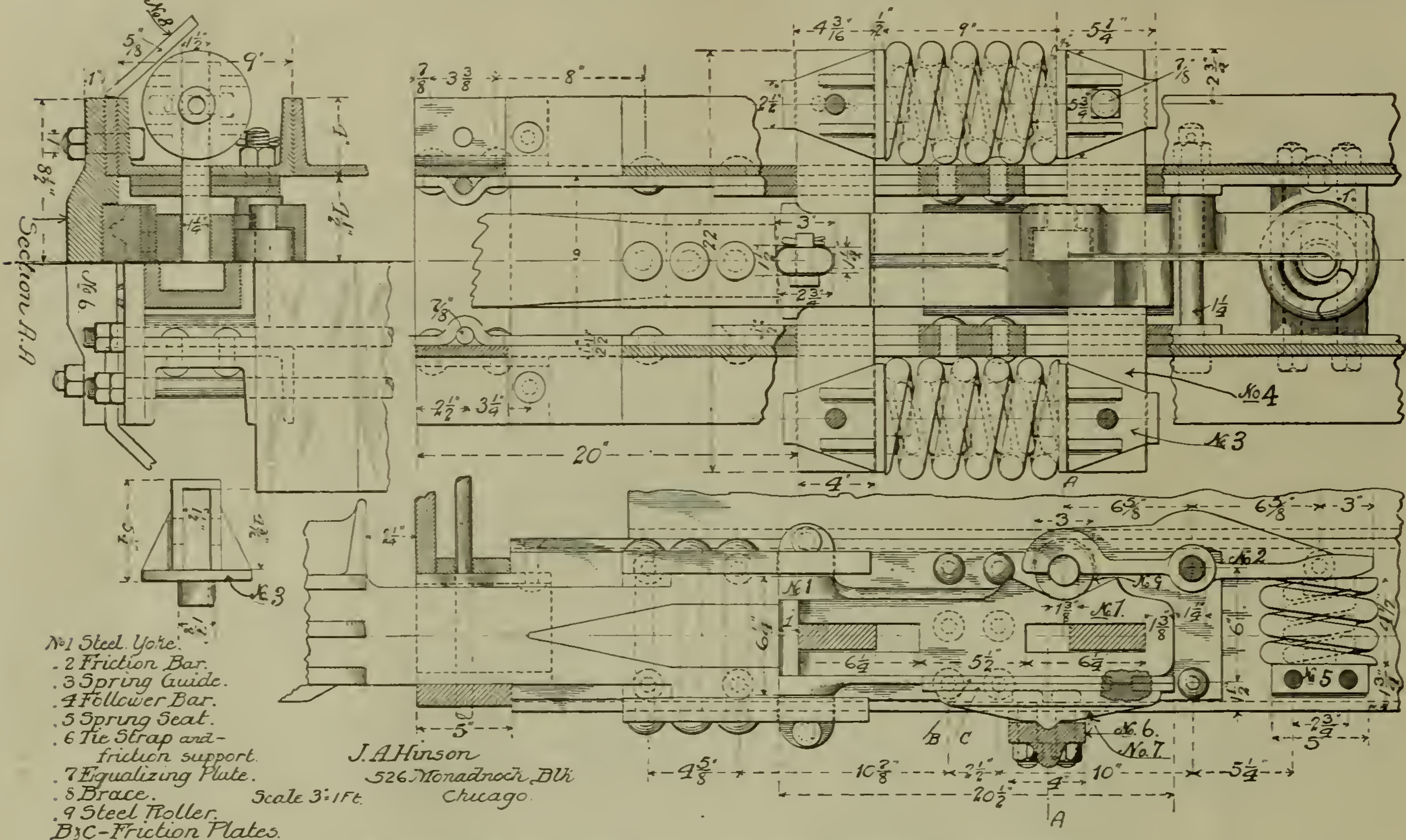
Combined Twin Spring and Friction Buffer Attachment

THE larger drawing of the two shown in connection with this article, clearly illustrates a Combined Spring and Friction Buffer Attachment, invented and designed by J. A. Hinson, President of the National Car Coupler Company. It is designed more especially to be applied to channel iron draft sills, reinforced by another plate or plates of flat iron about ½ in. thick, securely riveted to the web of the channel, making it very strong. In the larger cut, a new form of yoke,



Combined Twin Spring and Friction Buffer Attachment.

or a casting to take the place of a yoke, has openings cast therein corresponding to openings in the draft sill that receives the follower bars. They have at their outer ends two 9-in. double coil drawbar springs between them, outside of the channel iron sills. On the upper side of this casting No. 1, is cast an incline both back and in front of the roller. The roller is engaged by a bar pivoted in the center secured by the draft sills with the rear end resting on a twenty thousand pound double coil spring, and it is obvious that when the draw bar is pulled forward or back, and the incline driven against the roller compresses this spring, thereby transmitting the same amount of en-



Combined Twin Spring and Friction Buffer Attachment.

ergy on the friction plates "B" and "C" directly beneath the roller. The friction plates "B" and "C" are supported by a cross bar No. 6, secured on either side to the web of the channel iron. These plates can easily be removed when worn out, by removing the cross bar No. 6, as they are held from clipping by bosses cast on No. 1 and No. 7. No. 6 supports them from below. No. 7 is pivotly connected to No. 6 so when the coupler is moved vertically at the front end, the plates "B" and "C" are held in parallel relation, and prevents cramping. The friction parts can be eliminated and a first-class twin spring attachment left. The smaller cut shows the same device with the ordinary drawbar yoke, and a center spring 1 in. shorter than the outside springs substituted for the frictional parts, so it is obvious without anything more, there can be obtained a twin spring, a triplet spring attachment or a twin spring with friction buffer according to the capacity of the car on which it is to be applied.

Consolidation Freight Locomotive Canadian Pacific Railway

THROUGH the courtesy of Mr. E. A. Williams, superintendent of rolling stock, we show the accompanying illustration and give the following description of some new locomotives recently purchased by the Canadian Pacific Railway Company from the American Locomotive Company. The total weight of the locomotive illustrated is 159,500 lbs., the weight on the drivers being 140,500 lbs., and on the truck 19,000 lbs. The weight of the tender is 114,000 lbs., making a total weight of engine and tender 273,500 lbs. The locomotives were built at the Schenectady Works of the American Locomotive Company. The general dimensions are as follows:

Wheel base of engine......................23 ft. 7 in.
Rigid wheel base..........................15 ft. 8 in.
Total weight base engine and tender........51 ft. 8 in.
Simple or Compound.......................Compound
Cylinders.................................22 & 35—26
Driving wheel diameter on tread................57 in.
Driving wheel, centers....................Cast steel
Driving wheels, axle boxes................Cast steel
Driving wheels, axle journals (main)....9 in. x 11 in.
Driving wheels, axle leading intersand trailing.......................8½ in. x 11 in.
Engine truck journal....................8 in. x 11 in.
Engine truck wheel, Allen No. 7, steel tired.30 in. dia.
Crank pin journal (main), nickel steel...6½ in. x 6 in.
Crank pin journal, main (side rod), nickel steel.........................7¼ in. x 5 in. dia.
Crank pin journal, intermediate, nickel steel. ....5½ in. x 4½ in.

Crank pin journal, front and back	5 in. x 3½ in.
Crank Eng. truck	Swing bolster
Boiler	
Extended wagon top with wide firebox over frames	
Working pressure	200 lbs.
Dia. of boiler at waist	61 in. I. D.
Dia. of tubes	2 in. O. D.
Number of tubes	281
Length of tubes	14 ft. 3 in.
Grate, type	Rocking with dump.

TENDER.

Tank capacity	Water 5000 impl. gals.
Coal	20,000 lbs.
Tank material	Steel.
Frame	10 in. steel channel.
Truck	Common sense bolsters
Axles	Steel 5½ in. x 10 in.
Wheels	Cast iron 33 in. dia.

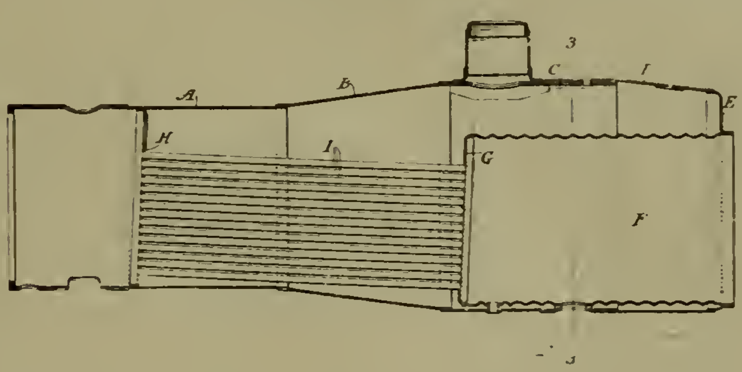
Consolidation Freight Locomotive, Canadian Pacific Railway.

Length of firebox	8 ft. ⅛ in.
Width of firebox	5 ft. 5⅜ in.
Depth of firebox	Front 4 ft. 6½ in.; back 5 ft. 2½ in.
Radial stays (Taylor iron)	1⅛ in. dia.
Stay bolts	1 in. dia.
Boiler material (steel)	½ in., ⅝ in., 11-16 in., ¾ in.
Heating surface, firebox	134.37 sq. ft.
Heating surface, tubes	2084.17 sq. ft.
Heating surface, total	2218.54 sq. ft.
Grate surface	43.64 sq. ft.

The special equipment includes a Westinghouse American combined brake on engine and tender for train, 9½ in. air pump, Franklin sectional asbestos block boiler lagging, Leach sand feed, two Crosby pop safety valves, two Detroit sight feed lubricators, United States metallic packing, Tyres Krupp crucible, Washburn couplers, Star head lamp, McCord M. C. B. journal boxes, A. French & Co.'s springs, Sterlingworth re-inforced brake beams, two No. 10 Gresham and Craven automatic restarting injectors.

Interesting New Railway Patents

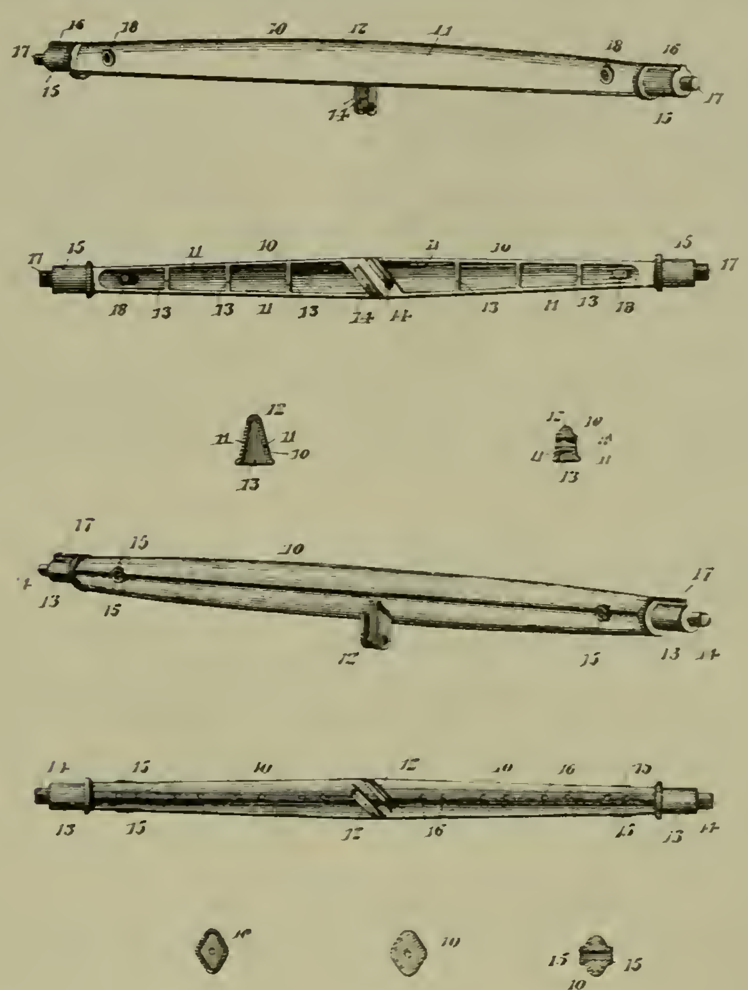
MR. CORNELIUS VANDERBILT, of New York, N. Y., has presented an improvement upon his locomotive-boiler of which so much has been written. The object of the present invention is to avoid the danger of leakage at the joints of the boiler-shell occasioned by unequal expansion and contraction of the parts, while avoiding unnecessary weight, saving valuable space in



the cab, and retaining a desirable generating surface and steam-space. To attain these desirable results in one structure, the main fire-box section, the forward or barrel section, and the middle conical section are arranged symmetrically with respect to the common axis, and the rear portion of the fire-box section is reduced or tapered to a head which is of larger diameter than the cylindrical fire-box, and, furthermore, the flue-sheet is inclined from the vertical, so that it shall stand at right angles to the inclined tubes.

The forward or barrel section of the boiler is cylindrical and is connected by a truncated conical middle section with the main fire-box section, which is also cylindrical and is of greater diameter than the forward or barrel section. These three sections of the boiler shell are severally symmetrical with respect to the common axis of the boiler, whereby unequal expansion and contraction at the joints between the several sections are avoided, and consequently leakage at such joints is also avoided. The rear portion of the fire-box section is tapered or reduced in diameter to afford additional room within the cab and to avoid unnceessary weight, the extreme end of such portion being secured in the usual manner to a head, which is of greater diameter than the cylindrical fire-box. If this portion of the fire-box section were reduced to the diameter of the fire-box, not only would desirable generating-surface be lost, since the water-level within the boiler is necessarily higher than the top of the fire-box, but valuable steam-space above the water-level would also be sacrificed. The connection of the tapered portion of the fire-box section to the head avoids the objections just mentioned and at the same time secures the advantages above referred to. The fire-box is preferably cylindrical in cross-section and is disposed eccentrically within the fire-box section of the boiler. The rear flue-sheet and the forward flue-sheet are set at a slight angle from the vertical, so that the inclined tubes may be secured to said flue-sheets at right angles thereto, thereby avoiding danger of leakage at the joints between the tubes and the flue-sheets.

MR. WILSON E. SYMONS, superintendent of motive power of the Plant System of Railways, has designed two novel designs for brake beams. It is his plan to make them of cast steel. One consists of a beam in the form of a hollow body, which is substantially diamond-shaped in cross-section, with its corners rounded.

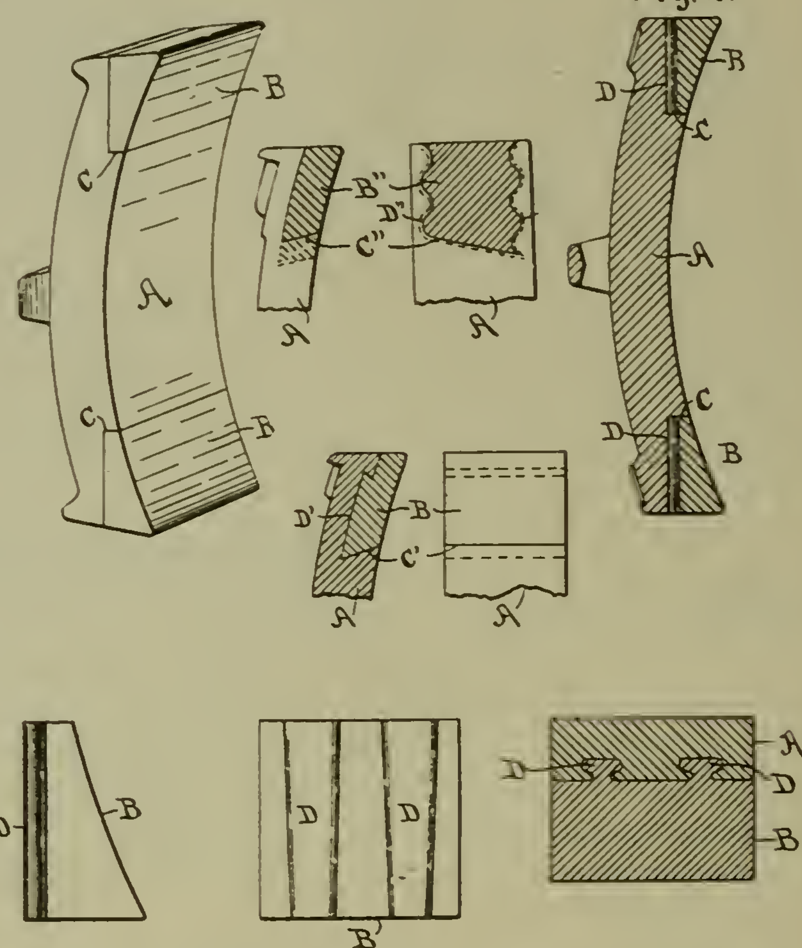


The body tapers from its central portion toward its ends, and said central portion is provided with spaced lugs, which are located at an inclination to the side walls. The ends have projecting spindles, which are provided with terminal screw-threaded shanks and a rib or feather. Transverse openings or sockets are located in the body contiguous to the inner ends of the spindles.

The other beam is substantially triangular in cross-section and tapers from its central portion toward its ends. The body comprises a pair of walls arranged in angular relation and joined at their convergent side edges, the opposite edges being spaced apart. Transversely-disposed webs extend across the space between and connect the side walls. Minor details of the design reside in arranging the centrally-located spaced lugs at an inclination to the side walls and in providing longitudinal feathers upon the spindles; also, in screw-threading the shanks and providing transverse sockets or openings through the body contiguous to its ends.

