

Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXII

NEW YORK, SATURDAY, NOVEMBER 14, 1908

No. 24

PUBLISHED EVERY SATURDAY BY THE

McGraw Publishing Company

James H. McGraw, President. J. M. Wakeman, 1st Vice-president.
A. E. Clifford, 2d Vice-president. C. E. Whittlesey, Sec. and Treas.

Henry W. Blake, Editor.
L. E. Gould, Western Editor. Rodney Hitt, Associate Editor.
Frederic Nicholas, Associate Editor.

NEW YORK, 239 WEST THIRTY-NINTH STREET.

CHICAGO: Old Colony Building.

PHILADELPHIA: Real Estate Trust Building.

CLEVELAND: Schofield Building.

LONDON: Hastings House, Norfolk St., Strand.

Cable Address, Stryjourn, New York; Stryjourn, London—Lieber's Code.
Copyright, 1908, by the McGraw Publishing Company.

TERMS OF SUBSCRIPTION

United States, Hawaii, Puerto Rico, Philippines, Cuba, Mexico and Canal Zone.

ELECTRIC RAILWAY JOURNAL (52 weekly issues and also special daily convention issues published from time to time in New York City or elsewhere), postage prepaid..\$3.00 per annum
Single copies.....10 cents

Combination Rate, with Electric Railway Directory and Buyer's Manual (3 issues—Feb., Aug. and Nov.).....\$4.00 per annum

Both of the above, in connection with American Street Railway Investments (The "Red Book"—Published annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

CANADA: extra postage.....\$1.50 per annum

To All Countries Other Than Those Mentioned Above.

ELECTRIC RAILWAY JOURNAL (52 weekly issues and also daily editions as above), postage prepaid.....\$6.00 per annum
25 shillings. 25 marks. 31 francs.

Single copies.....20 cents
Foreign subscribers may remit through our London office.

NOTICE TO SUBSCRIBERS.

CHANGE OF ADDRESS.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

BACK COPIES.—For back copies of the ELECTRIC RAILWAY JOURNAL, STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW, applications should be addressed to the McGraw Publishing Company. No copies of issues of the STREET RAILWAY JOURNAL or ELECTRIC RAILWAY REVIEW prior to January, 1907, are kept on sale except in bound volumes.

DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

Of this issue of the ELECTRIC RAILWAY JOURNAL 9000 copies are printed.

The Grand Trunk Installation

At first thought the Grand Trunk tunnel electrical equipment, which was officially put in service this week, seems an ideal one for direct current. The line is comparatively short, 3.7 miles. It extends through a subaqueous tunnel where difficulties with insulation for high-tension current might be expected. The load is intermittent on account of the use of a single track, so that storage of power would naturally suggest itself. All in all the conditions

seem to be those which are frequently mentioned as being most suitable for direct current. Yet single-phase is employed and is doing the work successfully. The facts are that a locomotive or car equipment designed purely for single-phase equipment is a much simpler machine than that required for composite a.c.-d.c. operation, with its duplicate control, collectors and many other parts. Again, the question of intermittent load is cared for largely by the supply of energy needed for the pumps and miscellaneous power supply and at night for lighting. The performance required of the locomotives is worthy of mention, that of hauling a 1000-ton train up a 2 per cent grade at 10 m.p.h. The train load is limited only by the maximum drawbar pull of 50,000 lb., which was considered the highest safe limit with the mixed rolling stock hauled through the tunnel. The installation is also noteworthy as being the first application in this country of single-phase equipment for heavy freight service.

Steel Ties

Steel ties are being adopted by a number of street railway companies for track construction in paved streets, but the rapidly waning supply of wooden ties and their increasing cost have not yet proved sufficiently alarming to most engineers to warrant the use of steel ties in open ballasted track. Steel ties cost from two and one-half to three times as much as wooden ties at present prices of 75 cents for the latter and from \$1.75 to \$2.50 for the former. The life of steel ties, on the other hand, is estimated at from 20 to 30 years in open track and an indefinitely long period when encased in concrete in paved track, whereas wooden ties even when treated at an additional cost of from 10 cents to 50 cents per tie will not last more than 18 years at the most and generally begin to fail after from 7 to 10 years. The relative economy of steel and wooden ties, considering interest on investment, maintenance cost, first cost and scrap value can be reduced to a simple equation showing the maximum first cost of wooden ties and the minimum first cost of steel ties for equal economy. Roughly speaking, at present market prices of steel ties they show no economy in ballasted track over wooden ties costing less than \$1 a piece.

In track with concrete foundation, however, the first cost per foot of track of steel tie construction is less than that with wooden ties for the reason that the spacing of ties can be doubled and a smaller quantity of excavation and concrete is required. Charles E. Clark in a paper printed elsewhere in this issue estimates that a saving in first cost of \$1,637 per mile of track can be made by using steel ties instead of wooden ties and there can be no question of the longer life of the all-metal construction. Inasmuch as the

author of the paper was one of the earliest advocates of this form of construction and has had extended experience with it, the figures of relative costs presented are of especial interest.

Two faults have been found with steel ties when used in ballasted track carrying the heavy wheel loads of steam railways. The early forms of channel trough ties proved too weak to carry the vertical loads imposed, and failed quickly when put in track. Later forms of I-beam section, on the other hand, have been criticised as being too rigid, causing the rails to break instead of the ties. Track in paved streets cannot be too rigid, so that this objection does not hold. The other defect, if it may be called a defect, is not in the tie itself, but in the form of rail fastening employed. In ballasted track, bolted clip fastenings sometimes work loose, and are liable to be sheared off by the flanges of derailed wheels. When the ties and the base of the rail are completely embedded in concrete and protected by the paving above, this objection to the fastenings is also overcome.

Rates for Special Car Service

The increasing use of special cars on electric railways is one of the most important indications that publicity work in the traffic department is bearing fruit. Perhaps nowhere else in street and interurban transportation has the value of progressive and selective advertising been better demonstrated. The work of a passenger agent is largely of the kind that cannot be exactly measured in its effect on earnings, but in the selling of special car service there is a pretty close relation between the cause and the effect. Even to this day, comparatively few persons outside the relatively small number of secret societies that have patronized the special car realize the attractiveness and reasonable cost of such service, particularly in comparison with the cost of special car or train service on a steam railroad.

There is a great field for this class of service on systems covering large areas and traversing territory of attractive characteristics, but there is one point to be considered that has not always received proper attention by the operating company selling special car service. That is the standardization of the charges for the use of these cars. In not a few instances the special car tariffs have been tabulated without much regard for consistency; in others they have been based upon single factors, like the mileage traversed or the time the car was in service. The problem is difficult, because the demands for special car services are so variable; the parties wishing to travel vary in size, the routes are rarely twice alike in succession, except when parks or fixed attractions are visited, and the time of day or night is liable to be pretty much anything and cars demanded at the shortest possible notice.

All these points ought to be considered in charging for a special car service, as well as the regular fares by the company's lines, the regular and special car charges of competing lines, the zones established for ordinary traffic charges, transfer limits, and special conditions of mileage and hours. To base the tariff for special car service upon only one of the several factors which influence its cost opens the way toward insufficient profits or possible dis-

agreements with future customers who desire what they consider an equivalent service at a price received by a previous special car party. The main point in making special car rates is to be sure to cover the cost and show a reasonable profit, if possible, on top of that, and to keep a careful record of the charges and circumstances of each particular case. Parties desiring the same or similar service ought to be quoted substantially the same rates. This can be done by keeping all charges and pertaining facts of service rendered, and by establishing a tabular list of charges for the standard runs and services most frequently desired by special car patrons. In some cases the fare per special car patron may be higher than that for the similar journey by a regular car, but that is not a serious matter as a rule, considering the private service thus rendered to the party. An alert auditing department will have little trouble in estimating the cost of any particular special car service, and it will pay to have this done for complex cases. The special car means so much greater comfort to the company's patrons that it deserves a fair price under practically all circumstances.

Paying Station Agents

The opinion in which a railroad is held by its patrons is largely molded by the character of the service it gives. This applies to both passenger and freight business, but with the latter the question of service is largely in the hands of a few men, the local freight and express agents. Hence the choice of the men to fill these positions should be given more than passing attention. It has been the custom of many steam railroads to employ as station agents young men who would fulfil their set duties in a routine way and be satisfied with wages of from \$30 a month up, according to the requirements of the work. One result of this practice of apparent economy in wages at way stations has been the prevalent opinion in the minds of the traveling public that a railway employee will do only so much work and be only so courteous as the tenure of his job will permit. With the growth of the electric interurban lines it would be a mistake for this opinion to take root and a number of them have adopted the policy of placing the agents at their way stations on a commission basis.

A railway ticket or freight and express agent whose pay varies with the amount of business which his station originates may be said to have the same incentives for good work that are offered the small merchant. If he is at all aggressive and anxious to forward his own interests he will undertake to build up the traffic in his territory to the highest point. The result of a number of agents pursuing this same policy along an interurban road must be highly instrumental in increasing the earnings of the road. Such men are on the alert not only to grasp all the immediate business, but to lay foundations for future additional traffic. It has been shown that they broaden their acquaintance among the farmers and local merchants and by so making friends learn promptly when a prospective shipment is being considered. Theater parties can be organized by a wideawake agent and his pocketbook fattened by his effort. If his pay depends upon his ticket sales as well as his freight business, he will never permit his station to be out

of tickets, and his self-interest will incite him always to be courteous and diplomatic in the handling of the company's business, as well as active to introduce methods of increasing the company's revenue.

The Illinois Traction System, of which B. R. Stephens is general traffic manager, is a company which follows this plan of paying the agents at its way stations a certain percentage of the earnings. Those at all other than terminal stations receive a commission of 5 per cent of the revenue of all in-and-out freight and express handled by them. In addition they receive 2 per cent of the revenue derived from the tickets sold at their stations. At the large terminal stations there are district agents who are responsible for the territory within a radius of 40 miles to 50 miles from the city in which they are stationed. The remaining territory is apportioned among the way-station agents who are paid on the commission basis. The company furnishes the local agents with all the facilities of the station, including light and heat, and the agents hire their assistants and are responsible for the conduct of the company's business in their own territory. It is said that some of the agents on this road earn on the commission basis more than \$100 a month, which is considerably more pay than could be had at a steam railroad station in a corresponding territory.

The Illinois Traction System earnings from freight and express during the past month show an increase of 115 per cent over the corresponding month of a year ago. There has been an increase in mileage of only 8 per cent. The management attributes a considerable portion of this satisfactory increase to the aggressiveness of its solicitors and agents and in this way substantiates the arguments for paying way-station agents on a commission basis.

Checking Initial Failures in Power Plant Equipment

The installation of new types of apparatus in an established power plant always introduces a critical period of operation. To minimize the value of the factory test of a new gas engine or a novel design of turbine valve government is to close one's eyes to some very suggestive information, but after all it is the final test of commercial service that decides the success or failure of a given machine. In most equipment contracts involving the selection and installation of new types of apparatus the purchaser requires the manufacturer to establish the success of the machinery in the plant before payment is made. This responsibility cannot be divided without opening the way toward possible disagreements, but the purchaser can do much to help avoid initial failures and retard the adjustment of the equipment to its service.

One method of co-operating on the part of the purchaser is to be more than usually careful to maintain an accurate log sheet of the station performance, including extra repairs, adjustments, service interruptions and changes from the original design, if any become necessary. The most actively alert installation expert cannot be in close touch with the plant as a whole at all hours of the day or night, even though he spends from 12 to 18 hours a day at the site of the new machinery. To adjust the performance of his machine properly and to fit it into

the local conditions he must observe the work of that machine, whether engine, turbine or condensing outfit, with the greatest care at just those times when the plant as a whole is under the stress of the peak load. By requiring his station staff to cooperate cordially with the installation man from the factory, the purchaser can do a good deal to hasten the date of acceptance, and incidentally lower the charges for the services of the installation expert himself, which are very generally placed on the day basis.

It is frequently the case that the purchaser of a new unit will throw it into active service of the severest kind before the manufacturer has had sufficient time to limber it up for regular duty, and will then complain because the station fuel consumption does not decrease as he had expected. Not seldom does it happen that the failure in service of some of the older apparatus necessitates the rushing into operation of the new units, but when this is the case, ultimate economies obtainable after prolonged adjustment of the whole station to the new conditions cannot in reason be demanded at the outset.

Aside from keeping the installation engineer in close touch with the performance of the station through the log and the personal intercourse of the responsible engineers in charge of the different operating shifts, the purchaser can materially aid the situation usually by paying more than the ordinary attention to the minor adjustments and maintenance of the old apparatus in the plant. Just before the new unit is placed in service is a good time to go over the existing installation and make sure as far as possible that the apparatus is capable of doing its work without failure. In this connection the taking of indicator cards and resetting of inefficient valves, the replacement of adjustable wearing parts of low first cost, the supplying of a little extra lubrication perhaps, the improvement of the quality of steam or water used in relation to the needs of the particular plant, and the removal of possible leaks in the piping and the re-covering of worn out mains which have become heat wasters will all pay heavy interest on their cost. To assume that a new machine will positively be able to take up its load within a few days of its erection and to let the balance of the plant get into a condition of semi-neglect because of the supposed increase in immediate capacity is to invite costly service interruptions and run the risk of injuring the new unit by heavily overloading it before there has been enough time to properly fit it into the installation. Promptness in notifying the manufacturer of any developments which are unsatisfactory will do much to reduce the time required for initial adjustment and will by so much avoid the occurrence of initial failures or troubles which at first give the apparatus a bad name in the confidential discussions between the purchaser and his friends. In electric power plants the pressure is almost always great to put a new machine into service at the earliest possible moment, but ultimate efficiency demands a reasonable time for the preliminary adjustment. Purchase of new equipment far enough ahead of an expected increased demand is another way by which the initial failures and defects of new types of apparatus can be minimized.

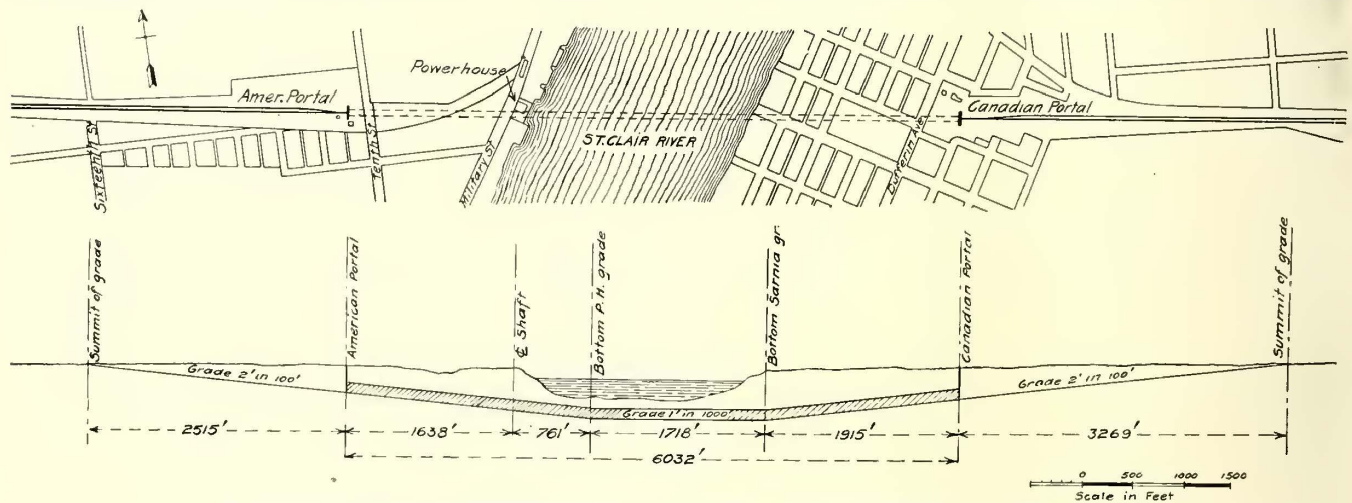
ELECTRIFICATION OF THE ST. CLAIR TUNNEL

The question of the electrification of the St. Clair Tunnel has been under consideration by the Grand Trunk Railway officials for some years. During the analysis of these plans for electrification a conference was held between C. M. Hays, second vice-president; E. H. Fitzhugh, third vice-president, and Bion J. Arnold, Chicago. As a result a report was prepared covering the general question of electrification. It contained detailed estimates of cost of installation and operation of the various systems that might be used in connection with the work. Mr. Arnold was commissioned to prepare specifications for the equipment. These specifications stipulated, in addition to various guarantees regarding efficiencies of different parts of the system, and of the system as a whole, that the installation when completed should be capable of hauling a 1000-ton train through the tunnel from terminal to terminal in 15 minutes, and that in so doing the maximum speed should not exceed 25 m.p.h., and the minimum speed, when ascending a 2 per cent grade, should not be less than 10 m.p.h. Tenders were submitted by the companies that were prepared to undertake the work as specified, and after careful analysis the decision was made to adopt the single-phase alternating current system, using an overhead working conductor, this being the first decision providing for

ft., or about $2\frac{1}{4}$ miles. The grade on the tunnel approaches and the inclined sections of the tunnel is 2 per cent, while the flat middle section of the tunnel, about 1700 ft. in length, has a grade of 0.1 per cent downward toward the east, just enough to provide for the proper drainage of any seepage water to sump pits, from which it is lifted by electric pumps.

A single track extends through the tunnel, while a double track is laid in both of the tunnel approaches. The necessary tracks for handling the freight and passenger traffic are provided in the yards at Port Huron and Sarnia. The map and profile of the tunnel are shown in an accompanying illustration. The tunnel shell consists of cast iron rings built up in sections, the inside diameter being about 19 ft.