MR. GEORGE O. VAIR, of Corning, N. Y., claims that chilling the surface of all or any portion of the shoe very materially weakens the shoe, for the reason that the depth to which a surface chill may be thrown cannot be calculated close enough by any modern method so but at times it will be thrown through the entire depth of the shoe. This of course makes the shoe dangerous and worthless, as a brake-shoe thus chilled through its entire depth will not have sufficient strength to resist the brake-pressure and will consequently break and fall off, thereby causing great danger to life and property. To overcome this objection to a chilled shoe and yet retain the chilled or hardened surface portions and also to further reduce the cost of production, he has devised a brake-shoe comprising a body portion of soft strong non-chilling iron, having cast thereon at each end a chilled or hard iron or steel pad or end tip. The body of the shoe may be made from any close strong cast-iron (preferably scrap), but free from chilling qualities. The end tips or pads may be made from white iron or steel, or they may be chilled by being cast on a chill-mold, and are provided at the back with tapered dove-tails, around which the metal of the body portion flows in the process of casting, thereby fastening the pads securely to said body portion. The inner ends of these pads are squared, so as to abut

Fig. 2.



against shoulders in the body portion. The method of manufacturing the brake-shoe is as follows: The end tips or pads are first cast from white iron or steel or upon a chill-mold. A wood or metal pattern having recesses in the ends is then placed upon and surrounded by the drag part of the flask. In the recesses at the ends of the pattern are then laid the dovetails of the pads, so that the upper face of the shoe-pattern and the upper face of the pads are in the same circle. The whole is then covered with molding-sand and rammed up. The half-mold is then rolled over and the follow-board taken off. After this the cope part of the flask is put on and rammed up. The wood or body portion of the shoe-pattern is then withdrawn, leaving the end tips or pads as a component part of the mold. Iron is then poured into the mold, filling the body portion and running down into the interstices between the dovetails, thereby incorporating the dovetails into the body of the shoe and permanently fastening the end tips or pads to the shoe.

The Year 1901

As showing to what extent the business interests of the railway service have been advanced during the past year, we publish the following from some of the more prominent manufacturers of railway supplies:

The Standard Pneumatic Tool Co., of Chicago, state that their sales of "Little Giant" pneumatic drills, hammers, boring machines and other air appliances has increased almost 100 per cent during the past year, particularly in the west and south. They have made a large number of improvements in their machines, which has greatly enhanced their value as time and labor savers on railroad work. They are constantly increasing their manufacturing facilities and the outlook for business during the coming year is very promising in-

The Springfield Manufacturing Co., of Bridgeport, Conn., manufacturers of surface, slide bar, car wheel, universal, tool and dry grinders, as well as emery wheels, report the largest business during the past year they have ever had. In 1900 they built a new modern factory constructed of iron, brick and stone, containing about 20,000 square feet of floor space, one story with Monitor roof. Assembling floor, 160 feet long and 20 feet wide, equipped with two traveling cranes over the entire floor, which is made of vitrified stone. The plant is heated by steam; power, electricity. They are now contemplating doubling their capacity the coming year to take care of their new orders more promptly, and have already placed orders for expensive machinery, including one 54x54x20-ft. Pond planer equipped with four heads and all modern improvements. While their business has covered a large variety of special grinding machines, they report a larger sale of surface grinders and car wheel grinders than ever in one year before. In their emery wheel department they also have increased their facilities and expect soon to make further improvements.

Gould & Eberhardt, of Newark, N. J., say that there has been a steady domestic demand for their machine tools during the past year, but the foreign market has fallen off considerably owing to the general depressed condition of business in Europe. There has been a good demand from the leading railroad shops in this country and Canada for their Eberhardt's patent drill presses and "double triple quick" stroke shapers, as also far a few of their larger size gear cutting machines. Of their shapers, the patented extension base style seems best to meet popular favor. Within the past month they have received an increased number of inquiries from railroad purchasing agents, which would seem to be indicative of extensive alterations and additions to the present equipment of some of the more prominent lines. They believe the demand for machine tools, particularly of the better grades, will hold firm for at least another year and possibly several years.

Washburn Coupler Co., Minneapolis, Minn., write as follows: "Our business has been very satisfactory, and prices have been well sustained. We are most pleased with the large sales which we have made of our couplers with flexible heads. This device seems to interest all railway mechanical men who have given couplers any thought whatever, and we believe that the sale of these devices will steadily increase. At the present we are unable to keep up with the demand for couplers of this type. The general tendency in railroad is toward couplers of heavy types, and we are of the opinion that the adoption of 5x7 shank will decrease to a very great extent the breakage of coupler shanks, as well as the smaller parts. We are preparing a coupler with a 5x7 shank, and in making up this coupler have improved very greatly upon our knuckle and locking device, and have also taken advantage of the increased size to make such arrangements of the parts in the head as will give a great increase in strength."

Boston & Lockport Block Co., of Boston, Mass., state that the past year has been one of the best they have ever had. The increased demand for special blocks and trucks for extra heavy work shows the expansion along all lines, and that all companies using blocks are seeking only the best and of larger capacity than ever before. To meet the increased demand they have put in important additions at their East Boston factory, increased the power and other facilities for handling this larger work promptly, besides furnishing additional storage room so that they can carry larger stocks for immediate shipment. They have also found it necessary to take extra space for their Boston store, having added three additional floors, one of which will be devoted exclusively to trucks and platform wagons more especially for the New England trade. Their pump trade has increased largely and they are bringing out a set of patterns for an entirely new diaphragm pump, which will act as a force pump as well as a suction. Their 1902 catalogue is in press and will be ready for delivery about the first of the year. They are now ready to book orders for same, which they will be pleased to send free of expense to all interested parties as soon as they may be received from the printers. Their new Boston address will be No. 160 Commercial street.

The Safety Car Heating & Lighting Co. has compiled some very interesting statistics regarding the wonderful development of the use of Pintsch gas, from statements sent them recently by Julius Pintsch, of Berlin, Germany. An interesting detail, and one which will be a surprise to many, is the fact that there are now 17,000 cars in the United States in which this gas is used; and that there are 54 plants manufacturing the gas. The entire statement is as follows:

Statement of Cars, Locomotives, Buoys, Etc., Using Pintsch System of Lighting to May, 1901.

	Cars.	Locomotives.	Gas Wks.	Buoys & Beacons.
Germany	38,218	4,285	71	98
Denmark	45	.....	3	21
England	18,611	18	87	272
France	6,618	.....	27	240
Holland	3,318	5	10	83
Italy	1,528	.....	5	15
Switzerland ..	380	2	1	...
Austria	3,777	.....	10	1
Russia	2,845	102	13	13
Sweden	591	29	4	2
Servia	169	.....	..	...
Bulgaria	98	.....	1	...
Turkey	112	.....	..	...
Egypt	2	.....	3	112
Canada	75	.....	2	60
Brazil	974	31	1	33
Argentine	1,046	.....	10	2
Chili	46	.....	2	...
India	8,058	.....	16	...
Australia	2,053	.....	13	29
United States.	17,000	.....	54	162
Japan	100	.....	2	4
China	...	.....	1	15
Total	105,664	4,472	336	1,162
Increase for the year	7,482	451	30	124

The Pressed Steel Car Company of Pittsburg, Pa., has, of course, made large advances during the past year. In the various changes that have been wrought during the past decade in connection with the railroad and mining interests in the United States, we doubt if there has been such rapid progress in any other one branch of these various interests, as in the means of transportation. This has been brought about by the introduction of the large-capacity steel car. There can be no doubt as to the steel car being an assured success, and this has been conclusively demonstrated by the cars now in actual service. The Pressed Steel Car Company, of Pittsburg, were the first to build large-capacity steel cars in America, and are practically the only company doing business on a large scale today. The development of the industry cannot be better illustrated than by the fact that the Pressed Steel Car Company built in—

1897	501 cars.
1898	2,931 cars.
1899	9,624 cars.
1900	16,671 cars.

Up to and including November, 1901, 23,381 cars, making a grand total of 53,108 cars. The rapid development of the pressed steel car and the prompt manner in which it has been adopted by the leading railroads of this and foreign countries, is attributed to the economies it produces; briefly stated, they are: reduced number of cars required, reduced friction and atmospheric resistance, reduced empty car movement, reduced switching service, reduced train length, reduced payment for car mileage, and cost of inspection, reduced number of parts, greater life, no insurance, greater salvage, and an increase in traffic capacity of sidings, treminals and, in fact, the entire road. Decrease in cost of repairs from an average of between $30 and $40 per annum for wooden cars, to an average, established by complete records, of $10 to $15. It has been estimated by several railroad companies using steel cars to great extent that the revenue derived from the increased load alone will pay for the cars in less than three years. The Bessemer & Lake Erie Railroad is one of the many American railroads which has adopted the pressed steel car. It hauls iron ore from Lake Erie to Pittsburg and coal to the lake. From the moment it put into operation pressed steel cars of 10,000 lbs. capacity it showed 73½% paying load to train weight, and showed train-mile earnings of $5.38 per mile. The Railroad Gazette is responsible for the following statement of train-mile earnings of other roads the same year: Chesapeake & Ohio, $1.38; Erie, $1.37; New York Central, $1.84; Northern Pacific, $2.75; Great Northern, $2.73. As contrasted with any of the other earnings cited, $5.38 to the mile is fairly favorable to the pressed steel car. Bessemer traffic consists largely of train-load lots, for which, of course, some allowance should be made. In addition to the thousands of all-steel cars manufactured for the handling of coal, ore, limestone, and other similar commodities, many box cars with wooden bodies and steel underframes are being built. The Pressed Steel Car Company, of Pittsburg, are now delivering a large number of steel-underframe box cars of 100,000 lbs. capacity for the Pennsylvania Railroad.

Baldwin Locomotive Works, Philadelphia, Penn., call attention to the mechanical developments of the locomotive, and as conspicuous among these developments they note the following: During the present year a large number of locomotives have been built of what is known as the Prairie type, having three pairs of coupled wheels and a two-wheeled truck at the front and rear, with the firebox extending out over the rear wheels. While this type maay be new in its particular adaption to broad gauge locomotives, all of the principal features have been covered by the Baldwin Locomotive Works in locomotives they have built for various foreign roads. In 1885 a number of locomotives were built at these Works for the New Zealand Government. These locomotives were practically of this type. The arrangement of the wheels was identical, although the firebox was placed between the driving wheels, extending over the driving axle. Many locomotives of this type were built for various roads in Japan, Australia and South American countries. In 1895 orders were received from the Government Railway of Japan for 24 passenger and 20 freight locomotives to burn an inferior quality of coal. To accomplish this result fireboxes of extraordinary size were required. The tractive power necessary for the passenger locomotives could be obtained with two pairs of driving wheels, but for the freight locomotives it was necessary to use four pairs of coupled wheels in order not to overload the rails. The firebox in both of these types was carried back of the back driving wheels and a rear truck placed under the firebox to support the overhanging weight. This was the first instance in which the combination was made of the wide, overhanging firebox and the swinging rear truck. It will be seen that this arrangement, so far as the back driving wheels and the truck are concerned, is practically the same as that adopted in the Prairie type and covers the important feature of the design, the number and sequence of the wheels being immaterial, depending entirely on the conditions and requirements of the service. The Atlantic type for fast passenger service is also an example of the locomotive in which, for the purpose of increasing the boiler capacity, the firebox is placed entirely back of the rear pair of driving wheels, and the weight is supported by a single pair of wheels much smaller than the driving wheels in order to allow an adequate depth of firebox. As originally designed, and in the practice of these works, the trailing wheels are supported in the engine frame and comprised in the rigid wheel-base of the locomotive. The Atlantic type was originated at the Baldwin Locomotive Works in 1895, and since that time about 200 have been built at these works for leading roads in the United States, France, Bavaria, Japan and South Africa. The success of the type in the service for which it was designed has been so marked that it has been fequently copied in the United States under various other names, although the broad principles have been adhered to. This type has also been copied in England. The Vanderbilt firebox and Vanderbilt tender may also be mentioned among the new features of locomotive construction. This locomotive, built by the Baldwin Locomotive Works for the Illinois Central Railroad, embodying both of these inventions, was illustrated and described in a recent issue of the Railway Master Mechanic.

New Dining Cars, L. & N. R. R.

THERE have been recently built by the Pullman Company and delivered to the Louisville & Nashville Railroad, three new dining cars which are very handsome in appearance and design. These cars are 70 feet in length over sills, 9 feet 8 inches width over sills. The Pullman standard cantilever truss is used with continuous blocking below the belt rail, and standard anti-telescoping device is also used. The finish inside the car is mahogany with fine figured veneer panels, except the kitchen, which is finished in oak. The

ceiling is Empire pattern painted light green with gold decorations. There is a seating capacity for thirty people. Standard steel platforms, wide vestibules, Westinghouse brakes, Pullman standard trucks and National hollow brakebeams are part of the equipment. The

general style of interior finish is shown in the accompanying illustrations. We are indebted to Mr. C. L. Stone, general passenger agent of the Louisville & Nashville, for the information from which this description has been taken.

An Interesting Contrast

THROUGH the courtesy of "Sunset" Magazine we show the accompanying illustrations, which tell at a glance a story of railway evolution. Mr. Paul Sharp, in a recent article in "Sunset" on this subject, says that "the ordinary box-car to most of us is the box-car of twenty years ago. That it is far larger in every way, that it possesses double the capacity of its predecessor, we are apt to overlook. The engines do not seem to our hasty sight to greatly change. The great freight haulers may weigh upwards of two hundred tons against ordinarily less than half that weight when Garfield was elected president, and may have twenty additional devices such as those used for ringing the bell automatically and burning oil; yet if we notice any change it is more apt to be that nowadays the smokestacks have lost their bands and their flaring, pretentious tops. Perhaps if observant, we notice the extension fronts that give an air of dignity to these locomotives and may be note that driving wheels nowadays are quite apt to be six feet in diameter. Yet there are changes in railroads, wonderful changes that require constant remodeling and rebuilding, in maintenance of way and in rolling stock. It is a subject of serious, of vital interest to a railroad. A road must not lag behind. As a competitive line it must meet rivals; as a part of a through line it must do its share in carrying people and their belongings between great traffic centers."

Two Locomotives that Help the Story of Railway Evolution.
From "Sunset." Courtesy Southern Pacific Co.

Railway Box Cars of the Past and Present.
From "Sunset." Courtesy Southern Pacific Co.

The Round House of the Pittsburg & Lake Erie R. R.

THE Pittsburg & Lake Erie R. R. recently completed a new roundhouse at McKee's Rocks, Penn. This is the first building erected following out the plan of having new shops and facilities for caring for locomotives and cars at McKees Rocks. It will be interesting to read in connection with this description the report of the committee of the Master Mechanics' Association on "An Up-to-date Roundhouse." See page 218 of the July issue of the Railway Master Mechanic.

There are several interesting features of design and equipment. The building is designed for 34 stalls, but the contract for construction covers only 29. The structure is a brick building 300 ft. in diameter, between the outer walls, and 75 ft. deep, with a 60-ft. turntable at the center and a 45-ft. space intervening between it and the inner walls of the roundhouse. The walls of the building are upon concrete footings. The inner side of the roundhouse is framed with steel columns spaced 13 ft. centers and 12 ft. 1¾ ins. in the clear. The clear space from top of rail to the under side of the girder over the door is 17 ft. The general plans of the construction of the building are shown in the accompanying Fig. 1. The roof slopes 1½ ins. to the foot, and is made of 1¼-in. matched yellow pine dressed on one side and covered with ordinary tar and gravel roofing material.

A prominent feature in the construction of the building is the large amount of light secured. This commendable arrangement is accomplished by a window over the large doors, two large windows on the opposite side of the house, in each stall, and two windows above them at

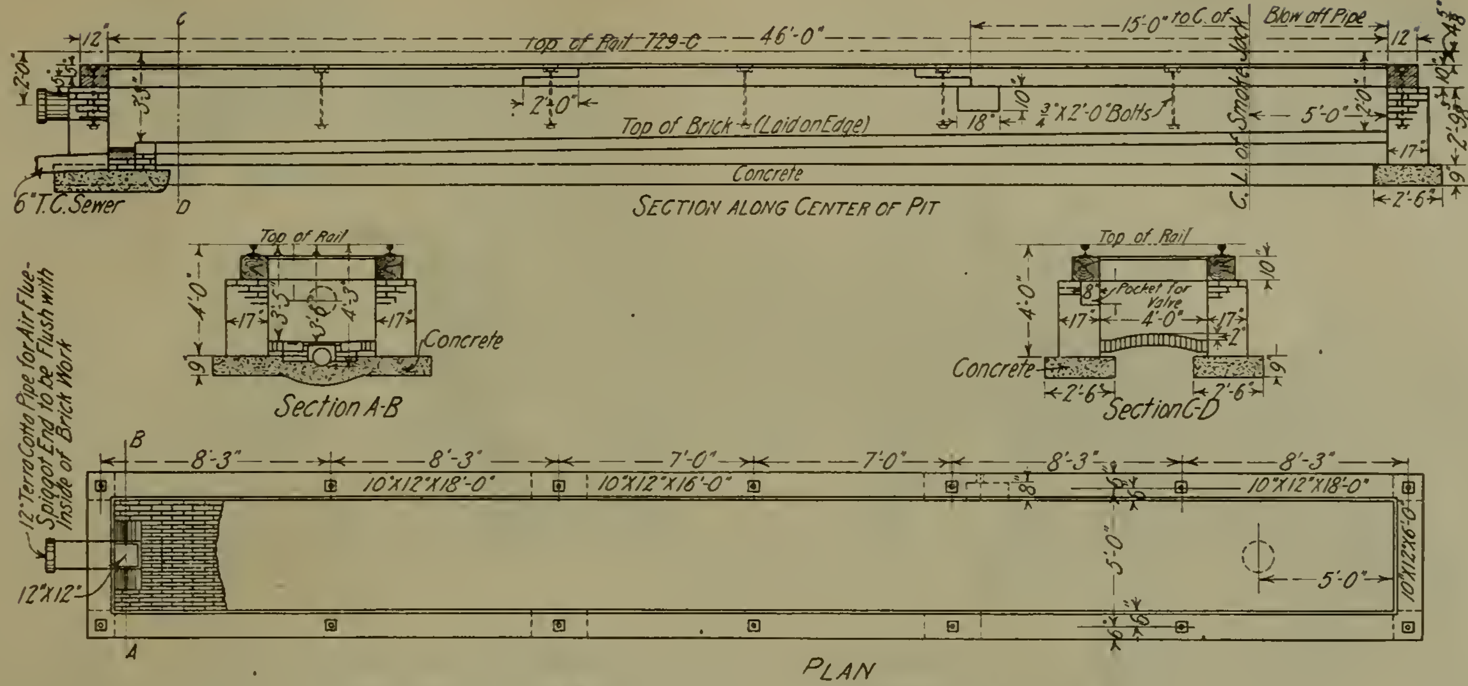


FIG. 2—ENGINE PIT, McKEE'S ROCKS ROUNDHOUSE, P. & L. E. R. R.

the ends of the roof trusses, shown in the figure. The flooring is of 1¾-in. plank. Use is made of the Dickinson cast iron adjustable smoke jack and copper ventilators 2 ft. in diameter with dampers, one in each stall. Metal rolling doors are used, some of which were made by the Kinnear Manufacturing Co., of Columbus, O., and others by J. Godfrey Wilson, of New York City.