Until the completion of the electrification, four steam locomotives of special design had been in commission since the construction of the tunnel for handling the freight and passenger traffic. They were designed to provide the necessary high tractive effort required to operate the trains over the grades in the tunnel and on the approaches, and arranged to burn anthracite coal, in order to minimize the inconvenience due to excessive smoke in the tunnel. These locomotives have given good account of themselves, and have handled the traffic in a satisfactory way throughout



St. Clair Tunnel Electrification—Plan and Profile of Tunnel and Approaches

the application of the single-phase system to heavy steam road service. The contract was awarded some months later to the Westinghouse Electric & Manufacturing Company, and provided that it be responsible for the installation and successful operation of the entire equipment. The equipment has been in continuous operation since May 17, 1908, handling the entire train service of the St. Clair Tunnel Company, this service being the heaviest railroad service handled by electricity in the world.

THE TUNNEL

The St. Clair Tunnel was opened for traffic in 1890 by the St. Clair Tunnel Company, organized as a subsidiary company to the Grand Trunk Railway System. The tunnel, located under the St. Clair River, is the connecting link between the terminal of the Western Division at Port Huron, Mich., and the terminal of the Eastern Division at Sarnia, Ont. The length of the tunnel from portal to portal is 6032 ft. The open tunnel approaches are of considerable magnitude, that on the Port Huron side being slightly over 2500 ft. in length, while that on the Sarnia side is nearly 3300 ft. in length. The total distance between the American and the Canadian summits is 12,000

feet. Their maximum tractive effort limited the weight of the trains handled to about 760 tons, and even with this load the speed up the 2 per cent grade was often very slow. With the constantly increasing traffic, at times the capacity of the tunnel with its steam equipment was taxed in handling the tonnage, and it was thought desirable to make such changes in the operation of the tunnel as would increase its possible capacity for handling traffic, and at the same time obviate the danger and inconvenience due to the presence of the locomotive exhaust gases in the tunnel.

PROPOSED SYSTEMS FOR INCREASING CAPACITY

The advantage of the use of electric locomotives, on account of the freedom from smoke and the attendant discomfort, together with the possible greater economy in operation, led finally to the decision to provide an electrical equipment to handle the tunnel service, this equipment to provide for the operation of the trains through the tunnel by means of electric locomotives, the handling of the drainage and seepage water by means of electric pumps, and the lighting of the passenger stations, tunnel and roundhouses by electricity. Provision was also made to

furnish a certain amount of power to the roundhouses, and for a limited amount of outside lighting in the form of arc lamps. The different electrical systems available for such service were considered, and estimates as to the relative cost and efficiency of the various systems were prepared. Decision was finally made in favor of alternating current, using a three-phase system for the distribution of power required for pumping and for shop motors, with single-phase distribution for locomotives and lighting.

SERVICE CONDITIONS AND REQUIREMENTS

The St. Clair Tunnel Company is operated as an independent division of the railroad, the trains being delivered by the Western Division in the yards at Port Huron, and taken by the tunnel locomotives through the tunnel, and delivered to the Eastern Division at the yards in Sarnia, the westbound trains being handled in the reverse order. The steam locomotives operating on the divisions adjacent to the tunnel are never operated through the tunnel.

To increase the capacity of the tunnel, it was desirable to provide for the maximum practicable tractive effort in the new locomotives.

The capacity limit was determined by the maximum pull to which it was deemed wise to subject the drawbars on

pump house of a pump operator and the continuous operation of the power plant.

The lighting service to be provided for was of minor importance insofar as the amount of power required at both Sarnia and Port Huron was concerned, this being somewhat less than 100 kw. The power requirements for motors in the roundhouses at Port Huron and Sarnia was about 100 kw for both shops.

To furnish electrical energy for the service outlined above, provision was made in the power plant for supplying single-phase current for the electric locomotives, three-phase current for the pumping service, and three-phase and single-phase current both for the power and lighting service at various points throughout Port Huron and Sarnia, as well as for a small amount of arc lighting.

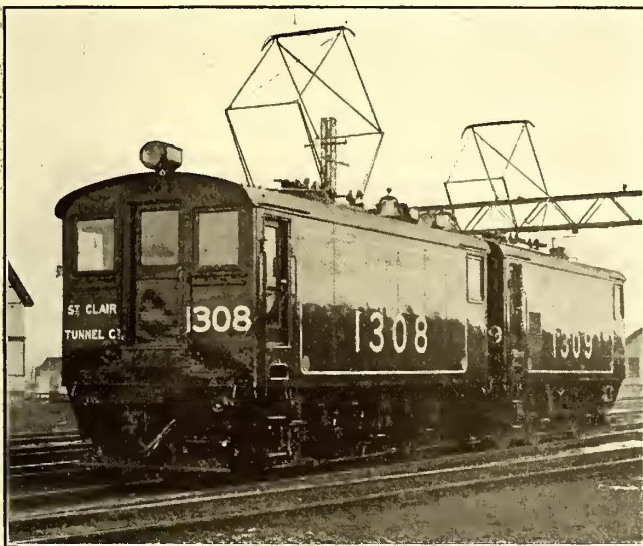
LOCOMOTIVES

Three locomotives have been provided, each consisting of two half-units, each half-unit mounted on three pairs of axles driven through gears by three single-phase motors with a nominal rating of 250 hp each, the nominal horsepower of the complete locomotive unit being 1500. Inasmuch as the electric motors have a very liberal overload rating, it is easily possible to develop 2000 hp, and on occasion in excess of this, in one locomotive. The half-units are duplicate in every respect, and are equipped with the multiple-unit system of control.

As previously stated, the locomotives are designed to develop a drawbar pull of 50,000 lb. at the comparatively low speed of 10 m.p.h. The locomotives are powerful enough to start a 1000-ton train on a 2 per cent grade in case this should be necessary. In a test made on a half-unit, using a dynamometer car, it was found that a single half-unit developed 43,000 lb. drawbar pull before slipping the wheels. This was done on a comparatively dry rail, with a liberal use of sand. On this basis it would be possible to develop about 86,000 lb. drawbar pull with a complete locomotive. The maximum speed of the locomotives is 35 m.p.h. However, it is not the intention of the tunnel company to operate the locomotives at a speed in excess of 30 m.p.h. Speed indicators are provided, which indicate on a large dial located in the locomotive cab near the driver's seat the speed at which the locomotive is running, and at the same time record the speed throughout the length of the run. This assists the locomotive driver in keeping the speed of trains within prescribed limits at all times, and furnishes records of the exact speed of the trains throughout all trips, for the inspection of the superintendent of the tunnel.

The locomotive cab is rectangular in section, constructed of sheet metal supported by structural steel shapes. Inside of the cab are located practically all of the apparatus used in connection with the locomotive, with the exception of the motors and the brake rigging. Included in this apparatus is a single-phase transformer used for reducing the voltage from 3300 to a voltage suitable for application to the motors. The transformer, as well as the motors, is air-cooled by a single-phase motor-driven blower, also located in the locomotive cab, and supplied with 100 volts by a tap from the main transformer. After leaving the motors and transformer the heated air passes either through an opening in the floor of the cab into the open air, or, if desired, into the interior of the cab. In the latter case an appreciable amount of heat can be secured from the main transformer for utilization in heating the cab during cold weather.

Single-phase motor-driven air compressors are also located in the cab, and supply air pressure at about 100 lb.

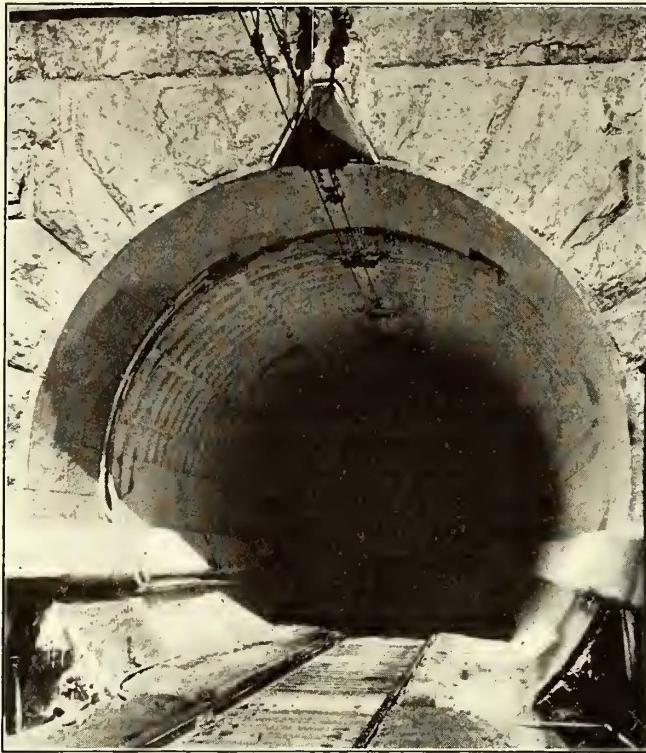


St. Clair Tunnel Electrification—Electric Locomotive

the mixed rolling stock that must be handled, without danger of breaking trains in two. For this reason the locomotives were specified of sufficient capacity to develop a drawbar pull of 50,000 lb. when operating at a speed of 10 m.p.h. It was estimated that such a locomotive would be able to make the complete trip through the tunnel from terminal to terminal with a 1000-ton train in 15 minutes, or four 1000-ton trains per hour, which would provide a capacity for traffic about three times larger than the actual maximum demands up to the present time.