The building is lighted with its own electric plant, there being an inclosed arc lamp in the space between each two stalls. Each lamp has its own drop switch which can be easily reached from the floor to cut it out when not in use. There are also incandescent lamps at the work benches around the wall, opposite the doors, and there are arc lamps placed on brackets outside of the roundhouse, to light the space around the turntable, besides other lamps at the water plugs.

The house is heated and ventilated by warm air blown by a Sturtevant fan located just outside of the house, as

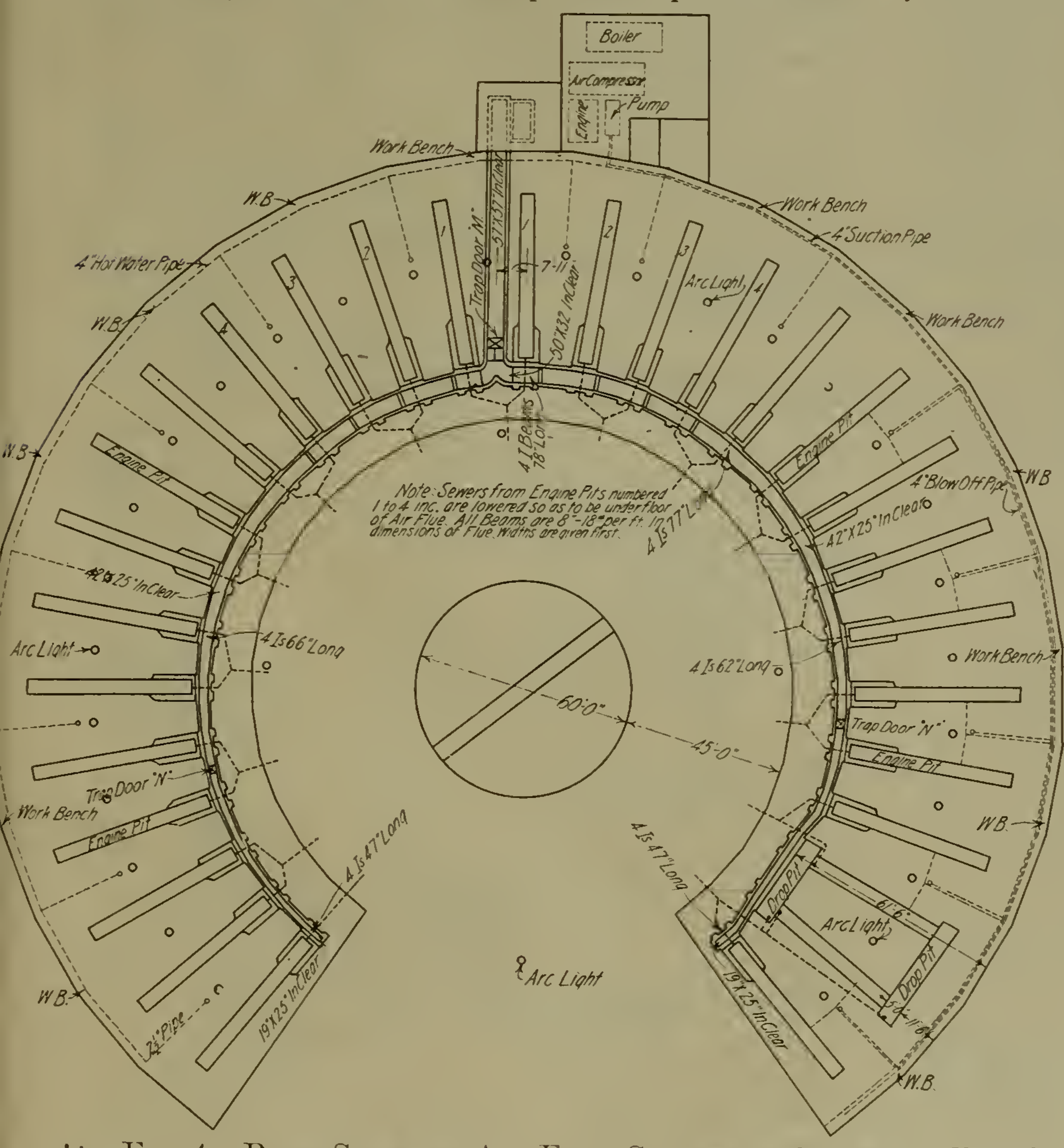


FIG. 4—PLAN SHOWING AIR FLUE SYSTEM OF PIPING. McKEE'S ROCKS ROUNDHOUSE, P. & L. E. R. R.

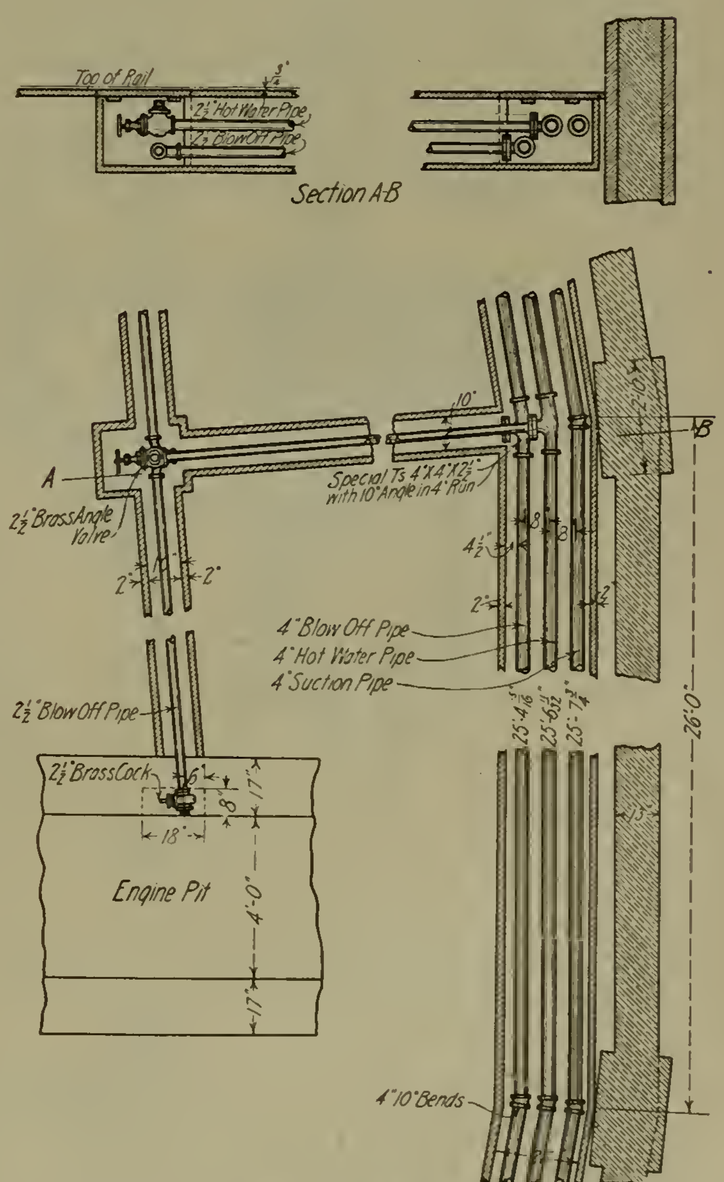


FIG. 6—DETAILS OF PIPING ARRANGEMENTS, McKEE'S ROCKS ROUNDHOUSE, P. & L. E. R. R.

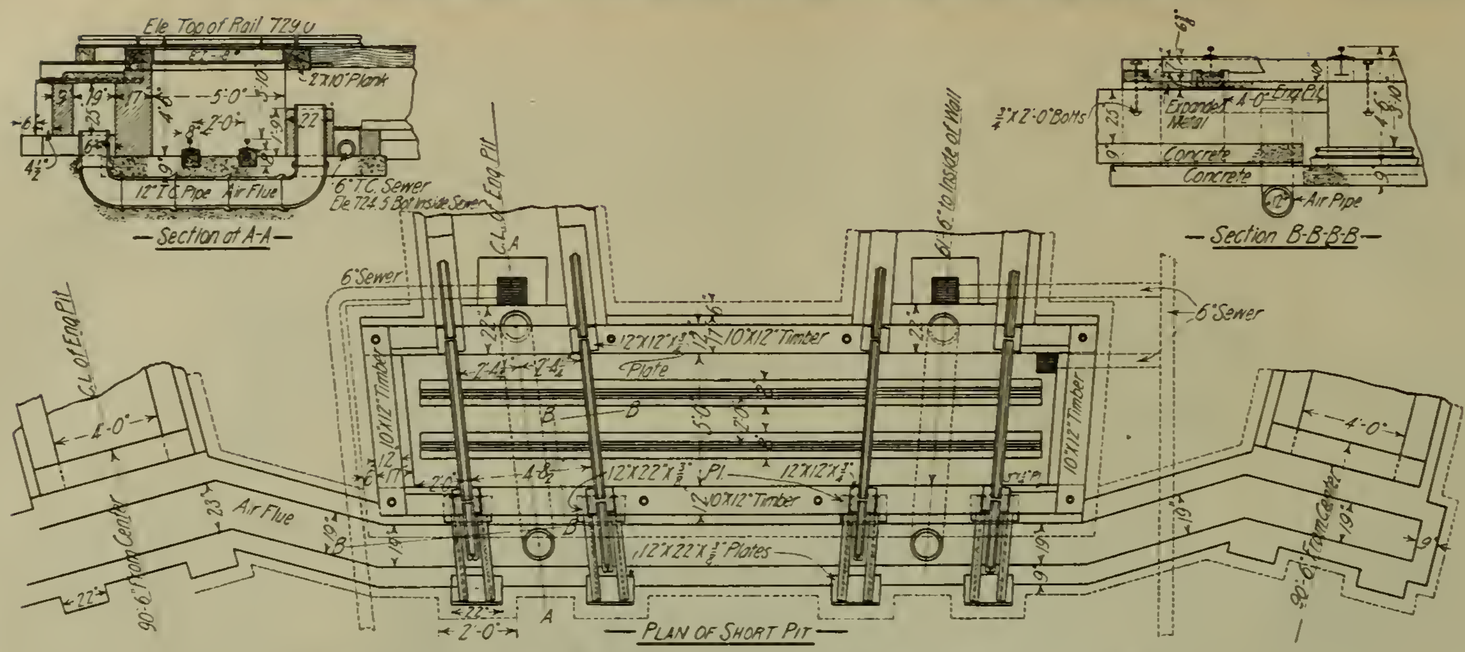
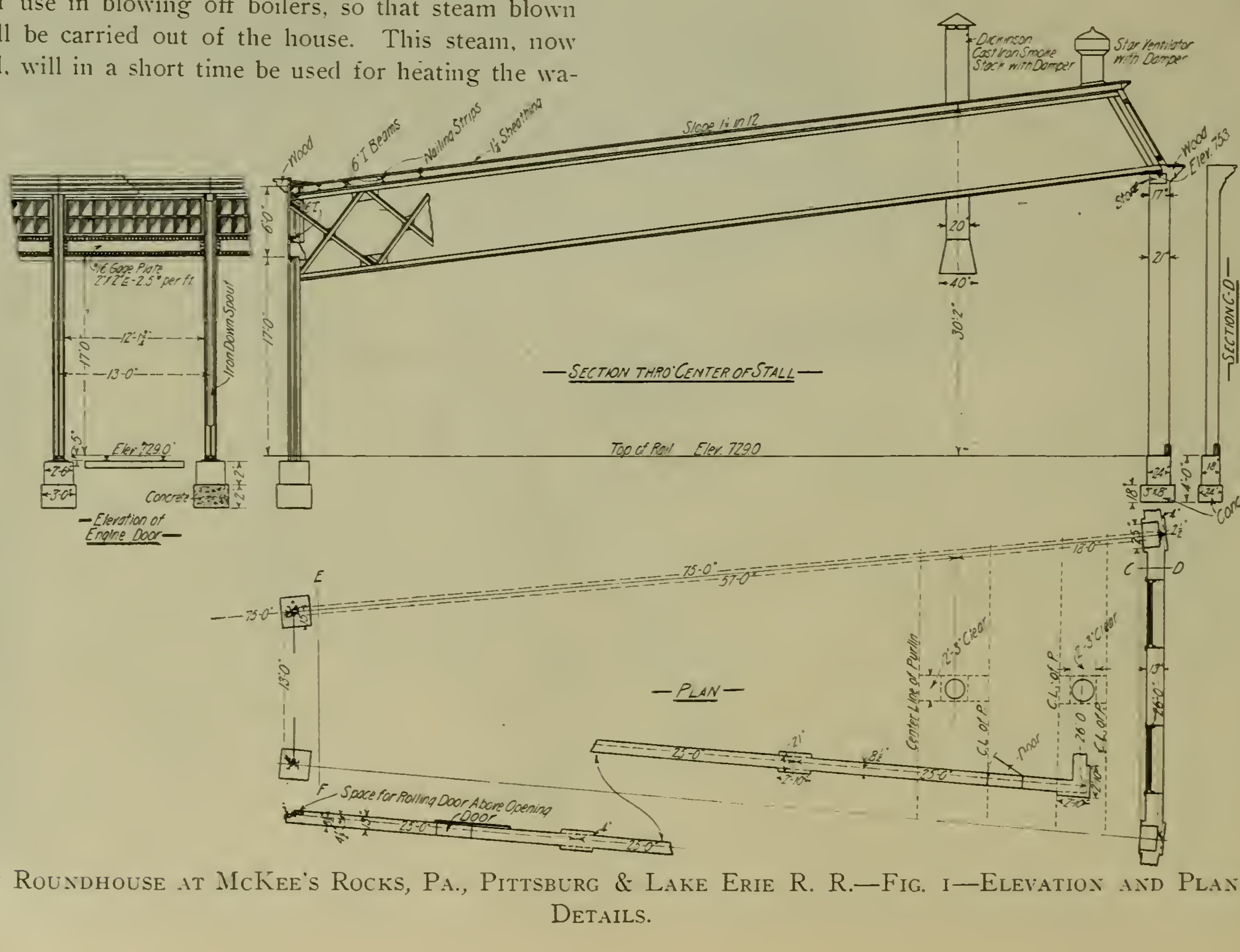


Fig. 3—Drop Pits in McKee's Rocks Roundhouse, P. & L. E. R. R.

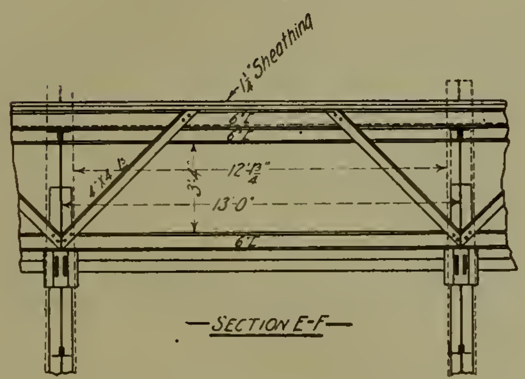
shown in Fig. 4. The air is conveyed by a brick duct under the floor to a point at the turntable end of the engine pits, where it divides into two branches which run around the house at the ends of the engine pits. From these ducts there is a circular opening to each pit 12 ins. in diameter, with a damper to control the discharge. The details of the air flue arrangement at each pit are made clear in Fig. 5. The air is heated by exhaust steam from the 50-h. p. engine, and there has been no difficulty in heating the house to a temperature of 60 deg., F., during zero weather.

The details of the engine pits and of the drop pits are shown in Figs. 2 and 3. Ten engine pits, including the two with drop pit facilities, are arranged with steam piping for use in blowing off boilers, so that steam blown off will be carried out of the house. This steam, now wasted, will in a short time be used for heating the water for washing the boilers. Compressed air and steam are piped to each engine pit for use in operating drills, blowers, etc., and a force pump is used for supplying water for washing out boilers. This pump draws from the ordinary water tank head and delivers the water at the required pressure at openings in the floor between the engine pits, as shown in Figs. 2, 4 and 6. The plan drawing, Fig. 4, shows the general arrangement of both the air flue and piping systems, while Fig. 6 shows the arrangement for bringing the pipes into the pits. All piping in the house is accessible, and is free to expand and contract as the temperature changes on account of steam and hot water being used at various times.



New Roundhouse at McKee's Rocks, Pa., Pittsburg & Lake Erie R. R.—Fig. 1—Elevation and Plan Details.

—Elevation of Outside Panel—



New Roundhouse, McKee's Rocks, Pa.

Patent Suction Pipe for Locomotives

THE accompanying photograph and drawings illustrate the application of an improved device for providing a free and ready flow of water to injectors on locomotives. As can be seen, the water has an unobstructed passage from the tank to the iinjector, there are no vtalves, and yt the engineer has perfect control of the water without moving from his seat.

This device consists of four parts only, which are made of malleable iron and threaded standard pipe size for 2-inch and 2½-inch pipe, is very cheap, and almost indestructible, some of them having been in use on the Yazoo & Mississippi Valley R. R. for the last five years, and have cost nothing for repairs since they were put on.

The water is drawn from the tank in such a manner that the sediment and dirt are left in the bowl and may be easily cleaned out by removing the plug in the well, the flow of water through this orifice quickly washing out the bowl.

That end of the pipe that is over the well is provided with a strainer, thus preventing the entrance of any obstructions and at the same time a free flow of water is

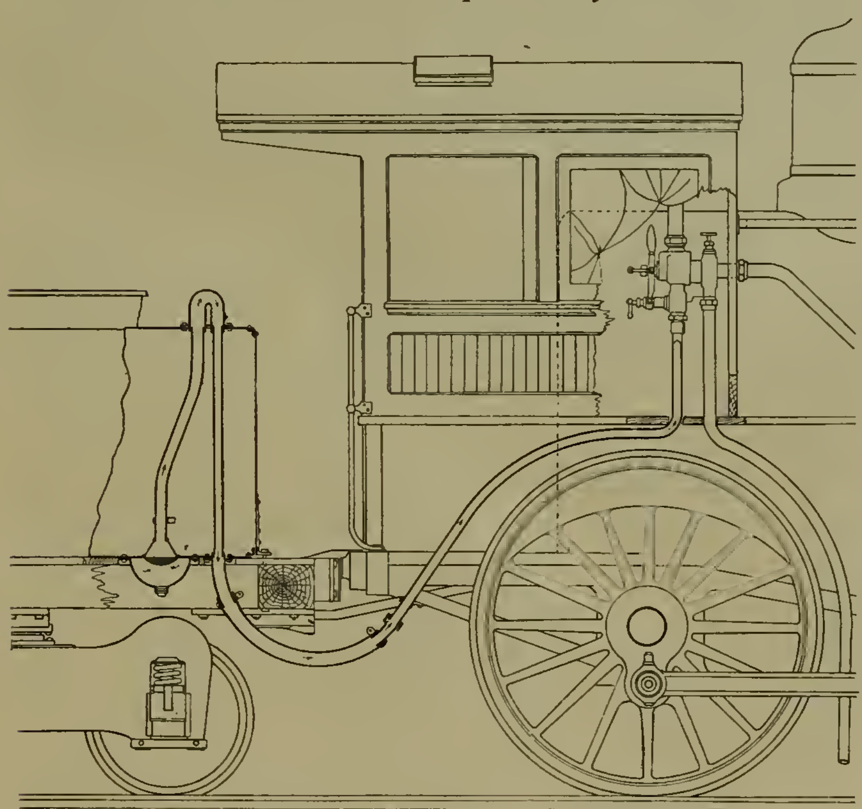


Fig. 2.

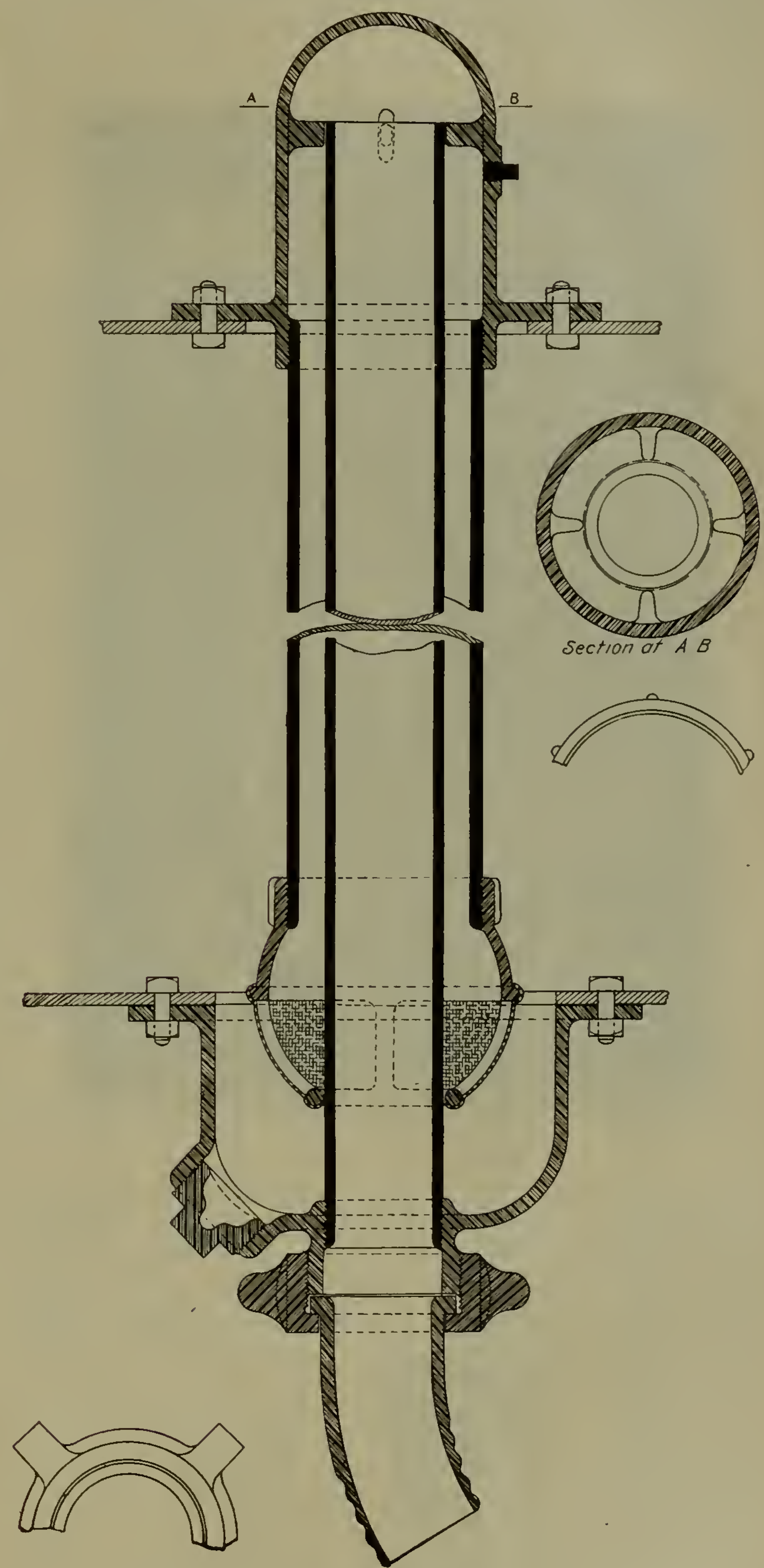


Fig. 3.

maintained to the full capacity in the tank. Eight wheel, 17x24 cylinder engines, with 3,850 gal. tank run 113 miles with one tank of water. This can be done for the reason that every drop of water can be used, there being no waste, as is the case with the old style tank valve.

An improved form of this syphon is shown in Fig. 3 and can be readily understood from the drawing. It is

FIG. 1.

claimed that with these syphons, an injector will run a great deal longer than with the old tank valve, for with it the injector had to be cleaned every 10,000 miles, whereas, with this device, an engine can run 20,000 miles before any cleaning is necessary.

The part of a locomotive'sequipment referred to in this article is important, and as there has been great improvement in it from the earlier designs, there is a considerable loss in efficiency resulting from the comparative crudeness in this part of the water system. It is true, there have been some improvement in the tank valves and there have been attempts to trap the sediment, but in this device there is a radical departure from the old style practice. IIt would be expected that a considerable economy and increased efficiency would result from the use of the Linstrom device.

It is patented by Mr. Charles Linstrom, master mechanic of the Yazoo & Bississippi Valley R. R. at Vicksburg, and is in use on a number of railroads.

A Record for Friction Draft Gear

WE publish herewith a statement of the record of Westinghouse Friction Draft Gear in service on Butte, Anaconda & Pacific Railway cars, which is interesting reading in view of the very great importance of this subject to railway people generally. This record was obtained with great care from the car foreman's record, and has been amply verified by submitting it to the operating officers of the B., A. & P. So far as these records bear upon the question, they support the contention that a friction draft device greatly reduces the draft gear stresses in the direction of its greatest weakness, viz., pulling or extension. It is evident that nearly all the breakages here reported were from pulling stresses, and not compression strains. Take, for instance, the item of yokes, which constitutes about one-third of all the breakages reported and which, not being subject in any way to compression strains, can, of course, only be broken in pulling.

The data contained in the attached report indicate that the merits of the device in service are promptly apparent.

RECORD OF FRICTION DRAFT GEAR ON BUTTE, ANACONDA & PACIFIC RAILWAY CARS.

The Butte, Anaconda & Pacific road has 520 fifty-ton Pressed Steel Car Company's ore cars, all of which are fitted with the Westinghouse Friction Draft Gear, and used in ore traffic between the mines in Butte and the smelters in Anaconda, Montana. The comparative records given below are for 155 of the above 520 cars, 5 of which were placed in service August, 1898, and the remaining 150 in June, 1900; the remainder of the 520 cars having been placed in service more recently. The couplers on these cars have 6-inch shanks, excepting the 5 cars first in service, which have 5-inch shanks.

One of the connecting lines of the Butte, Anaconda & Pacific has a number of similar steel cars, equipped with twin-spring draft gear, also having couplers with 6-inch shanks, and used in the coal traffic over the Butte, Anaconda & Pacific railway, to the smelters in Anaconda and the mines in Butte.

The record of draft-gear failures and mileage made for the six months from Nov. 1st, 1900, to May 1st, 1901, on fifty-ton steel cars, both foreign and home, on the lines of the Butte, Anaconda & Pacific Ry., is as follows:

1900	No. of Failures Foreign.	B.A.& P.	Car Mileage Foreign	B.A.& P.	Ratio of Mileage Foreign.	B.A.&P.	Remarks
Nov.	18	0	14455	149820	1	10.3	
Dec.	20	1	17183	146040	1	8.4	(x)
1901.							
Jan.	18	0	22356	139800	1	6.2	
Feb.	10	0	13263	97380	1	7.3	
Mar.	13	1	11637	131640	1	11.3	(xx)
Apr. 1	11	1	15535	149220	1	9.6	
	90	3					

(x) Three (3) B. A. & P., and three (3) foreign cars had sills damaged in a collision, and two (2) of the latter had couplers broken.

(xx) Friction draft gear cylinder found cracked two weeks earlier.

It therefore appears that the average monthly mileage of foreign fifty-ton steel cars on the Butte, Anaconda & Pacific road was 15.738 miles, while the average monthly mileage of the Butte, Anaconda & Pacific cars was 135, 650, or 8.6 times greater.

The yokes on the foreign cars were of 1x4 inch iron, while nearly all of those on the B., A. & P. cars fitted with friction draft gear were of 1x4½ inch iron. Of the 90 breakages of draft gear on foreign cars, 25 were boken yokes. Deducting this number on account of yokes being unlike, we have 65 couplers and knuckle breakages on foreign cars to 3 on the B., A. & P. cars, or more than 21 times as many. On an equal mileage basis, the breakages on foreign cars were 185 times as many as on the B., A. & P. cars fitted with the friction draft gear.

We are assuming that the couplers on foreign cars were of equal strength with those on the B. A. & P. cars, and as all of the former had the extra-large 6 in. shank and, therefore, were designed for especially severe service, this assumption seems amply justified. The breakages on foreign cars were divided as follows:

35 couplers,
30 knuckles,
25 yokes.
—
90

On B. A. & P. cars but 3 couplers were broken and no knuckles or yokes, this comprising the entire breakage of draft attachments in six months' service. Compared with 35 broken couplers on foreign cars and allowing for the home cars making 8.6 times greater mileage, the breakage of couplers only, on an equal mileage basis, on the foreign cars with the double-spring draft gear was 100 times as great, or, 300 couplers, instead of 3, would have been broken on B. A. & P. cars had they been equipped with the spring draft gear.

The saving in coupler breakages only in six months' service, by the use of the friction draft gear on 155 cars, as shown by the above record, was enough to pay the entire cost of the friction draft gear with which they were equipped, the saving in broken knuckles and yokes being additional and in the nature of an increased interest—and a large one—on the investment.

The ore service on the B. A. & P. is severe as the grades are steep reaching 132 ft. per mile, while the locomotives are very heavy and powerful, those used between terminals being eight-wheel-connected Schenectady compounds. Trains of 50 and 60 loads are handled one way and empties the other, all the air brakes on the latter rarely ever being used, resulting in additional severe strains on the draft gear.

At each terminal, the powerful switch engines employed work on heavy grades, enabling them to handle but few cars at a time, which causes a great deal of switching and an unusually severe service for the draft attachments. The use of heavy locomotives on steep grades, handling cars of large capacity—conditions which are rapidly becoming common on many roads—probably accounts for the inadequacy of the spring draft gear, although of the strongest type and greatest capacity, to protect the couplers from breaking. The record at the same time brings out very clearly the great value and really indispensable character of the friction draft gear under these conditions.

A Pneumatic Motor Chain Hoist

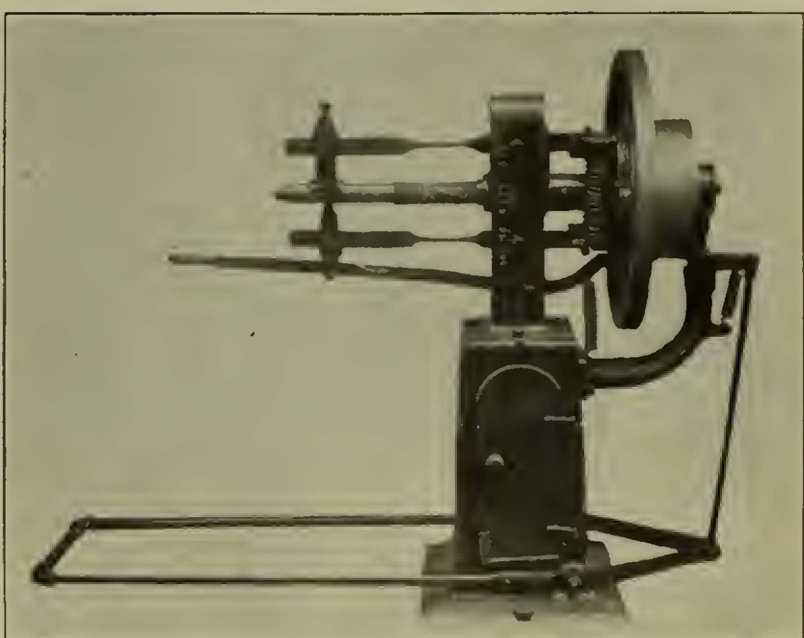
A HOIST that takes up little head-room and will positively hold its load, has long been desired. We illustrate herewith a pneumatic motor chain hoist which is light and takes up about the same head-room as the hand-power differential hoists. They are easily handled and are under the perfect control of the operator to start, stop and hold load at any point. They do not de-

pend upon air pressure to sustain load. These hoists can be suspended upon a trolley and run in any direction or upon a boom of jib-crane, or in any position where a block and fall can be used. One reversible motor is attached to the side plates. This motor has a pinion on each end of piston shaft, which meshes into driving gear wheels, which in turn operate the main shaft, upon which sprocket wheels are placed for the chain to run over. Being a chain hoist, any length of lift desired can be obtained. These hoists are for sale by the Eclipse Pneumatic Tool Co., 303 Dearborn Street, Chicago.

Herschell Flue Welding Machine

THE flue welding machine shown in the accompanying illustration is built for welding any size from one and a quarter to four inches. It will weld on the average 200 two-inch tubes per day. If using a belt machine, only one man is required to operate it. The machine should run from 100 to 110 revolutions per minute. It is in use in many railroad shops, where it has given satisfaction. One complete set of tools for operating upon any given size of flue is furnished with each machine. These tools consist of scarfing and welding swages and spindle. The machine is quite handsome in appearance, the pedestal being a box base with door and shelves for tools. The power is applied by belt to a friction pulley in the rear of the machine.

The machine built for railroad service is made 2 inches standard and is furnished with a complete set of tools for scarfing the ends preparatory to welding. The mandrels are finished so as the flue when cold will fit and when heated for welding will expand enough to go on easily. The swedges or hammers are made so as to conform to the flue and when taken from the mandrel are smooth inside and out and true to size. The capacity of the machine depends upon how fast the flues can be heated. In operating the machine by hand the back bracket and clutch are taken off and the crank put on. The machine is automatic and all that is necessary to do is to heat the flue, ram it on the mandrel; the machine then does the turning and both hammers operate simultaneously except when scarfing, when only one is used. Twelve to fifteen revolutions of the wheel will usually weld a flue. The shipping weight of machine is 650 lbs. and it occupies a floor space of 18 inches square. There is no countershaft required, no gear wheels to get out of order and it can be repaired in any shop. The machine is made in three styles by Maddocks & Herschell, of Princeton, Ind., who will gladly furnish any additional information upon request.



HERSCHELL FLUE WELDING MACHINE.

Cleveland Car Foremen's Association

The regular meeting of the Cleveland Car Foremen's Association was held at the Kennard Hotel Saturday, November 16. Among the items of business discussed was the matter of changing time of meeting from day to evening, which was taken up, and after some discussion a motion was made and carried that the time for holding meetings be changed from the afternoon to the third Saturday evening of the month, calling the meeting to order at 7:30 p. m.

A committee was appointed relative to having membership cards printed, and they were instructed to draft a clause changing the constitution, so as to allow other classes of railroad employes to become members, with a view of increasing the membership of the association. Messrs. Johnson, McAlpine and Dennerle were appointed the committee, with instructions to report at the next meeting.

Among the subjects discussed were the following:

No. 1. Side door forced out by load, and partial transfer necessary in order to make repairs. Who is responsible for the partial transfer, also for the repairs to door? After discussion, by a unanimous vote of the association, it was made the sense of the meeting that the delivering company would be responsible for the partial transfer, and the owners for repairs to door.