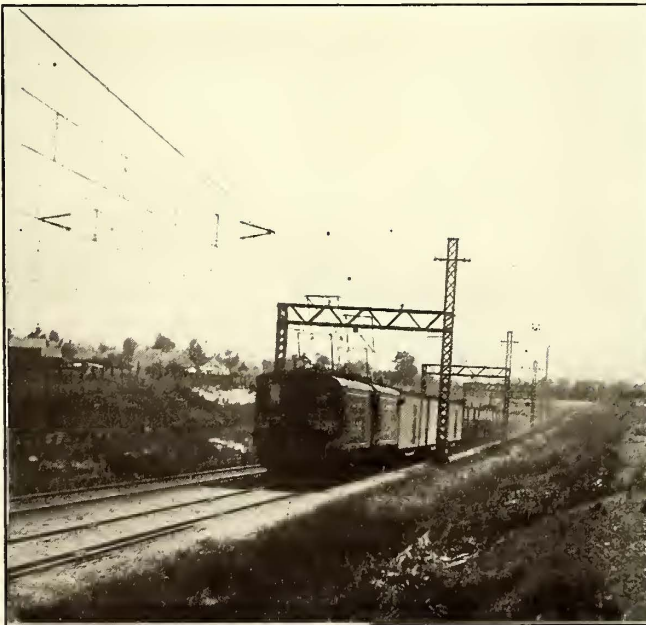
It was estimated that the pumping service, for which adequate provision must be made, would require the installation at the Sarnia portal of two pumps each with a capacity of 5500 gal. per minute, and at the Port Huron portal the installation of two pumps each with a capacity of 4000 gal. per minute. To provide absolute continuity of service, duplicate pumping equipments were provided in each portal, as well as duplicate feeder lines leading from the power plant to the pump houses. As noted above, the pumps must always be in readiness for operation, day and night, throughout the entire year, which, in case of electrical pumps simply necessitates the presence in the

for operating both the automatic and straight-air equipment on locomotive and train, and in addition for a variety of minor purposes in and about the locomotive. All of the



St. Clair Tunnel Electrification—Trolley Supports at Tunnel Portal

contactor switches used in controlling the operation of the locomotives are air operated, the air valves being operated by direct current electrical control. This is also



St. Clair Tunnel Electrification—Locomotive and Train Ascending 2 Per Cent Approach Grade

true of ringing the bell, blowing the whistle, raising and lowering the trolley, and the application of sand to the tracks.

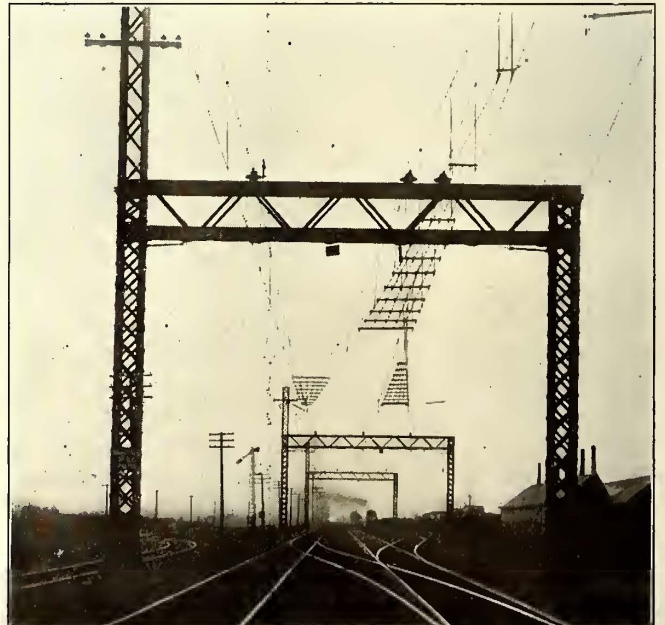
The feature of the control system is that the locomotive is equipped only for single-phase operation,*so that it does not present the complications required when direct cur-

rent is also employed. The main auto-transformer is connected to the trolley by a high-tension cable through an oil circuit breaker provided with a no-voltage release protective relay.

The current for the master controller is furnished by a small storage battery operating at about 20 volts, the battery in turn being charged by means of a small motor-generator set provided for the purpose. The electric controller has 21 points in all, 17 of which are running points. This provides for an increase in the speed of the locomotive from the lowest running speed to the maximum speed by very slight gradations, thus making it possible to maintain a practically constant drawbar pull while the locomotive is accelerating the train. This is very desirable, insofar as the minimum variation in the drawbar pull while handling the train through the tunnel decreases the liability of breaking the train in two. The motorman is guided in his application of the current by an ammeter which is in front of him. The cab also contains foot pedals for operating the bell and sander by air, thus making it possible for the operator to perform these functions while his two hands are employed in operating the master controller and the air.

The motor equipment consists of three 250-hp motors geared to three driving axles. They are of the 10-pole compensated type and designed to run at 235 volts normally and 25 cycles. They are connected in multiple.

Each half-unit is arranged for operation in either direction; air valves, a master controller and ammeter being located at each end of the cab. By means of cable couplings the control system of two or more half-units can be thrown in parallel, thus providing for the operation of any number of half-units from any master controller. In this way the two half-units are generally operated in the handling of freight trains through the tunnel. The pas-



St. Clair Tunnel Electrification—Overhead Construction at End of Port Huron Yard

senger traffic can ordinarily be taken care of by a single half-unit.

The current is collected from the trolley wires suspended at a distance of 22 ft. from the track by means of a sliding bow pantograph trolley. Since the trolley wire extends throughout the length of the tunnel, no additional

provision has to be made for the collection of current while the locomotive is passing through the tunnel. Electric headlights are provided, as well as lights for the illumination of the interior of the cab and the dials of the indicating instruments. The heating of the cabs is provided for by means of standard electric heaters. Heat is also available for drying the sand stored in sand boxes. In general, the M. C. B. standards have been conformed with insofar as couplers, wheel treads, etc., are concerned. The general dimensions of the half-units are as follows:

Length over all.....	23 ft. 6 in.
Height from top of rail to top of roof.....	13 ft.
Height from top of rail to top of pantograph bow when lowered	14 ft. 11 in.
Width of cab over all.....	9 ft. 8 in.
Total weight of locomotive half-unit, fully equipped	67½ tons
(This weight is practically evenly divided over three drivers.)	
Weight of complete locomotive unit.....	135 tons
Length of rigid wheel base.....	16 ft.
Diameter of driving wheels.....	62 in.
Normal speed of train ascending 2 per cent grade (miles per hour).....	10
Normal speed on level tracks (miles per hour)....	25 to 30

In service it has been found that the locomotives will very readily handle a 1000-ton train at from 11 to 12, and possibly 13 to 14 m.p.h. on a 2 per cent grade, thus demonstrating their ability to more than fulfill the specified performance.

PUMPING

The second service to be provided for electrically consists of the pumping necessary to free the tunnel approaches from water due to rainstorms or melting snow, and the

house, these pumps serving to take care of the small amount of water that is constantly finding its way into the drainage wells. The motors in the pump houses are controlled by oil switches located on suitable panels. Provision is made on the panels for connecting the motor busbars with either of two feeders leading from the power plant. Two 150-gal., motor-operated, centrifugal pumps are also located at the foot of the Sarnia grade, and serve to remove from the tunnel the condensation and seepage water, delivering it to the well at the Sarnia portal.

LIGHTING AND POWER

Incandescent lamps in the roundhouses, the passenger stations, the Young Men's Christian Association buildings in both Port Huron and Sarnia, installed previous to the electrification of the tunnel, are now being furnished with current from the electric power plant by means of step-down transformers, reducing the voltage from 3300 to 110 volts. Motors operating on the 3300-volt circuit have been installed in the roundhouses at Sarnia and Port Huron, the current supply being taken from the power plant.

In all, 480 lights have been installed throughout the tunnel on either side at a height of 10 ft. above the rail. The tunnel lamps are operated four in series from the 440-volt secondaries of the lighting transformers installed in the tunnel. Similar transformers furnish the current supply for the tunnel drainage pump motors.

In addition, the stations and other buildings at both terminals are lighted. About 30 arc lights have been provided and installed in the yards at either terminal. The current for the arc lights is furnished at the power plant by means of a mercury arc rectifier. The total amount



St. Clair Tunnel Electrification—Overhead Construction at Port Huron Station Spanning Eight Tracks

removal of a small amount of condensation and seepage water collecting in the tunnel. For this purpose pumping plants have been installed at both tunnel portals, that at the Port Huron entrance consisting of two centrifugal pumps, each capable of delivering 4000 gal. per minute, driven by direct-connected, 100-hp, three-phase, 25-cycle, 3300-volt, induction motors, and that at the Sarnia entrance consisting of two 5500-gal. pumps driven by two 200-hp motors of the same type. In addition a 150-gal. pump driven by a small induction motor is located in each pump

of lighting load is somewhat under 100 kw, which, together with the motor requirements of 100 kw, makes a total of slightly over 200 kw for small power and lighting outside of the plant.