No. 2. A foreign car was received empty from owners and returned three days after, empty. Owners found six pieces copper roofing cut out, and claimed the road having car three days was responsible; said road claimed no unfair usage, not responsible, as it was a case of inside or concealed parts damaged. Who is responsible? It was the sense of the meeting that the owners would be responsible.

Mr. Johnson asked for an expression of opinion from those present as to whether they would consider owners or delivering company responsible for missing water troughs in stock cars. He recently had a case of a stock car with water troughs missing, and in corresponding with a number of car department officials throughout the country it developed that they were about evenly divided on the question. After considerable discussion it was made the sense of the meeting that in cases of stock cars where the troughs are concealed by the slats, and missing ones could not be detected except by inspecting the interior of car, they be considered owners' defect; but in cases of cars where the troughs are so located that they are easily discernible from the outside, the delivering road would be responsible for any that may be missing. After a topical discussion on various matters in connection with car department work, the meeting adjourned.

Personals

Mr. P. M. Hammett, assistant superintendent of motive power of the Boston & Maine, has resigned to take the same position with the Maine Central.

The headquarters of the superinendent of machinery of the Kansas City Southern have been changed to Pittsburg, Kan.

Mr. T. A. Summerskill, master mechanic of the Grand Trunk at Allandale, Ont., has been appointed superintendent of motive power of the Central Vermont, with headquarters at St. Albans, Vt., to succeed Mr. William Hassman, resigned.

Mr. E. T. White, assistant mechanical superintendent of Baltimore & Ohio, at Baltimore, Md., has been appointed superintendent of motive power of the lines east of the Ohio river, with office at Baltimore, and Mr. W. S. Haines, assistant mechanical superintendent at Newark, O., has been appointed superintendent of the lines west of the Ohio river, with office at Newark. S. B. Mason, assistant to the mechanical superintendent, has had his title changed to assistant to the general superintendent of motive power, with office at Mt. Clare, Baltimore.

Mr. I. N. Kilbaugh has resigned as master mechanic of the Baltimore & Ohio at Glenwood, Pa.

Mr. Fred Place has been appointed master mechanic of the Illinois Central at Waterloo, Ia., to succeed his father, Mr. T. W. Place, resigned.

Mr. F. T. Hyndman, master mechanic of the Pittsburg & Western at Allegheny, Pa., has been appointed master mechanic of that road and the Pittsburg division of the Baltimore & Ohio at Glenwood, Pa.

Mr. Howard M. Curry, road foreman of engines of the Northern Pacific, has been appointed master mechanic of that road at Fargo, N. D., in place of Mr. F. N. Risteen, resigned, to accept the position of assistant master mechanic of the Chicago Great Western.

Mr. J. W. Fagg has been appointed master mechanic of the Chicago Terminal Transfer, with headquarters at Chicago, vice Mr. C. W. Tait.

Mr. C. M. Taylor, master mechanic of the Atchison, Topeka & Santa Fe at La Junta, Colo., has been appointed master mechanic of the Rio Grande & New Mexico division, with headquarters at Raton, N. M.

Mr. Hugo Schaefer has resigned as master mechanic of the Central of New England, effective November 1, and Mr. A. B. Phillips has been appointed active master mechanic, with headquarters at Hartford, Conn.

Mr. J. C. Newmarch, foreman of the Atchison, Topeka & Santa Fe shops at Topeka, Kan., has resigned.

Mr. Benjamin Johnson has resigned as engineer of tests of the Atchison, Topeka & Santa Fe, to accept the position of superintendent of motive power and machinery of the Mexican Central, with headquarters at the City of Mexico, to succeed Mr. F. W. Johnstone, resigned.

Mr. A. E. Mitchell has been appointed assistant superintendent of motive power of the Chicago, Milwaukee & St. Paul, with headquarters at West Milwaukee, Wis.

Mr. John Lahey has resigned as general foreman of locomotive repairs of the St. Louis, Iron Mountain & Southern at De Soto, Mo., to accept the position of division master mechanic of the Kansas City Southern, with headquarters at Pittsburg, Kan.

Mr. Henry Giegoldt has been appointed master mechanic of the Atchison, Topeka & Santa Fe at La Junta, Colo., in place of Mr. C. M. Taylor, transferred, and Mr. H. T. Peyton has been appointed master mechanic of the Panhandle division, with headquarters at Wellington, Kan.

Mr. J. C. Fisher has been appointed master mechanic of the Hoxie, Pocohontas & Northern, with headquarters at Cape Girardeau, Mo.

Mr. W. B. Whitsel has been appointed master mechanic of the northern division of the Grand Trunk system, with headquarters at Allandale, Ont., vice Mr. T. A. Summerskill, who has resigned to accept service with another company.

Mr. T. H. Russman has been appointed supervisor of the car department of the St. Louis & San Francisco, with headquarters at the Mount Clare shops at Baltimore, Md.

Mr. D. R. Killinger, general foreman of the Allegheny shops of the Pittsburg & Western, has been appointed general foreman of the shops of the Baltimore & Ohio at Glenwood, Pa.

Notes of the Month

The Standard Pneumatic Tool Company have removed their general offices from Chicago to their new works at Aurora, Ill., where all correspondence should be addressed. Their present quarters have proved inadequate owing to the unprecedented increase in the sales of "Little Giant" pneumatic tools during the past few months. They have greatly increased their facilities for manufacturing, which will enable them to fill all orders for machines promptly in the future. An office in the Marquette Bldg., Chicago will be retained.

Mr. E. B. Colket, of Philadelphia, has been assigned to duty in the Chicago office of the Standard Steel Works and the Baldwin Locomotive Works. Mr. Colket has for some years been engaged in the Philadelphia office of the Baldwin Locomotive Works.

Consul Ridgely forwards from Malaga, August 29, 1901, a clipping from the Mining Review, an important industrial journal of Spain, noting that a steamer which recently took a cargo of iron ore to the United States has just returned with a cargo of steel rails. The paper deplores the lack of steel works in Spain, that would render such imports unnecessary.

The fifty-thousand mark has been passed by the Pressed Steel Car Company in the manufacture of pressed steel cars. This company's output of cars up to the 24th of October aggregates 50,091, enough to make a train of steel equipment over three hundred miles long. At a meeting of the directors of the Pressed Steel Car Company, held in New York on Wednesday, the 23d of October, the usual quarterly dividends were declared of one and three-quarters per cent on the preferred stock and one per cent on the common stock.

We have received from the American Wrecking Frog Company, of Indianapolis, Ind., a copy of a pamphlet recently issued by them illustrating and describing their wrecking frog. This device, we understand, is in use on very many electric and a number of steam roads.

Mr. R. A. Bagnell, who has been for several years connected with the Railway Review, representing them at first in the west and later in the east as manager of their Eastern department, has resigned his position with that publication to become the western representative of the Pocket List of Railway Officials.

Consul-General Bray, of Melbourne, under date of July 29, 1901, reports that the State treasurer of New South Wales, at a public meeting on July 27, said: "I hope the time is fast approaching when engines and steel rails will be manufactured in the State, giving employment to thousands of Government employes. To bring this about, a gigantic expenditure would be required at the start, and it might be advisable for the Government to give encouragement to a company who would be willing to expend nearly £1,000,000 ($5,000,-000) in laying down a plant. If a contract, extending over two or three years, for 200,000 or 300,000 tons of steel rails would lead to the establishment of a new industry, and its being carried on until the Government would be prepared to take up the industry, I think the interests of the States would be well served." Commenting upon these remarks, Consul-General Bray says that the existence of vast deposits of iron ore in the State of New South Wales has been proved, as well as in other States of Austraila, and it is undoubtedly only a question of time when the manufacture of iron and steel will be established there on a large scale, with consequent effect on the present imports from the United States.

Consul Geo. W. Roosevelt at Brussels writes that Mr. Julien Liebaert, the Minister of Railroads, Post, and Telegraph, has just approved estimates submitted to him for the purchase of various rolling stock for the State railways. About 15,000,000 francs ($2,895,000) has been appropriated for the acquisition of 100 heavy locomotives, type 32, destined for heavy freight traffic in transit; 20 locomotives, type 17, the same as those furnished by England, to be used for rapid and international trains; 35 locomotives, type 51; 180 tenders, of which 20 are to be of 18,000 liters, 100 of 13,000 liters, and 60 of 9,000 liters capacity. Sets of wheels and pairs of wheels for locomotives are included in the specification, contracts for which will shortly be awarded. Application for specifications and plans, which are not yet ready for distribution, must be addressed to the Minister of Railroads, Post, and Telegraph, No. 11 rue Louvain, Brussels, Belgium.

The November Review of Reviews devotes special attention to the municipal campaign in New York City. Besides the editorial discussion of the issues, illustrated by several pages of telling cartoons, there are brief sketches of the opposing candidates for the mayorality, Seth Low and Edward M. Shepard, written, respectively, by Dr. James H. Canfield and Mr. George Foster Peabody, together with a summary of the existing political situation in New York from the pen of Dr. Milo Roy Maltbie. These articles, taken together, make intelliglble to the outsider the peculiar conditions which at the present juncture confront the New York voter. The situation in Philadelphia, which is also regarded by the reform element as an extremely grave one, is described by Mr. Clinton Rogers Woodruff.

The Pullman Company has just finished and delivered to the Louisville & Nashville Railroad Company three elegant dining cars equipped with the axle light system of the Consolidated Railway Electric Lighting & Equipment Company. No auxiliary light has been provided in these cars. One of these cars will run between Cincinnati and Louisville and two between Birmingham and New Orleans.

The Boston & Lockport Block Company announce that on or about December 1st they plan to remove from their present quarters,, No. 142 Commercial St., to Nos. 158 and 160 Commercial St., Boston, where new apartments are now being fitted up for them, that they may better accommodate their increasing business. They are to have the entire store of five floors and basement, with offices on the first floor, and the others to be devoted to stock. They are planning to carry a large stock of trucks and platform wagons, which are manufactured at their factory at Lockport, N. Y., also an extended line of their Batt's differential hoists, and wire rope blocks and others which are constantly needed by railroads for emergencies. They will also carry a full line of pumps, and will as far as is possible transfer their shipping department for express shipments from their factory to their Commercial St. store. This will save pactically a day in shipping. A telephone exchange will be installed, with two receiving instruments instead of one as at present; so "when one line is busy you can call the other." Their new 1902 catalogue is now in the hands of the printers, and when completed, which will probably be somewhere around January 1, they will be pleased to mail free to any one interested. It will be the largest and most complete catalogue of blocks, etc., ever published.

We have received a letter, sent out by the Chicago Pneumatic Tool Company under date of Oct. 15, referring to the decision of the United States Circuit Court in favor of the Moffet patent No. 369,120 on portable drilling machines. The company informs its many customers that it has become convinced that the Moffet patent is infringed by the portable power drills now manufactured, and that in order to protect its customers it has bought a license under this patent, thus protecting the drills which it has made and sold heretofore, or may make and sell hereafter.

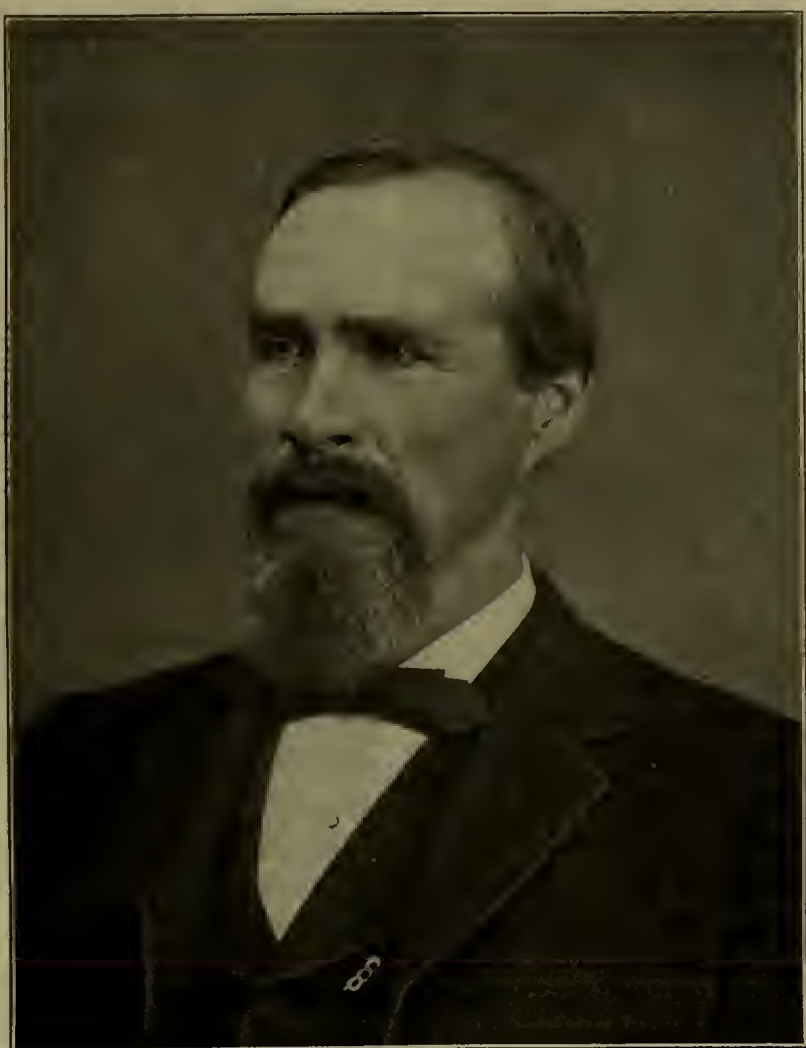
Railroad Paint Shop

A Department Devoted to the Interest of Master Car and Locomotive Painters
Edited by CHAS. E. COPP, General Foreman Painter, Car Department, Boston & Maine Railroad, Lawrence, Mass.
Official Organ of the Master Car and Locomotive Painters Association

M. C. & L. P. A. Portrait Gallery

ROBERT MCKEON.

MR. ROBERT McKEON, the subject of this sketch, spent his boyhood days in Brooklyn, N. Y. Going west in the spring of 1852, he entered the car shops of Stone & Witt at Cleveland, Ohio. One year later Messrs. Stone & Boomer opened a branch in Chicago known as the Union Car & Bridge Works. Mr. McKeon went there and remained two years, when the works were destroyed by fire. He then went to the Illinois Central shops, remaining there until the spring of 1857, when he went west to Norwalk, Ohio, to work for the Cleve- & Toledo Railroad. In the fall of 1857 he returned to New York and was employed in John Stephenson's omnibus works, remaining there six months, when he accepted a position as foreman painter at the shops of the Redbird stage line, which he held for eighteen months, when he took a similar position in the shops of the Second Avenue Line, remaining there until the fall of 1860, in which year he returned to Norwalk, Ohio, to work for the Cleveland & Toledo Railroad, when, after eighteen months, he was appointed foreman painter of Nelson Pebbles' carriage shop, in the same town. This position he filled until the spring of 1865, when he went to Brooklyn, N. Y., and worked at sign painting. In January, 1867, he was appointed foreman painter of the Erie shops at Kent, Ohio, then known as the Atlantic & Great Western, which position he held until October, 1901, when he was obliged to retire on account of failing eyesight, having held this position for nearly thirty-five years.



ROBERT McKEON.

Two years after the Master Car and Locomotive Painters' Association was organized he became an active member, joining at Cincinnati in 1872. In 1874 he was elected secretary and treasurer at the convention held at Buffalo, N. Y., which office he has held continuously until the present time.

Retirement of an Old and Faithful Servant

WE take the liberty of making the following extract from a private letter from Mr. Robert McKeon under date of October 22d: "My eyes are not any worse, but have not improved, and can but hope they will. My general health is better than it was at the convention. I have been obliged to quit the shop, which I did the first of October, not being able to do any work owing to my eyesight, after thirty-five years of service."

The above will be of great interest to every member of the Master Car and Locomotive Painters' Association, for whom he has served so long and so faithfully—about thirty-two years. They will all regret to know he has been obliged to leave the shop and will hope that it will be only temporary. Mr. McKeon is one of "the old masters" in the art of car painting.

Since writing the above we find the following extract in "The Western Painter" for October:

"Robert McKeon, who has been foreman painter for the Erie Railroad at Kent, Ohio, for thirty-six years, has resigned on account of ill-health and has been succeeded by Mr. Bowers, of Cleveland, Ohio. Mr. McKeon has been secretary and treasurer of the Master Car and Locomotive Painters' Association ever since its organization, thirty-two years ago."

Concerning the above, Mr. D. A. Little, in a private letter from which we take the liberty to make an extract, says: "I just read in the 'Western Painter' that our dear old friend McKeon had resigned from the Erie on account of failing health. I wrote him yesterday that we must have him with us at our Advisory Committee meeting in Pittsburg next February. We shall all miss him, but I hope that he can still meet with us as of yore. We can retain him as secretary and furnish him help."

Mr. Little is chairman of the Advisory Committee.

We are pleased to publish Mr. McKeon's portrait and sketch in another column as an appropriate notice of the retirement of such a veteran in the service. But we trust he will still be with us in our councils. In sending us his photo and sketch at our request, he writes, November 11th: "I think my eyesight is slightly improved and a continued rest for this winter I hope will improve it some more. My general health is improving and as that improves the doctors say my sight will improve. It is my intention to attend the Advisory Committee meeting at Pittsburg if I do not get any worse. I hope to meet you there on February 22d."

Convention Reflections

Editor Railroad Paint Shop:

The members of the Master Car and Locomotive Painters' Association, after their meeting in Buffalo last September, will go back to their work with new ideas and probably with a more complete conception of their calling. If it were otherwise the association would have failed of its purpose and we might as well spend all our time in pleasure-seeking. We will not speculate farther but state, what seems to us a reality, that we did make some progress in the knowledge of our business. To be sure, we did not solve the great question of terminal car cleaning to our entire satisfaction, but made some progress of a favorable character toward that end. Also the question perennial of piecework versus daywork still remains an unsolved problem in some minds, while in others it was settled favorably long ago.