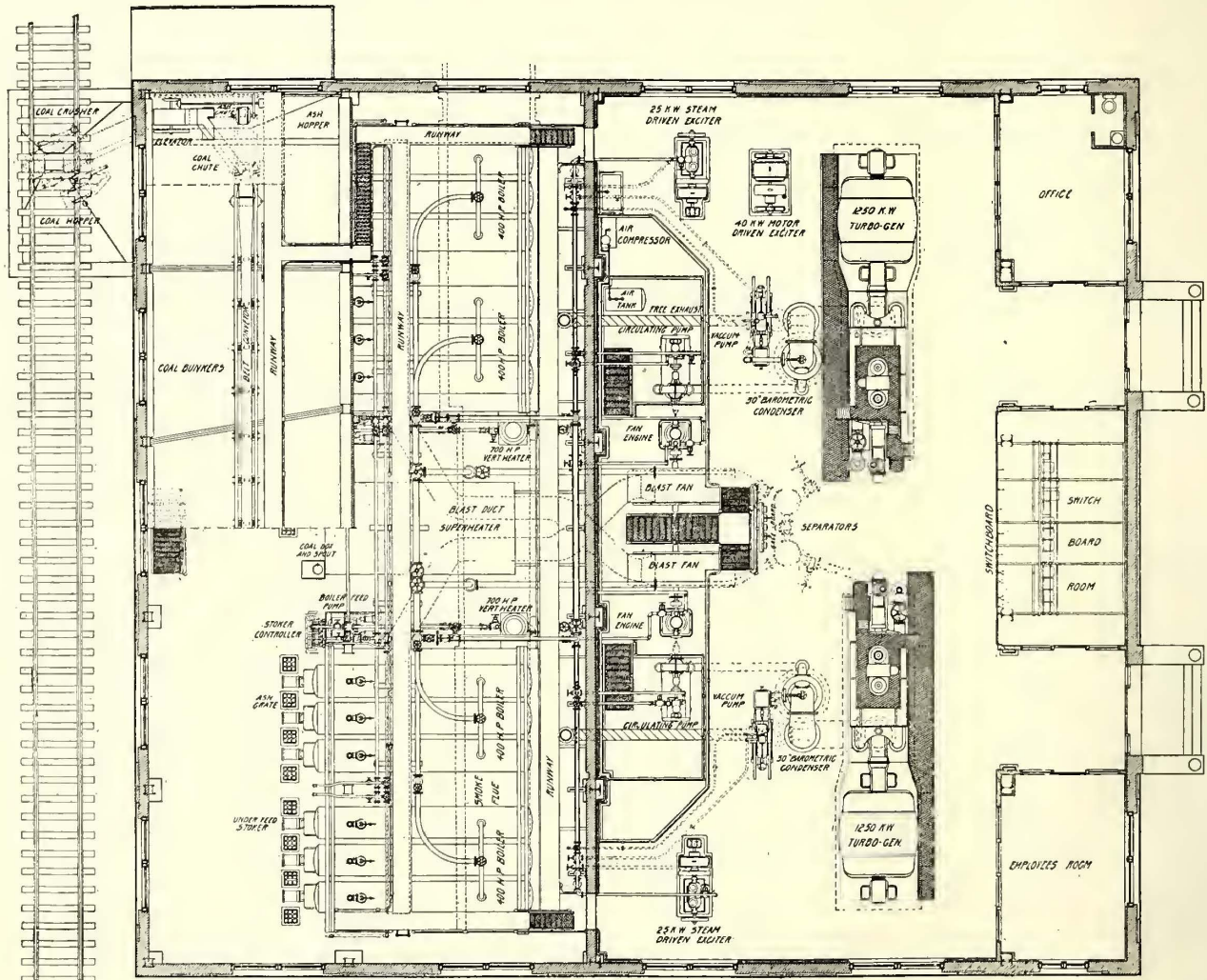
ELECTRICAL DISTRIBUTION SYSTEM

For distribution of the single-phase current to the locomotives, substantial steel towers have been erected throughout the tunnel yards. The steel work used for supporting the working conductors consists of strong lattice columns supporting bridges of trussed construction. The average

spacing of the overhead bridges is 250 ft. They are designed to extend over all tracks that are to be electrified, and in case of those located at passenger stations extend, in addition, over the platforms, thus in no way interfering with the access of passengers to and from the trains. This necessitates a length of about 141 ft. in case of some of the bridges located on the Port Huron side, in which case the bridge spans eight electrified tracks, in addition to the station platform.

Single catenary construction is used throughout, a messenger cable of $\frac{5}{8}$ -in. extra heavy galvanized steel being suspended on the insulators located on the overhead bridges immediately over the center lines of the track to be equipped. The working conductor is attached to the messenger cable by means of fittings of varying lengths so ar-

shell was conditioned by the requirement that complete overhead equipment should not encroach on the tunnel opening more than 9 in. This has been accomplished by bolting to the tunnel shell special iron brackets, each of which supports two spool-shaped insulators. These insulators in turn support steel messenger cables, which are drawn taut throughout the length of the tunnel, and attached at the tunnel portal to special brackets. Special clamps are attached to these messenger cables at points between the insulator supports, and these in turn serve to support the two trolley wires. The insulating supports are attached to the tunnel shell at intervals of 12 ft., as also are the clamps connecting the messenger cable with the trolley. This method provides an attachment at once sufficiently rigid to maintain the proper clearance between the



St. Clair Tunnel Electrification—Plan of Power Station at Port Huron

ranged as to support it at a uniform height of 22 ft. above the top of the rail. No. 0000 hard-drawn grooved copper is used throughout the yards, and at all places, excepting on the tunnel approaches and throughout the tunnel, on which sections two 300,000 circ. mil conductors have been installed. The messenger cables forming the catenary construction terminate at the tunnel portals, where they are securely anchored to eye-bolts imbedded in the heavy masonry portal. At this point the messenger wires supporting the working conductor throughout the tunnel are anchored to special brackets located on the tunnel face. The working conductors in the tunnel are continuous with those on the tunnel approaches.

The method of supporting the trolley inside of the tunnel

trolley and the tunnel shell, and at the same time sufficiently flexible to provide for the proper operation of the trolley bow on the overhead conductor. Section switches have been provided where necessary to permit of disconnecting the working conductor over any switch track from the main line extending throughout the tunnel.

The columns at one end of the transmission bridges have been lengthened for the purpose of supporting the transmission wires which supply current for the power and lighting service at the roundhouses and stations, as well as for the arc light circuits. Overhead lines terminate in the pump houses at either tunnel portal, where they are connected with the underground feeder system at the panel boards.

All feeder lines connecting the various parts of the equipment to be supplied from the power plant are carried in the tunnel conduits.

POWER PLANT

The power plant is located on the Port Huron bank of the St. Clair River, about 100 ft. distant from the center line of the tunnel. Sufficient space is afforded between the building and the river front for a spur of the Grand Trunk Railway. The proximity of the river makes it possible for coal to be received and handled by boat in case this should be found desirable. The power plant building covers a ground area approximately 100 ft. square. Its general design is along simple, massive lines and presents upon completion a very attractive appearance. The general artificial illumination in the building is taken care of by means of Nernst lamps, eight of which are provided for the illumination of the turbine room and two for the boiler room. In addition, nearly 200 incandescent lamps are used for illumination in various parts of the plant.