In looking over the report of our proceedings I find some things of a serious turn, and there is also a ludricrous side of human nature. I don't think we could make any kind of a report without friend Gohen; he always comes to the rescue on any and all subjects, and I find his name mentioned in the report ninety-nine times. President Bruning's I find one hundred and thirty-eight times; and Quest comes in a good third, solid and sensible every time. But one of the most thoughtful, calm, stern and undisturbed is Butts, who hits the nail on the head every time. And Miller must not be forgotten, for I regard him as indispensable.

There seems to be some latent ability in the membership that I wish could be stirred and brought up to a fighting pitch in some way. They have been in the rear long enough—many of them young men—hiding behind trees and criticising those who are doing the shooting at the front. Let them get "on the firing line" themselves and see how it seems. Men like Mance, Clark, Kahler and a score of others are too good looking and too smart to be in the background so much. Perhaps at our next convention in the "Athens of America," with her traditional "baked beans," we will be able to make the best report we ever have had.

One word regarding papers on the various subjects. I think they were among the briefest we have ever had, some members not returning a word on the subjects assigned them! I hope to see this remedied another year.

W. Bailey, B. & M. R. R., Concord, N. H.

Iron-Clad Schedules for Painting Locomotives

THE following correspondence, with names omitted for obvious reasons, will doubtless be interesting reading to those division foremen painters to whom typewritten copies of schedules for doing their work have been issued from headquarters. Schedules are supposed to be inflexible in all cases and foremen have no right to exercise their judgment in the matter, whether it be carried out to the letter in all cases or varied to suit the conditions they find locomotives to be in in many instances. We have before advised our readers of the folly of rigid classification of painting repairs issued in this manner, whether of cars or locomotives, without due regard to the exercise of the discretion of the painter who is on the spot and knows all the conditions and what can be done better than those who are miles out of sight. Some years ago, happening to be in a certain car shop on one of the great western lines, we witnessed an instance of this folly. The road had changed hands and its car-body color was to be changed also, from one dark shade to another dark shade, and instructions of an inflexible character had been issued to its various shops to burn off every car and paint from the wood up, regardless of condition of old paint. We could see no reason for this except to make a good market for somebody's primer and surfacer, for any practical painter knows that the new color-coats could have been applied without detriment over the old varnished surface, if in good condition, after a sandpapering, etc.

The following letter is from a division foreman painter to the master locomotive painter on a large railroad system, with his answer:

"Dear Sir: We have just received a new formula for locomotive work and I want to ask you a few questions about how far you expected them to be carried out. Did you intend these instructions to be followed strictly to the letter, or did you expect the foreman painter to use his judgment and do only what was necessary? There seems to be a feeling here that I am to carry out these instructions technically, regardless of time or conditions; that I have no right to use my judgment in the matter at all, but am still held responsible. Now, I contend that it is impossible to lay down a rule for old work that will do for every job when perhaps some require something different, and I can not see the advisability of doing this when not necessary. I wish you would write me and explain in a general way how you do work at your shop. My work has never been quite satisfactory to some parties. I want to know if the fault is all mine. I want to do the work as good and as cheap as others. I wish you would give this as much time as you can by going over the ground from priming to finish. I remain, etc., —— ———."

THE ANSWER.

"Dear Sir: Yours of the 25th received and contents noted. In reply would state that I am very much sur-

HEADLINING CORNER STENCIL, BY MR. WARNER BAILEY.

prised to hear that anyone should think a method of painting for repair work could be formulated to apply in all cases. It certainly is not done at this shop, nor was it expected to be done at any shop; and while it did not say in the formula that foremen painters should use their judgment, it certainly was understood that they would and should under all circumstances. If an engine is shopped for general repairs and the condition of the paint is such that it can be touched up and varnished it certainly would be a waste of time and material to follow an iron-clad formula of painting it. The idea, as I have understood it, is that when in the judgment of the foremen painter any one of the operations therein mentioned is to be performed it instructs how and what is to be used, and not necessarily to follow the whole method from A to Z. When an engine or tender is shopped, I examine it and decide how much and what is necessary to be done, taking into account how much time may be allowed after the tank reaches the paint shop for the work to be done. If it is in bad condition we scrape as clean as possible and give it the regular course; but if the letters are good and the foundation solid but the varnish perished we wash thoroughly, scrape what can be removed, sandpaper and then black around the letters. Sometimes we find the letters good but bad places in parts of the surface. We scrape all such places, give the tank a primer, knife in and black around the letters. In the latter case we use drop black instead of the engine finish; and when hurried in regular work, as we frequently are, we use one coat of drop black and one coat of engine finish. On the engine, should the cab be in condition to partly burn off or have new posts, etc., put in, we prime them and then, if in good condition, we knife over the whole; but such are rare, as I find in the majority of cases the cabs need a coat of mineral paint outside, then knife, etc. If the inside of the cab, in my judgment, is in a condition that one coat of green enamel will do, it gets only one coat. When an engine is ready to be wheeled, having in the meantime had the drivers prepared and blacked, we clean and black the frame; this includes the fire-box, which in some cases are in a condition that a "peen" hammer is used to knock off the accumulation of grease, dirt and scale. But ordinarily this is done with a putty knife, or old file. We do not claim to get it smooth as new iron, in fact it would be too expensive. The same with an extension arch; it is absolutely impossible to always obtain a perfectly smooth arch, for there are some that nothing short of an immersion in a potash kettle would touch. In such extreme cases we can only do the best we can without incurring too much expense. It has been my experience in the 12 years of service at this shop to use my judgment as to what an engine needs for preservation and good appearance, whether it be one coat or three, touched up, or given the entire system of painting scheduled, and as I said before, the method which has beeen received by you is to be followed when in your judgment such operations are needed. In regard to sandpapering you will see by the schedule that

HEADLINING CORNER STENCIL, BY MR. WARNER BAILEY.

it is practically discarded. Of course, after washing a cab, or tank, we sandpaper the old varnish off, or if it has been scraped, we smooth that up with sandpaper to that extent which calls for a sandpaper surface. We merely take down what edges a knife may leave, which amounts to about an hour or two of time on a tank, some not as much, as the men become proficient in knifing so the edges become less. It seems absurd for me to be giving you this information(?)to one who has been in the business so much longer than I have, and who knows as well as I do that the painting business is one of the trades that is packed full of the needs of good judgment on the part of the foreman. Perhaps I have made this too long, but as you asked for details I have tried to accommodate you. I am very truly yours."

"____________."

A Visit to the New York Central Shops

THROUGH the courtesy of Mr. A. M. Waitt, superintendent of motive power and rolling stock of the New York Central & Hudson River Railroad, extended to Mr. J. T. Chamberlain, master car builder of the Boston & Maine, this scribe, as general foreman painter of the latter road, accompanied by Division Foremen Painters Worrall and Lord, visited their West Albany shops November 7th to look into their paint shop methods, and were personally shown over the entire plant by Mr. Angus Brown, master mechanic, Mr. A. L. Kendall, general car foreman and Mr. H. M. Butts, master car and locomotive painter. There were 2219 men employed in the various departments of locootive and car works, 2300 being the full force, consequently something of the size of this immense plant may be imagined if not described in detail here. About 200 men are on the paint shop list under the able direction of Mr. A. L. Allen, who conducts all his work by piecework operations and seems to be a veritable encyclopedia of the details of this intricate business, being well assisted by Mr. Louis Fox. Within the past year locomotive work has been added to the car painting under Mr. Allen, and in this he is assisted by Mr. W. D. Wood. By a good organization everything seems to move along like clock-work, without the least friction, too, if we may judge from the good feeling manifest among the various foremen.

Somewhat behindhand by the demands of the Pan-

HEADLINING CORNER STENCIL, BY MR. WARNER BAILEY.

A WOODEN DECK LINING CORNER, BY MR. WARNER BAILEY.

American traffic upon the'r equipment, they still hope, by putting out about eight cars per day, to complete it early in June next, notwithstanding they are at present writing seriously handicapped by belated contracts to equip their paint shop with the hot-air system of heating, changing it from steam, laying a new concrete floor, and putting on a new monitor roof, in addition to the old one, with windows the entire length of same. Doubtless some of this work will have to be laid over until their busy season, now well under way, is over, as such work creates too much dust where the nice work of painting and varnishing passenger coaches is done. The sash and door varnish room is also to be enlarged to the full width of the paint shop, greatly increasing its capacity. Also an auxiliary paint shop of 20-car capacity is to be built alongside of the old one with two intervening tracks so as not to obstruct the light from the windows, as well as to serve other purposes. Electric lighting is also being installed, and we understand that in the near future electricity is to supplant steam as the motive power of the whole plant. Altogether the greatest enterprise seems to be manifest to bring it up to the needs of this great system where all its passenger and a large portion of its engine work is done.

We noticed a novel practice here among others—that of cleaning or washing all passenger equipment before they are repaired by the carpenters. Upon reflection this appears to be a good way to do it, if shops are so arranged as to facilitate shifting them from one shop to another, for a great deal of repair work is either discovered by the washers or paint-shop men, who go over every part of a car, or is more readily discerned after the dirt is off.

A shopping blank, or schedule, is filled out by Mr. Allen, who classifies the painting repairs before a car is shopped, assigning the time for each operation; and the day the car foreman is to deliver the car to the paint shop is also set down, as well as the day it is to

A Wooden Decklining Side Ornament, By Warner Bailey.

be delivered for service, after allowing the requisite time for trimming and a day on the steam track for inspection, etc. This is an excellent system. Mr. Allen can pull a book from his pocket anywhere on the premises and supply his superiors with this often valuable information. If the car foreman, for any reason, fails to deliver the car on the day promised his book of operations will show it and he is thus able to clear himself of any blame in the matter. This is at least a good piece of painter's protection.

All paint-shop shifting has to be done from one end of a large shop of seven tracks and, to facilitate matters, the cars are sorted out regarding their state of completion and shifted on Sunday so as not to interrupt the varnishing on Monday. This seems absolutely necessary as the shop is at present arranged. The main paint shop holds about 46 cars and, by various auxiliary shops and tracks where painting is done, they have a paint-shop capacity of about 90 cars. About all cars are "cut in," after having been cleaned with a solution of muriatic acid and water (about one part of the former to six of the latter, which is further reduced for less dirty work), and a scrubbing with pumice and water. Most cars are given an "E" cleaning (i. e., a terminal cleaning) three times during the year in service, a record of which is stenciled on the truck in a place provided for it.

In closing this hasty sketch (written in a hotel while waiting for our train) of a pleasant trip, we wish those who extended to us many courtesies the greatest measure of success in the arduous duties that now confront them, and suggest that if some of our foremen painters from smaller shops, who think they are burdened with details, will visit the New York Central's West Albany shops and follow Messrs. Butts and Allen through a day's operations they will get sufficiently widened out so that they can go home to find an easy task before them.

Paint and Varnish Making from a Consumer's Standpoint

SOME good people with little experience in paint or varnish making think it strange because we report against their products when they know personally that they contain nothing but the very best of materials! Well, now, if they would stop to think, it is not so strange after all: for, ten to one, they are doing the same thing themselves by other people! Are they sure that Belinda Smith and Nancy Green will produce a decoction that will suit the palate just the same with coffee out of the same can and water out of the same spigot? Do they not know that the one is made and the other spoilt by cooking? Didn't they ever criticise Nancy's coffee for breakfast when she never put a thing into it but the best materials?

So with making varnish; it was spoiled in cooking. Getting the best materials and mixing them together without brains does not make a paint that will always produce satisfaction. Ditto, pies and cakes and coffee and the thousand and one nice things that a hungry man loves to eat. Ditto, the things he wears and the house he lives in. He may take the best of French calf to the shoemaker's and bring back a bungle of a boot. In fact materials, however good, are one thing and making anything acceptable out of them to suit an intelligent consumer is quite another matter.

Where the paint and varnish makers' science comes in, we take it, speaking from the layman's pew, is in not only knowing the right combination of materials but in the best method of so combining them as to suit his customers' needs. It is well to stick for pure materials, but you do not want in a garment broadcloth where buckram will serve a better purpose. Nor do you want in a paint all the heaviest pigments, however pure, to go to the bottom, like a rock, requiring an agitator propelled by steam or electricity to keep it mixed so that you can get anything like an even coat on the object being painted. This might do for some little thing you are doing yourself, but for a paint for Tom, Dick and Harry to use here, there and everywhere it will never do. Better put in some light material to keep the heavy in better suspension if good results are desired.

We have seen a car varnish that we had not the slightest suspicion it contained anything but the best Zanzibar gum, the best prepared linseed oil, the best turpentine, but the results from its use were anything but pleasing. However anxious you were to use it it would go back on you at any time and the time least suspected. There was something about it that was wrong: either would take a varnish-user's dictionary to describe all the in the combination, cooking or aging of the product. It deviltries it is capable of cutting up; Noah Webster's collection of language is not in it.

You get into your safe by knowing the combination; you get into another man's safe in another sense by knowing the combination that will suit him for a paint or varnish. Now quit beating your brains out against stubborn things by trying to get in in any other way. Save your brains—you will need them in your business quite as much as you will "the best materials."

Notes and Comments

By request of the publisher, we resume in this issue the publication of portraits and sketches of M. C. & L. P. A. members which we conducted so long in the Car Journal and Railroad Digest. It is our desire to have this department well illustrated and, together with photos as above mentioned and of other subjects as well, pen and ink drawings of designs of letters, scrolls, ornaments, etc., used in car and locomotive painting will be very acceptable, also drawings of paint shop devices. Mr. Warner Bailey, the veteran organizer of the M. C. & L. P. A. in 1870, furnishes us with some handsome designs in this issue. At somewhere around three-score and ten—we won't tell his age, as he may be bashful about it—his hand seems to have lost none of its cunning in this line and our young 'uns must look to their laurels.

Mr. Chas. E. Koons, Master Car Painter St. Louis Car Co., a member of the Master Car and Locomotive Painters' Association, also a member of the St. Louis Railway Club, has a paper in the proceedings of the latter body at the October meeting entitled "The Railway Problem as Applied to the Louisiana Purchase Exposition to be held in St. Louis, A. D. 1903," being one of a symposium from six gentlemen on that subject. A historical article on the M. C. & L. P. A. Convention Problem as Applied to the Pan-American, by James A. Gohen, would be interesting reading and perhaps serve to keep us out of another exposition town, with all due respect to the above paper.

The scraper is often mightier than the brush toward maintaining passenger equipment in proper condition.

Gold leaf direct from the near-by beater, if bought in book form, is the proper caper. Beware of cheap jobbing house leaf used by the paint trade as "a leader" to catch other trade. It is usually badly "mussed," as well as a poor article.

Berry Bros. of Detroit, Mich., were awarded a medal at the Buffalo exposition. Those who failed to see "Castle Copal" missed a fine sight.

We notice the following in the October "Western Painter" concerning a former member of the M. C. & L. P. A.: "A. W. LeGros, of the LeGros Paint Co., Princeton, Ind., has accepted a position as traveling salesman for the Peaslee-Gaulbert Paint Co., Louisville, Ky."

First snow, in the vicinity of this sanctum, Nov. 11; but, like the girl with too many fellows, it was only "a little flirt." Nov. 19, she is still flirting, but will be soon married and settled down with Mr. Winters. No reflection, though, upon the former Foreman Painter of the Wabash at Moberly, Mo.

Has the reader considered the advantages of a car-body enamel for use on the exterior of the clear story or turret in place of the usual flat color coats and varnish used separately? As there is no striping or other decoration usually put there it would seem that, as the cars go through the shop for the regular varnishing, one coat of color and varnish combined put on, of course at one operation, would be a saving here, the same as we do with our trucks and steps.

The Boston branch store and warehouse of the Murphy Varnish Company, corner of Franklin and Broad streets, burned Nov. 12, making a very stubborn fire with its thousands of gallons of varnishes, japans, etc., in the basement. It was a very heavy loss, but it is a pity that some worse varnish than theirs had not been food for the flames. A huge cloud of smoke must have rolled up from it, judging from a newspaper account.

The time-honored name of "Boston & Albany" is fast disappearing from the letter-boards of that equipment and "New York Central & Hudson River" is taking its place. We thought it would come to that, though they started in last year to paint the cars on the N. Y. C. standards otherwise but retaining the Boston & Albany name. 'Tis ever thus with a leased line. The only line now running out of Boston, among several formerly that had the name of the city on its equipment, to retain it is the Boston & Maine (unless we except the narrow-gauge, Boston, Revere Beach & Lynn), and the Boston papers say this should remain. "So mote it be"; but there is no knowing what may happen next in these consolidating lines. It looks queer to see a N. Y. Central shifting engine on the B. & A. Grand Junction tracks on the north side of the city.

In painting the White House, which has just been given two coats of paint, 2,900 pounds of white paint were used. This had to be thinned with oil and turpentine, which process required about 1,000 pounds of this material, making a total of 3,900 pounds that has been placed on the building. The cost of the labor and material is approximately $1,500.