COAL AND ASH HANDLING

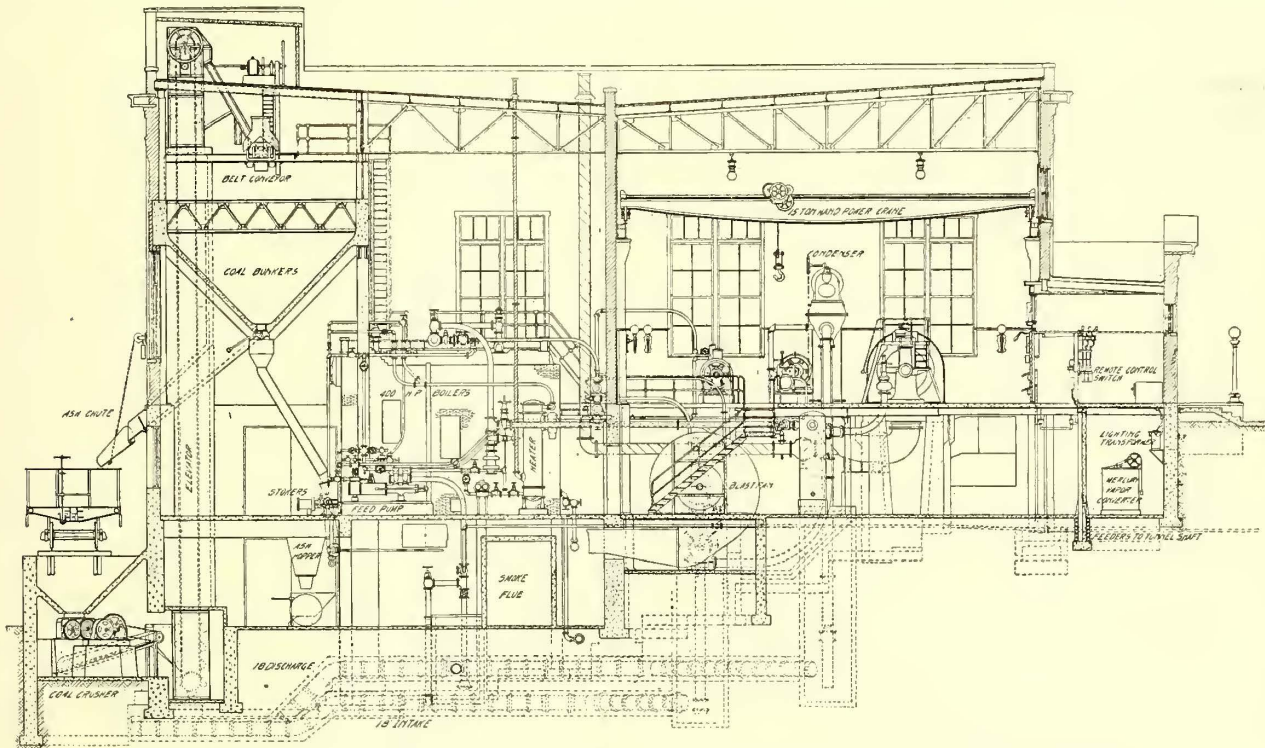
Coal is delivered to the plant in hopper cars, which are run over a wooden trestle leading above the receiving hopper, into which it is dumped by gravity. The coal-receiving hopper feeds directly into the crusher, which has

is separated entirely from the boiler room by a metal lath partition, thus practically insuring the exclusion of coal dust from the boiler room. In a similar way the coal crusher pit and the coal elevating mechanism are enclosed as completely as possible.

Coal for firing purposes is drawn directly from the bunkers, through sheet metal chutes, into the stoker hoppers, which are located in front of the boilers.

The ashes are drawn from the grates of the boiler furnaces onto the boiler room floor, where clinkers are broken and delivered through a coarse grating into the ash hoppers, which are suspended underneath the floor. From the hoppers they fall by gravity through ash grates into the push cars, and are dumped into an ash chute connecting with the coal elevator. The elevator, when handling ashes, discharges into a spout leading to a small ash bunker at the end of the building. From this bunker they can be delivered by gravity into cars alongside the power plant.

Jones under-feed stokers are installed in the plant, six being used for each battery of two boilers, making a total equipment of 12 stokers. Forced draft is supplied for each battery by an American Blower Company steel-plate fan 11 ft. in diameter and 3 ft. 5 in. wide, driven by a 10-in. x 10-in. x 10-in. type B enclosed vertical engine directly connected to the fan shaft. These fans are located in the pit



St. Clair Tunnel Electrification—Cross Section Through Power Station at Port Huron

a capacity of about 30 tons per hour, and which acts at the same time as a feeder, delivering the coal at a uniform rate to the vertical bucket elevator extending to the top of the building. From the vertical elevator the coal is fed by chutes onto a conveyor belt, from which it is discharged by an automatic tripper arranged to deliver the coal at any point above the bunkers. Slow speed induction motors of the squirrel-cage type drive the coal-handling apparatus, a 20-hp motor being used in the crusher and a 10-hp motor installed in the pent house at the top of the building for the operation of the elevator and conveyor.

The coal bunkers are constructed of reinforced concrete resting on the steel building columns. The space occupied by them, located in front of and above the boilers,

of the turbine room. By means of a special blast gate in the galvanized iron duct leading from the fans to the boilers, either battery of stokers may be supplied from either of the fans. Each battery of stokers is controlled by a Cole automatic regulator, which is driven from the shaft belted to the fan engines.

On account of the very great variation in the load on the power plant, special precautions were necessary for the control of the fires under the boilers, in order to keep the steam pressure fairly constant. This is accomplished by means of the Jones stoker equipment, which controls the fire automatically, both by regulating the air forced through the stokers and the rate of feeding of coal into the boiler furnaces. This regulation is accomplished by means of a

Kitts regulating valve, which acts as a throttling valve on the fan engines. The potential piping leading from the regulator is connected to the main steam header between the superheater and the turbine. In case the pressure in the steam lines tends to drop, the Kitts regulating valve increases the supply of steam to the fan engine, thus at the same time increasing the amount of air supplied to the boilers, and the frequency of operation of the stokers. In case the boiler pressure tends to rise, the Kitts valve decreases the supply of steam to the fan engine, thus decreasing the amount of air and coal supplied to the furnaces.

BOILERS

The boiler equipment consists of four 400-hp Babcock & Wilcox sectional water-tube boilers arranged in two batteries of two each, each boiler having three drums 42 in. in diameter and 23 ft. 4 in. in length. This results in an unusually wide boiler, the tubes being arranged 9 high and 21 wide, in order to secure quick-steaming. This requirement is a necessary complement to the automatic stoker control referred to above. In addition the three drums provide storage for a large quantity of heated water available for quick steaming on any decrease in pressure. The boilers are designed to carry 200 lb. steam pressure.

STACK AND SUPERHEATERS

The smoke flue, located in the boiler-room basement floor, is built of reinforced concrete. The height of the stack from the top of the smoke flue is 150 ft., or 162 ft. above the basement floor. It was built by the Weber Steel-Concrete Company. The inner shell is of standard construction, and the outer shell, which is of the same height as the building, has a square exterior, being faced with brick above the grade line to conform with the building construction. Lightning protection has been applied to the stack in the

regulator, which, by admitting air either above or below the fires, serves to control the superheat within narrow limits, approximately 30 deg. The regulator consists of a thermal coupling installed in the superheater steam outlet, which in turn operates through a relay and solenoid on the by-pass valve of the hydraulic cylinder, the piston of which directly controls the dampers in the air ducts. The regulating device is so adjusted as to provide a superheat of about 100 deg. under actual working conditions, and has been found in operation to very closely control the temperature of the steam, notwithstanding the great variation of load to which the power plant is subjected.

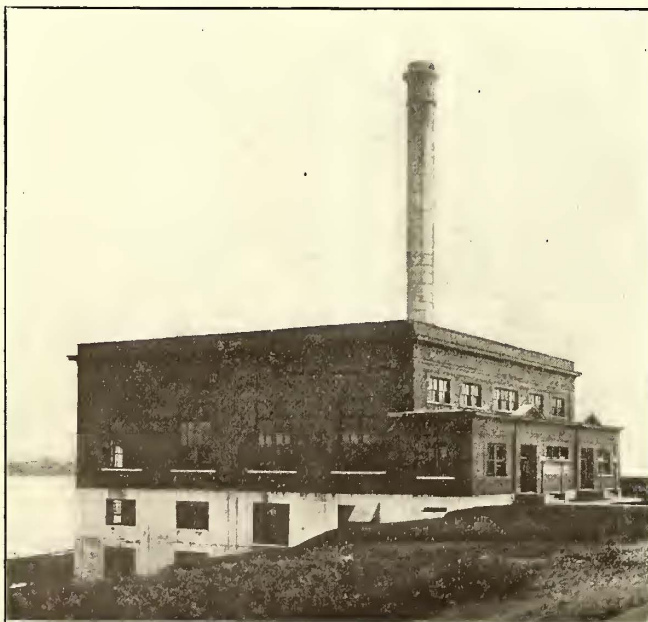
PIPING

The steam is supplied by the boilers at 200 lb. pressure, and is delivered through the system of high-pressure piping either to the superheaters and thence to the turbines, or through by-pass connections directly to the turbines, steam separators being installed in the piping system adjacent to the latter. The steam supply for all of the steam auxiliaries in the plant is taken from an auxiliary header at 125-lb. pressure.

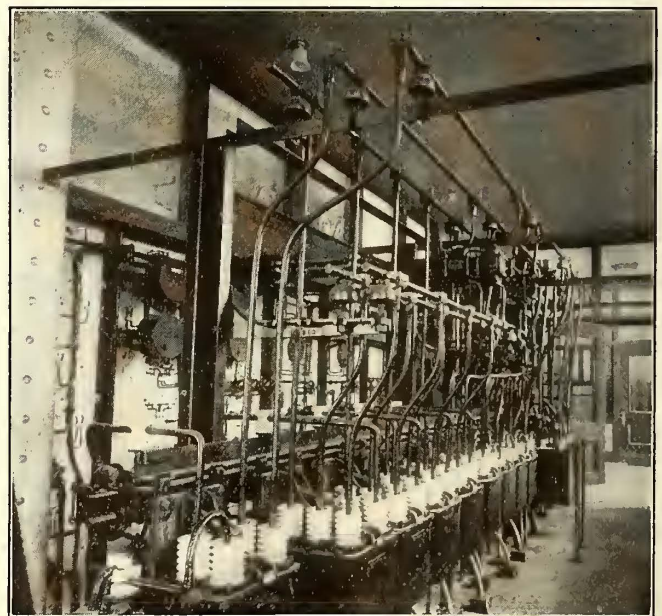
A 12-in. Cochrane oil separator is installed in the exhaust steam line just before it enters the feed-water heater. Goubert type B vertical water-tube heaters, each of 700 hp capacity, are used. A 4-in. spiral riveted pipe for free exhaust leads from each heater up through the roof.