The Car Foremen's Association of Chicago

November Meeting

THE regular meeting of the Car Foremen's Association of Chicago was held in Room 207 Monadnock Building, Chicago, Wednesday evening, Nov. 13th, 1901. Meeting called to order at 8 p. m. by President Grieb. Among those present were the following: R. R. Alderson, J. Ackerman, R. A. Alderson, W. L. Bukford, J. J. Beam, Wm. Bruce, N. Bockwoldt, O. W. Bodler, J. W. Bourell, W. A. Bourell J. W. Brown, G. M. Bates, Theo. Blohm, W. M. Brown, A. C. Banen, J. Buker, Chas. Bossert, W. J. Baldwin W. A. Carter, W. C. Cook, Thos. Cooper, Geo. D. Casgrain, C. H. Carey, I. S. Downing, R. H. Darlington, F. P. Donahue, W. H. Evans, W. P. Effinger, Ralph Earle, M. Fitzgerald, H. G. Griffin, H. W. Gardner, J. C. Grieb, J. C. Grogan, B. Buthenberg, H. A. Hampson, H. H. Harvey, E. Hendrick, T. B. Hunt, G. H. Isringhaus, R. R. Jones, Axel. Johnson, Geo. Johnson, Wm. Kramer, B. A. Keeler, F. C. Kroff, Aaron Kline, M. Krump, F. Kamen, T. B. Kirby, H. V. Kuhlman, C. F. Kopf, C. F. Keebler, W. C. Lau, M. J. Lauky, H. La Rue, Chas. Miller, J. E. Mehan, C. M. Mileham, T. R. Morris, J. Murray, Hugh Marsh, W. S. Nicholson, Geo. Niklaus, Fred Nelson, L. Olsen, P. Parke, P. H. Peck, D. L. Phipps, L. G. Parish, A. R. Perry, G. T. Phelps, G. T. Rohrback, R. D. Smith, S. Shannon, J. W. Senger, H. A. Stewart, R. Sielaff, F. C. Schultz, J. P. Schneider, Aug. Schultz, C. Schoeneberg, J. B. Scott, C. E. Swift, C. Schmidt, Chas. Shearman, O. M. Stimson, Geo. Thomson, A. G. Utt, W. W. Wessell, T. Williams, G. S. Wood, L. C. Wirtz.

Pres. Grieb: As the minutes of the previous meeting have been printed in the Railway Master Mechanic and distributed, if there are no objections they will stand approved as printed.

Sec. Kline: The following have made application for membership:

W. A. Gardner, General Manager, C. & N. W. Ry., Chicago.

Axel Anderson, Nt. Foreman, L. S. & M. S. Ry., Chicago.

G. C. Ames, Acting Sec'y., The Sargent Co., Chicago.

A. E. Beaman, Foreman Painter, L. S. & M. S. Ry., Chicago.

P. J. Brennan, General Foreman, C. & A., Chicago.

N. Bockwoldt, Foreman, Swift Ref. Line, Chicago.

H. W. Blake, Asst. Foreman, Swift Ref. Line, Chicago.

J. J. Beam, Clerk, Swift Ref. Line, Chicago.

W. A. Bourell, Inspector, Swift Ref. Line, Chicago.

Chas. B. Barnes, Draftsman, C. M. & St. P. Ry., W. Milwaukee, Wis.

Jos. Beberger, Car Inspector, C. M. & St. P. Ry., Chicago.

O. W. Bodler, Special Apprentice, L. S. & M. S., Chicago.

Jas. Beckor, Car Inspector, I. C. Ry., Chicago.

Thos. Cooper, Foreman, L. S. & M. S. Ry., Chicago.

I. S. Downing, General Foreman, L. S. & M. S. Ry., Air Line Jct., O.

J. A. Ellis, Ellis & Ripley, Chicago.

W. D. Earnshaw, Secy., Dayton Mall Iron Co., Dayton, O.

W. D. Crosman, Gold Car Heating Co., Chicago.

Geo. D. Flaws, Gen'l. Yard Master, L. S. & M. S. Ry., Chicago.

N. N. Fritz, Foreman, Armour Car Lines, Allegheny, Pa.

E. C. Farrington, Chief Clerk, C. & N. W. Ry., Chicago

Theo. H. Goodnow, Chief Clerk, L. S. & M. S. Ry., Chicago.

Jas. Gallagher, Inspector, Swift Ref. Line, Chicago.

A. Gallagher, Car Inspector, Swift Ref. Line, Chicago.

H. K. Gilbert, V. P. & Treas., The Sargent Co., Chicago.

Jos. Grove, Cashier, Sargent Co., Chicago.

Wm. J. Grogan, Supt. Repairs, Mather Stock Car Co., Chicago.

Wm. Heinz, Car Inspector, L. S. & M. S. Ry., Chicago.

W. J. Harpell, Salesman, Griffin Wheel Co., Chicago.

E. B. Hill, Draftsman, Swift Ref. Line, Chicago.

J. R. Hoff, Foreman, U. R. T. Co., Milwaukee, Wis.

P. C. Hart, Train Master, C. M. & St. P. Ry., Babcock, Wis.

Chris. Holtz, Car Inspector, C., M. & St. P. Ry., Franklin Park, Ill.

Geo. C. Isbester, Salesman, Railway Appliance Co., Chicago.

Axel Johnson, Yard Foreman, L. S. & M. S. Ry., Chicago.

L. B. Jenson, Foreman Painter, C. M. & St. P. Ry., West Milwaukee, Wis.

B. D. Jones, Jones Car Door Co., Chicago.

N. S. Kimball, District Master Mechanic, C., M. & St. P. Ry., Green Bay.

Chas. F. Kopf, Asst. Secretary, Griffin Wheel Co., Chicago.

John Kolla, Car Inspector, C., M. & St. P. Ry., Calmar, Ia.

O. E. Kleppin, Storekeeper, C. M. & St. P. Ry., Chicago.

Andrew Lindseth, Foreman Blacksmith, L. S. & M. S. Ry., Chicago.

W. C. Lau, Car Inspector, L. S. & M. S. Ry., Elkhart, Ind.

E. J. Lamb, Air Brake Inspector, C. M. & St. P. Ry.

C. J. Lundquist, Foreman Coach Repairs, C. M. & St. P. Ry., Minneapolis, Minn.

O. F. Landberg, Car Foreman, C. M. & St. P. Ry., Calmar, Ia.

Martin J. Lauky, Gang Foreman, Penn. Co., Chicago.

D. J. McRae, Foreman, L. S. & M. S. Ry., Chicago.

Percival Manchester, Secy, Railway Appliance Co., Chicago.

Chas. Miller, Car Inspector, C. M. & St. P. Ry., Chicago.

C. C. Murphy, Standard Railway Equipment Co., Chicago.

F. J. Nixon, Wrecking Master, L. S. & M. S. Ry., Chicago.

W. S. Nicholson, Clerk, Swift Ref. Line, Chicago.

Geo. F. Niklaus, Stenographer, Swift Ref. Line, Chicago.

August Ott, Car Inspector, C. M. & St. P. Ry., Chicago.

Chas. Ross, C. J. Ry., Franklin Park, Ill.

Robt. H. Ripley, Ellis & Ripley, Chicago.

L. J. Steward, Yard Master, L. S. & M. S. Ry., Chicago.

James Scott, General Foreman, L. S. & M. S. Ry., Chicago.

F. C. Steinmuller, Storekeepr, L. S. & M. S. Ry., Chicago.

F. F. Sherwood, Supt. Car Equipment, Knickerbocker Ice Co., Chicago.

D. W. Schreck, Inspector, Swift Ref. Line, Chicago.

C. Schmidt, Foreman, Swift Ref. Line, Chicago.

C. J. Stevens, Clerk, Swift Ref. Line, Chicago.

Geo. M. Sargent, Chairman Board of Directors, Sargent Co., Chicago.

F. W. Sargent, Mech. Engr., American Brake Shoe Co., Chicago.

C. F. Street, Manager Ry. Dept., Dayton Mall. Iron Co., Dayton.

E. G. Sawusch, Car Inspector, C. M. & St. P. Ry., Rondout, Ill.

J. E. Sullivan, Clerk, C. M. & St. P. Ry., Chicago.

A. Z. Taylor, Foreman, C. M. & St. P. Ry., Portage, Wis.

Alex Turner, Galena Oil Co., Chicago.

F. L. Taylor, Bill Clerk, C. B. & Q. R. R., Aurora, Ill.

H. G. Westphalen, Clerk, C. & A. R. R., Chicago.

F L. Whitcomb, Gen. Sales Agent, Griffin Wheel Co., Chicago.

L. Wyman, Car Inspector, C. B. & Q. R. R., Chicago.

Henry Weinhardt, Gang Foreman, P. F. W. & C. R. R., Chicago.

Ernest Wendt, Car Inspector, C. M. & St. P. Ry., Chicago.

Pres. Grieb: That is the largest number of applications ever presented at any meeting of the Car Foreman's Association. We had twenty in November, 1900, against 82 tonight. We started out with the intention of doubling our membership, which last year was 420, and if the applications continue to come in as at present it will certainly be a very easy matter to accomplish.

At a meeting of the Board of Directors held recently it was determined to take decisive steps to increase our membership sufficiently to put the Association on an independent and self-supporting basis during the coming year, so as to avoid the necessity of soliciting contributions from the railroad companies and private car lines to carry on our work. Unfortunately, we were in need of it last year, and to those who did contribute we owe a great deal of thanks, because it was due to their efforts that we were able to keep on the right side of the ledger. I feel sure that if each of the members will make an effort to solicit new members, we will have a sufficient addition to our membership to carry on the business this year without calling on railroad companies and private car lines for contributions. If each one will secure one additional member I think we will have enough money in the treasury to carry us through. Of course that looks like an easy proposition, but we hardly can expect that each member will bring in a new one, and therefore it becomes necessary for some to exert themselves sufficiently to make up for deficiencies in others. The secretary is engaged at present in sending a personal appeal to railroad officers and those of private car lines, inviting them to become members of our association, and using this means to reach the end we have in view—to become self-supporting. If everybody will lend a little assistance I feel satisfied that this will be the banner year.

We will now take up our regular program for the evening, the first item of which is discussion of the M. C. B. Rules.

(It should be understood that those Rules or Sections did which not elicit any remarks were understood by the members and were entirely satisfactory.)

Sec. 1, Rule 3. Defect cards to indicate on which end of car the defects exist.

Mr. Bates (C. B. & Q.): I would like to know why it is necessary to state, on the defect card, on what end the defects exist, when there is no difference in price. It is a good idea to give this information on the repair cards, but I do not see the necessity of mentioning it on the defect cards.

Mr. Kroff (P. F. W. & C.): What puzzles me is what you are going to do when there are two brake staffs on the car and no push rod—call them both B end?

Secretary Kline: The only way to distinguish them would be to have the car stenciled A end and B end.

Sec. 5, Rule 3. Worn flange: wheels under cars of 80,000-lbs. capacity or under, with flanges having flat vertical surfaces extending more than 1 inch from tread, or flange 1 inch thick or less. Wheels under cars of over 80,000-lbs. capacity with flanges having flat vertical surfaces extending more than 7/8 inch from tread, or flange less than 1 1-16 inches thick.

Mr. Evans (B. & O.): While I note there is a different flange wear permitted for wheels under cars of over 80,000-lbs. capacity, yet I do not see that they have provided a gauge for determining this wear. Can anybody suggest a way in which this can be done with the present gauge?

Mr. Hunt: I think the gauge shown on page 6, M. C. B Code, could be made to do the work without the use of an extra gauge. Upon that portion of the gauge that is used to show the height of the vertical wear of flange (1 inch) could be placed a mark to show a height of 7/8 inch wear, and as for gauging the thickness of flange 1 1-16 inches, this space could be made in gauge where thumb hole is now located, so that one gauge could be made to do the work.

Mr. Peck (Belt Ry.): I do not think that would be as good as making a separate gauge. I have instructed my men to make a separate gauge. It is not very much trouble to make them.

Mr. La Rue (C. R. I. & P.): We have made a special gauge for measuring wheels under cars of over 80,000-lbs. capacity and I think that is the best way to get at it.

Sec. 25, Rule 3. Missing or torn air brake hose or missing or broken air brake fitttings, angle cocks, cut-out cocks, cylinders and reservoirs, triple valves, release valves and pressure retaining valve or parts of any of these items.

Mr. Bates (C. B. & Q.): I would like to hear an expression of opinion from this association as to whether a charge may be made for a torn hose if the car is not delivered in interchange. The rule states "delivering company responsible." I understand from that that if a car is delivered to another line a card must be furnished. Does the party who damages the hose stand the expense if he repairs the same before delivering to another line?

Mr. Peck (Belt Ry.): He does not. If Mr. Bates has a car on his line and tears a hose he can replace it and charge the owner. If the car is offered in interchange he is responsible.

Mr. Stewart (A. C. L.): I would like to hear an expression from the association about a missing air hose. The rule states "delivering company responsible," and I have always understood that no charge can be made for replacing a missing hose; in fact, this seems to be so closely understood that the point has never been arbitrated. I do not think it is the practice for any one to bill for a missing air hose and the responsibility for missing and torn hose is located in the same section of the rule, and I think we will all agree that if no charge can be made for hose missing the same will apply to torn hose.

Pres. Grieb: I think from the reading of the section that when a car is found with a missing or torn air brake hose, a card can be exacted. I always understood that when you received one of your own cars you are entitled to a defect card for missing hose and you are now entitled to a card for a torn hose.

Mr. Darlington (C., M. & St. P.): As I understand that rule it abrogates two decisions of the Arbitration Committee, one with reference to air hose cut by striking and the other with reference to air hose torn off. As I understand the rule which is now in force the delivering road, or in other words, the company handling the car on which an air hose is either cut by striking or torn off, must replace that air hose at their own expense, the same as renewals of air hose missing while car was in their possession.

Mr. Peck: That is not the intention of the rule, as I understand it. If you have a car in your possession and the air hose is torn off and you replace it before offering the car in interchange, you can bill the owners.

Mr. Stimson (S. R. L.): I think it is understood by all that Mr. Darlington has correctly stated the manner in which the rule is interpreted by the majority. It is at least so understood by me.

Pres. Grieb: Torn air hose would be of necessity replaced free of charge by the party having the car in his possession.

Mr. Stimson: That rule was framed for the purpose of compelling trainmen to uncouple the hose by hand or assume responsibility for damage to the hose. I would like to ask Mr. Peck if he would make an exception of any other items mentioned in Section 25—whether bill can be rendered for any items shown therein.

Mr. Peck: It is supposed that an air hose will stand tearing apart in switching. If it does not do it you put on a new hose and bill the owner. There are decisions on that in the Master Car Builders' Arbitration cases, but if you offer it in interchange you have to card for it.

Mr. Stimson: I would like to ask Mr. Peck if there has been an arbitration decision since this rule has been adopted? If not, the former decisions of the Arbitration Committee do not apply, so far as this rule does not conflict with the old one.

Mr. Hunt (P. F. W. & C.): This term "delivering company responsible" is used all through the book of rules and is used in a different connection from what Mr. Peck puts it. For instance, take Sec. 18 of Rule 3. It says: "Cut journals, axles bent, etc., delivering company responsible." You are responsible for that cut journal whether you deliver the car or not. Must we not take the same meaning with the hose? Is it not a fact that the hose must be uncoupled by hand or does not the Master Car Builders' Association except the hose to be uncoupled by hand? You will notice Sec. 26 of Rule 3 reads: "Damage to any part of the brake apparatus caused by unfair usage, derailment or accident, delivering company responsible." Now they are responsible whether damaged in fair usage, whether they deliver the car or not.

Mr. Morris (C., M. & St. P.): I think it all hinges on the interpretation of the words "delivering company." Is the delivering company the same as possessing company?

Mr. Grieb: I think the two terms are synonymous and should be so understiood by all.

Mr. Peck: If a company has a car in their possession and break a knuckle, they renew that knuckle and bill the owner, but if they offer it in interchange they have to card for it.

Mr. La Rue (C. R. I. & P.): Arbitration Case 502 decides that charge can be made for air hose that is torn in two.

Mr. Stimson: I would ask Mr. La Rue to give the date of that decision. I take the position that any decision rendered before the adoption of the rule does not stand.

Mr. Stimson: I make the motion that it is the consensus of opinion of this association that their interpretation of Section 25, Rule 3, is that the delivering company is responsible for missing or torn air brake hose, regardless of whether offered in interchange or not.

Mr. Morris: I would make an amendment, or rather an addition, that we regard the delivering company as being synonymous with the possessing company as a proper interpretation of the rules.

Pres. Grieb: We are using a great deal of time reading the entire rules and if there are no objections we will omit reading that portion of the rules wherein no change has been made and only read those portions which show changes from the previous rules.

Mr. Evans (B. & O.): I will have to rise to object. I think the rules under which we are operating are the most important thing this Car Foremen's Association can take up and I venture to say there are a great many members present this evening who have not read them since they have been changed. I must confess that I have not read them through. I would suggest a better plan would be, when the president thinks we have consumed sufficient of our time on the rules, to stop where we have finished reading and take them up at another time.

Pres. Grieb: I presumed that everybody had read them and understood these rules and that we would be more especially interested in those portions where changes have been made, but I am willing to put in the entire evening in going over the rules the same as Mr. Evans is.

Mr. Mehan (C. M. & St. P.): If in order, I would offer as a motion that we finish the reading of these rules this evening and that we eliminate any part of the rules wherein no change has been made. Motion seconded and carried.

Sec. 2, Rule 4. Repairs to foreign cars shall be promptly made and the work shall conform in detail to the original construction and with the quality of material originally used, except that malleable iron M. C. B. Standards may be substituted for grey iron M. C. B. Standards, and grey iron may be used in place of malleable where grey iron is an M. C. B. Standard, providing that in substituting malleable iron for grey iron the price of grey iron is used, and except as provided for in Section 4 of Rule 4.

Pres. Grieb: It will be observed that this specifies only as to the matter of price. The matter of weight is left rather indefinite. Do we have a uniform understanding as to what weight will govern.

Mr. Stimson: Actual weight applied.

Sec. 3, second paragraph: In making repairs for which owners are responsible, 30 in. and 36 in. wheels may be replaced with 33 in. wheels, if practicable. If changes are necessary in order to bring the car to the proper height, the cost of so doing shall also be chargeable to the car owner.

Mr. Mehan: In regard to this section, my interpretation of this amendment is that if we get a car with 36-in. wheels and two pair are defective, that this rule does not authorize us to put 33-in. wheels under the car throughout. It only authorizes us to replace the defective 36-in. wheels with 33-in. I also interpret from this amendment that there is no provision made for changing the brakes, for instance. You cannot charge the car owner for changing the brakes, only for bringing the car to the proper height.

Pres. Greib: Has anybody had occasion to change either 30-in. or 36-in. wheels with standard 33-in. wheels, if so, how did you go about it in the matter of brakes?