CONDENSER AND BOILER FEED-WATER SUPPLY

The condensing water is obtained from the St. Clair River, a concrete intake provided with structural steel grid and woven wire screen being installed along the dock line. From the intake the water flows through an 18-in. tile to the cold wells located below the centrifugal circulating pumps in the pit of the turbine-room basement. Water is delivered from each of these by the circulating pump



St. Clair Tunnel Electrification—Exterior of Power Station at Port Huron



St. Clair Tunnel Electrification—Rear View of Switchboard in Power Station

form of standard equipment furnished by the Ajax Conductor & Manufacturing Company.

The separately fired Foster superheater is located between two batteries of boilers, and was furnished by the Power Specialty Company. The superheater has a capacity to add 200 deg. of superheat to 36,000 lb. of steam per hour. The superheater is hand-fired, but requires very little additional attention, as it is provided with an automatic temperature

through the condenser, and is discharged into the hot well below the condensers. From the hot wells the water flows through an 18-in. pipe into a sump under the boiler feed pumps. These pumps deliver the water through the feed-water heater to the boilers. Excess water in the pumps is discharged through an 18-in. tile pipe emptying into the river. A 3-in. Worthington water meter is connected between each of the feed pumps and the heater. The city

water supply is connected to each feed pump by a 3-in. tap. In addition, the suction of the feed pumps may be connected to the cold water intake, thus making three sources of supply for the boiler feed water.

Each battery of boilers is fed by a 12-in. x 6-in. x 10-in. duplex outside, end-packed Worthington boiler feed pump.

TURBO-GENERATORS AND CONDENSING EQUIPMENT

Two Westinghouse-Parsons turbo-generators have been installed in the plant. The machines are designed to operate at a normal voltage of 3300 volts, with a frequency of 25 cycles per second. They are three-phase machines, but are further required by the specifications to furnish their full rated load of 1250-kw single-phase current. The turbines are approximately 37 ft. long over all, 6 ft. wide and 8 ft. high, and designed to operate at 1500 r.p.m. The generators are cooled by means of air drawn through the coils by vanes installed on the rotor. A speed-limit device is arranged to cut off the supply of steam in case the speed of the turbine exceeds a predetermined value.

Barometric jet condensers with 30-in. inlet manufactured by the H. L. Worthington Company have been installed in connection with each of the steam turbines. A 36-in. exhaust pipe connects the exhaust outlet of the turbine with reducing fitting attached to the condenser head. A 14-in. automatic relief valve is installed in connection with the exhaust fitting, and connected to the free exhaust piping. The cooling water for each condenser is furnished by a 10-in. volute pump driven by 7-in. x 9-in. vertical engine. The rotative straight line vacuum pumps, 8 in. x 6 in. x 12 in. in dimension, are supplied in connection with each condensing equipment. The dry vacuum pumps are located on the turbine-room floor alongside the condensers, while the circulating pumps are located in the open pit in the

dinarily used in the operation of the plant, the two steam-driven exciters being for additional security so far as continuity of service is concerned.

The switchboard, of Westinghouse make, contains 10 panels. A hand-power traveling crane of 15 tons capacity, manufactured by the Northern Engineering Works, is installed on runways in the turbine room, by means of which

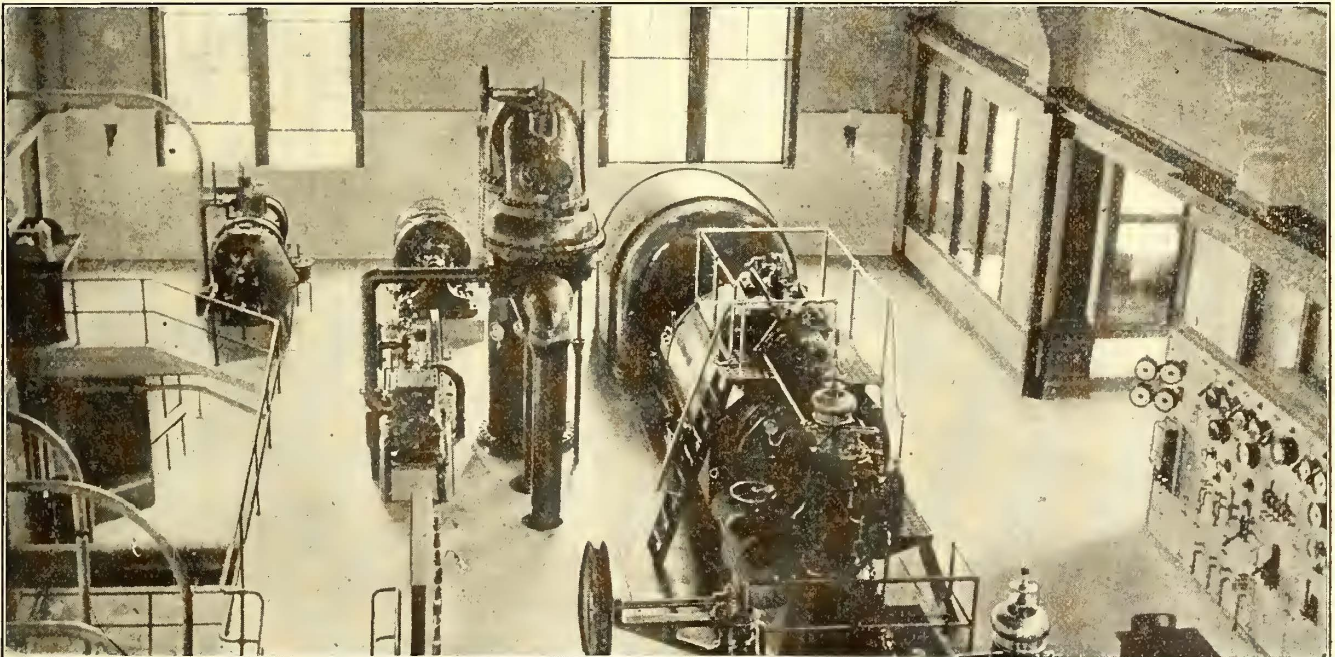


St. Clair Tunnel Electrification—Boiler Room in Power Station at Port Huron

all parts of the equipment in the room can be conveniently handled.

CONSTRUCTION AND OPERATION OF THE ELECTRIFIED SYSTEM

The entire electrical equipment has been in preliminary



St. Clair Tunnel Electrification—Interior of Turbine Room in Power Station at Port Huron

turbine-room basement, where they are in plain view from the turbine-room floor.

EXCITERS, SWITCHBOARD AND CRANE

Two steam-driven exciters have been installed in the plant, each of 25-kw capacity, this being sufficient to provide excitation for a single turbine. In addition a motor-driven exciter of 40-kw capacity is installed, and is or-

operation during the larger part of the year 1908. The work of construction was done without any material interference with the traffic through the tunnel. The greatest difficulty was experienced in carrying out that part of the installation located in the tunnel proper. For this purpose the tunnel was given over to the contractor for construction purposes for two 2-hour periods each day during the time that actual construction was in progress in the tunnel.

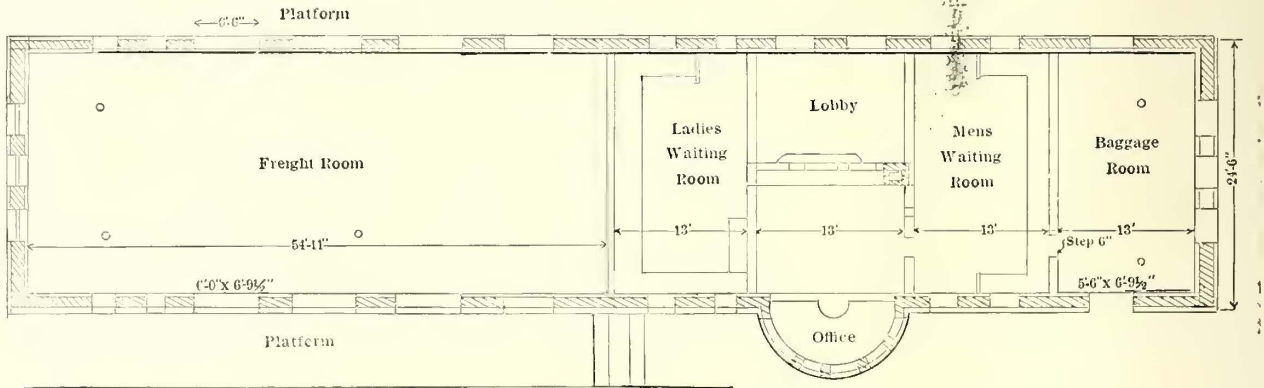
The construction of the overhead work in the yards was carried out without any serious interference with the ordinary traffic of the road, and the power plant construction, being entirely removed from any of the properties operated by the St. Clair Tunnel Company, was not subject to any interference on account of railroad operation.