Mr. Peck: I do not think it is necessary to change the brakes at all. In raising the car to standard height the brakes remain the same. If we put in 33-in. wheels, two pairs in one truck brings the brakes back to where they were, and if the brakes were all right before the change of wheels they should be all right afterwards.

Mr. Mehan: I would like to say we had a case in which a car was equipped with 28-in. wheels and in applying 33-in. wheels we found it necessary to change the location of the brake hangers. Can we charge the owners for that?

Mr. Peck: I think you can bill the car owner easily for any part of the brakes less than 2½ ins. from the rail. If they were too low you can charge the owners under that rule.

Mr. Mehan: How would it affect the lengthening of the brake rods? Can you charge the car owner for that?

Mr. Peck: I believe the rules give you authority to charge the owners for any changes which are necessary.

Mr. Mehan: It says—"any changes which are necessary to bring the car to the proper height." It does not mention any other changes.

Mr. Kroff (P., F. W. & C.) I would like to ask the gentleman whether the car had inside or body brake.

Mr. Mehan: I think they were hung from the body.

Mr. Kroff: Then I would say that it is not necessary to make any alteration in the brake. In bringing the draw bar up to standard height it raises the brake up accordingly. If the brarkes were hung to the truck then it would require some changes in the brakes.

Mr. Marsh (C., N. Y. & B.): I do not see how you can put in wheels of a different diameter without changing the rods.

Mr. Kroff: I would like to ask Mr. Marsh what rods he means?

Mr. Marsh: Bottom rods, particularly. We will have to change the bottom rod and also change the top rod. If we put in wheels of a larger diameter we will have the brake shoes riding the wheels.

Mr. Kroff: We have the dead lever guide with a lot of holes in it to take up the slack.

Mr. Marsh: I would suggest from what experience we have had with our own cars that the dead lever guide is used mostly when somebody puts on wrong material. If the car is properly equipped in the first place you do not have guides of sufficient length to admit of letting them out for wheels of greater diameter and the levers would not retain their proper angle if taken up in the guide on account of applying smaller wheels.

Mr. Kroff: I believe that the dead lever guide was put on there to take up the slack of the brake. That is what I use it for anyway.

Mr. Hunt: I would understand from this section of Rule 3 that any repairs that were necessary in this case ought to be charged to the car owner. If the car was low it is an owner's defect. If it is necessary to put in a standard sized wheel and changes were necessary to bring the car to the proper height, I think the owner ought to pay for all the changes that are necessary because he has given us a defective car. This rule says you can make these changes if necessary to bring the car to the proper height it must carry with it that he pays for all the work necessary on account of this change.

Mr. Darlington: There is one other point in connection with that. For some years past the policy of the Master Car Builders' Association has been towards making general standards and a road that runs a car about with 28-in. wheels deserves to be taxed to the full limit when these wheels fail on a foreign line, especially when 28-in. wheels are not recognized by the M. C. B. Rules or given in the list of prices for wheels.

Mr. Hunt: Is it reasonable to suppose that this matter of giving us a car with improper parts you can do only part of this work and charge it to him? Is that reasonable and does the rule mean that?

Mr. Mehan: The point I make is there is a chance for quibbling. Unless the rule states definitely just what is meant or if there is a loophole left a good many roads will take advantage of it.

Mr. Hunt: The first part of this paragraph reads: "In making repairs for which owners are responsible, 30-in. and 36-in wheels may be replaced with 33-in. wheels, if practicable." There is a period after practicable. Then it starts out and says "if changes are necessary" these changes to this car; to these wheels; this whole rigging, whatever it is. If changes are necessary to bring the car to the proper height, the cost of so doing shall also be chargeable to the car owner. Now what is meant by that if it is not meant that the car owner shall stand the cost of doing all the work?

Mr. Peck: I move you that it is the sense of this meeting that in the case of change of wheels other than 33-in. being replaced by wheels of 33-in., the car owner be held responsible for the expense of making all changes necessary.

Mr. Mehan: There is one portion of this that is not answered to my satisfaction. The question is, if you receive a car with one pair or two pair of 36-in. wheels defective, can you put in 33-in. wheels throughout?

Pres. Grieb: I do not think that anybody is apt to do more work than is necessary.

Mr. Hunt: Would it not be well to answer the gentleman on that? That is, have some of the members give their opinion. I think that you could change all those wheels if necessary to bring the car down because the car is defective and this part of the rules is put there for the purpose of making them correct this evil. Now if it is necessary to bring that car down by putting in standard sized wheels spoken of, I think you can put them all in, although only two pair are defective and the other two are in good condition, as this improper height is a defect which owner is responsible for.

Mr. Mehan: It says "Repairs for which the owners are responsible." They are not responsible for wheels in good condition.

Mr. Hunt: I will say that the owners are responsible for defect on a car such as too high.

Mr. Mehan: I would like to ask Mr. Hunt if his idea was carried out, how would he credit the good 36-in. wheels that he removed?

Mr. Hunt: I think under the present condition of things we should call them scrap, as they are not a standard wheel.

Pres. Grieb: Under Sec. 12, Rule 4 I think it would be well to consider the question raised by Mr. Kroff in regard to what should be done on a car that has two brake staffs and is without a push rod.

Pres. Grieb: Another point to be considered is how side doors can be designated as A and B end.

Mr. Bates: It seems to me that if a door opens towards the B end it will be known as B end, and similarly on the opposite side.

Mr. Mehan: I would like to ask Mr. Bates how he would designate refrigerator car doors?

Mr. Parish (L. S. & M. S.): We have gone a little further on the Lake Shore in locating the parts in taking record. We show the location of all repairs. In the case of side doors we take record as A R. R for right hand side and L for left hand side. This question of two brake staffs on a car and no brake cylinder push rod was taken up recently before the Central Railway Club and I understand they made a recommendation to the M. C. B. Association that that class of car be stenciled A and B end. Whether or not that has been taken up by the arbitration committee I am not able to say.

Mr. Bates: In reply to Mr. Mehan I would like to inform him that on refrigerator cars one-half of the door opens toward the A end and the other half towards the B end.

Mr. Hunt: As this A and B end has come to cut some figure in the rules now, would it be well to have the cars stenciled A end and B end? Would it simplify matters for the inspectors and repairmen and they may not be as liable to make a mistake if the cars are stenciled and it may be well for this meeting to say whether they think that it would be a good thing or not.

Mr. Parish: I would suggest for the information of the members that some roads are doing that at present. The Lake Shore and New York Central are doing that now.

Mr. Kroff: I think that the sides and ends ought to be marked A, B, C and D; then you can tell the side of the car In putting in a side post or anything like that it would be pretty hard to locate it now.

Mr. Parish: On that same line I think that our manner will take care of the whole thing.

Mr. Darlington: In connection with Sec. 13, Rule 5, I note that they do not specify any price for channel bars. They consider that evidently a manufactured article. I would like the sense of this meeting as to whether channel bars be considered manufactured articles or at the price of wrought iron. We have had numbers of cases in which that question has arisen and a general understanding of what is the right charge for channel bars would be quite desirable, I believe, to quite a few of us. My understanding of it would be to charge the channel bar at the manufactured articles cost price on the open market and then charge the cost of any work necessary in the way of drilling, etc., so as to prepare it for application to the car in addition to the labor which the M. C. B. Rules allow for applying the wood or iron channel bar now in use.

Mr. Mehan: I think Mr. Darlington covers the ground fully. If we have a channel bar spring plank, for instance, it differs very little in material itself from a channel center sill, and there are a great many cars being built now with channel center sills. The idea seems to be going in that direction and if we charge the channel bar spring plank as wrought iron the same thing ought to apply to a center sill, and for this reason I think it ought to be charged as a manufactured article.

Pres. Grieb: It will be observed in the list of prices the charge for channel bars is not fixed and as they are coming more generally into use it might be well to have an understanding as to what is the correct method for arriving at the price.

Mr. Stewart: I do not think we can consider a channel bar a manufactured article for the reason that it has to be heated and notched out and has to go through three or four hands before it is ready to be applied. I think where the rules give a price for manufactured articles it is for an article to be delivered to the railroad company or car owner ready for application. The rules say "Bolts, nuts and forgings" 3c. per lb., and anything that has to be run through a blacksmith forge can be classed as nothing else but a forging.

Mr. Darlington: I may say that there is practically not a cent of difference in the actual cost between buying the channel bars in the open market and paying the labor that the last gentleman has spoken about on it, and the 3c. a lb. The point is raised so that not so much as for a channel bar as applied to a spring plank only, but when brought into use as a center sill when there will be a material difference in the price of manufactured article, plus the labor, and the 3c. a lb. I think it is only fair that a man who applies a channel bar as a spring

plank should be allowed the necessary labor of drilling, etc., in connection with it. The charge then, as I understand it, would be—one channel bar, $1.65 per 100, plus blacksmith and machinist labor and the price applying to the car. I think the members of the Association will think that a fair proposition as to the way they should be charged.

Mr. Stewart: I think it a bad precedent to take any article that has to be forged and charge it out as a manufactured article. As I said before, the channel bar has to be heated and forged before it is ready for application and should not be considered a manufactured article. Anything in which you have to change the construction before using it cannot be considered a manufactured article.

Mr. Darlington: I move that it is the sense of this meeting that channel bars should be charged at the open market price as manufactured article, plus the necessary blacksmith and machinist labor. Motion lost by a rising vote.

Sec. 22, Rule 5.

Mr. Mehan: In the first paragraph of this section it says—"No charge to be made for labor of replacing or applying M. C. B. knuckles, knuckle pins, locking pins, clevises, clevis pins, lift chains, brake shoes or brake shoe keys, except on the authority of a defect card". Does that mean for missing material or wrong material? For instance, you have a defect card for a wrong brake shoe. Now would you allow full credit for that brake shoe and charge labor also, or does this mean only for missing material?

Mr. Peck: That was decided by the arbitration committee several years ago. I got beat on that with the Great Western.

Mr. Mehan: How would you treat a wrong brake shoe? Allow credit and charge labor?

Mr. Peck: Yes, sir. Give credit at scrap price and charge labor.

Mr. Kroff: I think that the labor charge of two hours is not sufficient for applying a coupler, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or two coupler stops, coupler pocket, coupler pocket rivets, renewing or replacing any or all, at same end of car at same time.

Pres. Grieb: I think we will bow to the Master Car Builders and charge as they say until time to change the rules.

Mr. Mehan: As to the last paragraph of Sec. 221, Rule 5—"No additional labor shall be charged for applying material in connection with the application of all other parts when the allowance made in Sec. 22 for one is sufficient to cover both, and the additional item involves no extra labor, and any cases of similar nature." It seems to me that this section is very indefinite and will result in a great deal of difference of opinion. For instance we will take out a pair of wheels and in that same truck renew an arch bar. What should be the labor charge for that arch bar; some may say two hours and some one. There is nothing definite. Another case—Suppose that you remove a side sill, and side plate and on that same side of car three side posts are renewed. Can you charge three hours for each of these side posts, or one hour, or two hours?

Pres. Grieb: Possibly it would not be well to consider any hypothetical cases tonight.

I would like to ask for a little information under Sec. 34, Rule 5, which fixes the price for freight cars destroyed. In the last item on page 40 it says "Flat car, eight-wheel plain, 32 ft. long or over, but under 40 ft., $140. Under this rule what would be a proper charge for the body of a 40 ft. flat car?

Mr. La Rue: Settle under Section 26 as a special car.

Pres. Grieb: There is another item that I would like to direct attention to in the same section, namely, gondola car. For an eight-wheel, plain, under 25 tons, they quote a price of $125. You will observe that a 33-ft. flat car of 40,000-lbs. capacity is worth $140, but if that same car carries coal sides and classed as a gondola car, it is worth only $125, you are selling a 33-ft. car and dropping $15 simply because it carries coal sides, when it ought to be worth more.

There is another little item in Section 25 that I would like information on. We have some cars shipped with straight air pipe fixtures, hose and fittings, and in case one of those cars is destroyed is it proper to add any charge for the value of those fittings?

Mr. La Rue: Yes, sir, if the car is so stenciled.

Mr. Hunt: I think it is not, because a car with only pipes on is not equipped with air brakes.

Mr. Buker (C. C. C. C.): It makes a connection with the next car, and I do not see why it is not chargeable if it is so stenciled on the car.

Mr. Hunt: Sec. 25 says that the amount $36 for air brakes is not subject to any depreciation. I believe it means by "air-brakes" that it must have cylinder and reservoir, must be equipped with an air brake.

Mr. La Rue: I think they ought to be paid for it because they have complied with the rules and have stenciled the car in that way, and in case the car is stenciled there ought to be some remuneration for that work.

Mr. Kroff: I do not think they should, for this reason: We have freight cars that have four side doors, two ventilator doors and two common side doors. You may say that body is worth a little more. It is not an air brake car simply because it runs in an air brake train and if the owners want to get pay for that they ought to equip the car with air brakes.

Mr. Darlington: Mr. Kroff's objection would not apply there. A car equipped in the manner he speaks of would be considered a special car and you could get paid for everything on it.

Mr. Marsh: There is a rule here which provides for the protection of car owner where they have cars with signal pipes on them and the car is so stenciled, and I move you that where cars are so equipped that they should be taken as a part of the air brake system, although not air brakes complete, and that the car owner should be allowed something for them as part of the air brake equipment. Motion carried.

Pres. Grieb: If agreeable to the members, we will hold the discussion of the passenger car rules in abeyance until some future meeting. We will now listen to the report of the committee appointed to design a suitable card case for repair and defect cards.

Chicago, Nov. 12, 1901.

To the Officers and Members Car Foremen's Association of Chicago.

Gentlemen: Your committee appointed for the purpose of investigating the practicability of having card cases attached to all freight cars, for the purpose of receiving and preserving M. C. B. defect cards, and if found practicable and desirable, to submit designs with recommendations, beg to report as follows:

Your committee has communicated with many of our members and others interested in the matter, and from the replies received, have reached the unanimous opinion, that a card case of suitable design for this purpose is desirable, if not in some cases at least an actual necessity.

Some of the most potent reasons why a card case is thought necessary and desirable are:

(a) The growing practice of substituting metal for wood construction makes it necessary to provide some simple and effective method for carrying M. C. B. defect and repair cards.

(b) It is believed that with a case of the proper design it would be possible to eliminate the necessity of writing upon both sides of the cards, thus causing great saving in clerical labor by the inspectors and at the same time preserving the cards with their record in much better condition.

(c) It has been shown that many cars are running with cards, the writing upon which was entirely illegible, and which has been torn off and replaced so many times by inspectors (to read what was written on the back of the card) that they did not correctly show all the defects and in some cases the name of the road issuing the card was missing. It is believed that with a properly designed card case, this trouble can be prevented.

The designs submitted to your committee are herewith transmitted to you as a part of this report, and which are enumerated below:

Nos. 1, 2 and 3 were submitted by employes of the car department of the C., M. & St. P. Ry., and which will be noted are all of practically the same design, that is open face with a spring arrangement for holding the card within the case. They differ only in that one has a solid back, while the others are skeleton frames.

Nos. 4, 5 and 6 were submitted by the A. M. Goodwin Co., of Saco, Me. They are all open face. No. 4 is used without the folder, Nos. 5 and 6 with the folder. No. 6 differs from the other two in that the finger notch at the top is omitted.

Both the cases submitted by the C., M. & St. P. Ry. employes and the A. M. Goodwin Co., are either patented or "patent applied for."

Nos. 7, 8 and 9 are designs submitted by the car department of the Swift Refrigerator Transportation Company, and represent an open face, a semi-open face, and an entirely closed case.

No. 10 represents a design submitted by the superintendent of the C. N. & B. Refg. Co., and which is a closed design with hinged top.

No. 11 represents a design submitted by employes of the car department of the C., B. & Q. Ry. and differs from other designs in that it is open at the end, the card being held in position by a spring.

In all eleven (11) designs were submitted, and after giving due consideration to each, your committee feels that it would be unwise to recommend any particular device, more especially if it were covered by a patent.

The desirability of a card case for M. C. B. defect and repair cards having been decided upon, it remains with the association to formulate an expression as to what constitutes the fundamental requirements of such a card case, and in this connection your committee recommends—

1st. That a card case, complying in all essential features with the following requirements, shall be securely fastened with screws, rivets or other equivalent means, to either the inside face of the cross tie at B end of car, or to the outside face of the intermediate sill, on all freight cars.

2nd. The card case must be entirely closed to protect cards as much as possible from cinders, sand blast, etc., and preserve the record on the card, so as to make it necessary to write upon one side only.

3rd. To permit of the easy application of a card, but not that the card should be as easily removed, thus in a large measure preventing mischievous persons from removing such cards.

4th. The card case must be designed in such a manner as to prevent the card from falling out, even when the case may be inverted, through accident to car.

5th. The card case must be 3⅝-in.x8⅛-in.x3-16-in. inside clear measurement.

6th. The card case may be of black sheet japanned, or galvanized iron, steel or other suitable material.

Your committee found upon investigating this subject that there was more to it than would appear on its face. We would therefore recommend that the subject be placed No. 1 on the list of subjects for discussion at the next meeting of the association, after which it is hoped that the association will adopt, as recommended practice, either one or the other of the samples submitted, or specifications covering the manufacture of same.

Respectfully submitted,
O. M. Stimson, Chairman.
J. Grieb.
F. C. Schultz.
Hugh Marsh.
Geo. Wentsel.

Mr. Morris: I move that we make this subject No. 1 on our next program. Carried.

Pres. Grieb: In this connection I would like to state that we have appointed a committee to report on Defect in draft rigging and suggestions for improvement of same. The committee consists of Messrs. T. R. Morris, T. B. Hunt, C. D. Pettis, Hugh Marsh, S. Shannon and H. H. Harvey. This committee has been at work for some time industriously gathering information and hopes to be able to report at the December meeting. As this is a most important subject it would be very desirable indeed, if arrangements could be made to have the report printed and distributed before the meeting so that we could all come here prepared to express our views.

Meeting adjourned.