The problem of transferring the operation of the St. Clair Tunnel Division of the Grand Trunk Railway System from steam to electricity gave rise to another problem which was successfully solved by the mutual co-operation of the representatives of the tunnel company and the contractor. No attempt was made to make a sudden transfer, but every

high character of the system so far as design and construction are concerned, but as well the conformity to the operating conditions that must necessarily be made in changing the operation of a division of a railway system from steam to electricity.

PASSENGER STATIONS ON THE INLAND EMPIRE SYSTEM

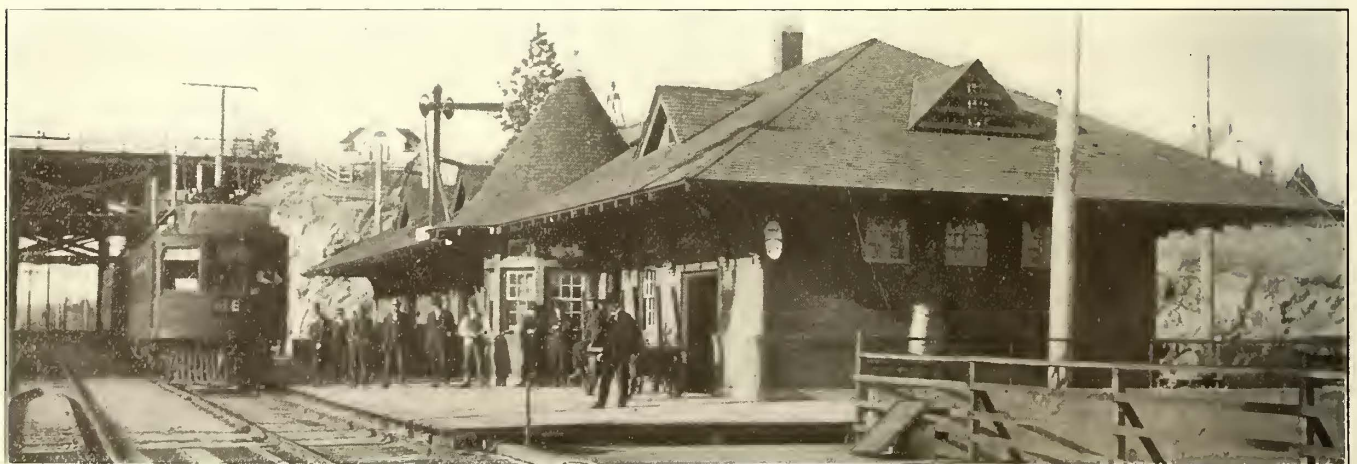
The Inland Empire System, centering at Spokane, Wash., has built a number of handsome brick stations for passenger, baggage and lighter freight service, of which the one



Floor Plan of Inland Empire Station at Palouse, Wash.

precaution was taken, not only to thoroughly test out all electrical equipment before attempting to use it in regular service, but also to allow ample time in which to thoroughly familiarize all those connected with the operation of the equipment with their work. Steam locomotive engineers were trained in the use of the electric locomotives. The forces required for maintenance of the locomotives and for maintenance and operation of the power plant were secured and assigned their duties during the time that the first experimental and test runs were made with the equipment. When everything was in readiness, test runs were made with light locomotives through the tunnel, and later, moderate-size trains were taken through the tunnel as test

at Palouse is a typical example. As shown in the accompanying plan, the Palouse station, which is on a site cut out of a hillside, is 110 ft. long over all and 24 ft. 6 in. wide. The baggage room, on the extreme right, is 13 ft. wide, with a 6-ft. sliding door opening on the platform and a narrower swinging door to the men's waiting room, which is of the same width, but 6 in. higher. The ladies' room, also 13 ft. wide, is separated from the men's room by an intervening section divided into a lobby and dispatcher's office. Besides this provision for passengers and baggage, an area of 54 ft. 11 in. x 24 ft. 6 in., equal to one-half of the station, is used for freight. This room has wide sliding doors at the front and rear. The company also has numerous sta-



Exterior View of Inland Empire Station at Palouse, Wash.

loads, and finally a limited number of regular trains were handled by the electric locomotives. In this way, by gradually increasing the amount of work done by the electrical equipment, the entire operation was transferred from steam to electricity. The fact that no delays worthy of notice have occurred, either during the time of partial operation, or later, during the time of preliminary electric operation, is worthy of special note, indicating as it does not only the

tions used for agricultural freight delivered in wagonloads. One of these stations was illustrated in the STREET RAILWAY JOURNAL of Oct. 12, 1907.

The urgent necessity for additional railway facilities in London has impelled the County Council to recommend the expenditure of a sum not exceeding \$5,000,000 for completing the electrification of the horse railways.

ACCOUNTS PRESCRIBED BY NEW YORK PUBLIC SERVICE COMMISSION, SECOND DISTRICT

Part of the uniform system of accounts for street railroads, adopted on Sept. 22, 1908, by the New York Public Service Commission, Second District, has been promulgated. The order accompanying the classification as issued provides that the balance sheet accounts shall be introduced as of Jan. 1, 1909, and the operating revenue and expense accounts and mileage statistics as of July 1, 1909. The accounting order for street railway accounts as issued is for corporations whose annual operating revenues equal or exceed \$500,000. An order covering a condensed scheme for smaller corporations, having annual revenues of \$100,000 or more, but less than \$500,000, will be ready soon, and a still further condensation will be made as promptly as possible for companies with revenues below \$100,000. The condensation applies to operating expense accounts only.

An abstract of the order of the commission, which applies to electric and to street railroad corporations, follows:

On and after the date of service of this order electric railroad and street railroad corporations shall not charge to any account representing cost of property any discount or commission on securities issued by the said corporation, but shall charge all such discounts, commissions and other expense connected with the issue of securities subsequent to the said date of service, in accordance with the directions contained in the definitions of the account named "organization," and the account named "unamortized debt discount and expense," in said "Schedule A."

On and after July 1, 1909, every electric railroad and street railroad corporation shall keep upon its books the accounts prescribed or defined in "Schedule B" so far as the same are pertinent to the facts and circumstances of the said corporation.

During the year beginning July 1, 1909, any said corporation may for purposes of comparison with prior years keep on its books any account pertaining to revenues, revenue deductions, income deductions and appropriations (as defined in the said "Schedule B") which it had on its books during the year begun July 1, 1908; provided that on or before Jan. 1, 1909, there be filed with the Public Service Commission a statement containing a list of the said accounts pertaining to the year begun July 1, 1908, and definitions of such accounts. Where any such account kept during the year begun July 1, 1908, is kept strictly in conformity with the "Standard System of Street Railway Accounting," as recommended by the Board of Railroad Commissioners under date of April 10, 1900, a statement of that fact in connection with the name of such account will serve as a sufficient definition of the said account.

For purposes of improving the efficiency of administration and operation, any corporation may, unless or until otherwise ordered, keep upon its books any temporary or experimental accounts and any accounts covering particular divisions of its operations, provided that in respect of each such temporary, experimental, or divisional account, the said corporation shall file with the Public Service Commission, at least 10 days in advance of the time when the said account is to be instituted, a statement showing the name of the said account, the date when it is to be instituted, the purpose for which it is to be kept, the period of time during which it is to be kept, and a clear and accurate definition of the classes of items and facts to be contained in the said account; and in case of a divisional account, the definition of the division covered. Upon compliance with the provisions of this paragraph, any account herein prescribed or defined in either said "Schedule A" or said "Schedule B" may be subdivided.

On and after July 1, 1909, each said corporation engaged in the operation of any railroad whereon electric energy is used as the principal power for the propulsion of cars, or engaged in the operation of any street railroad, shall keep on its books the statistical accounts prescribed or defined in the hereto annexed schedule marked "Schedule C."

All notices herein required to be filed concerning accounts shall be upon sheets 9½ in. x 12 in. in size.

DEPRECIATION ACCOUNTS

Provision is made for the treatment of depreciation in two primary operating expense accounts. The text accompanying these accounts is as follows:

Depreciation of Way and Structures.—Charge to this account month by month the amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during the month on all way and structures of the accounting corporation. Credit to this account each month an amount equal to the sum of the amounts charged for that month to the various repair accounts in "maintenance of way and structures." The net amount charged (or credited) to this account for any month shall be concurrently credited (or debited) to the reserve account "accrued amortization of capital." When any capital is retired from service, the amount (estimated if not known) originally charged to a capital account in respect thereof shall be credited to such capital account (except as provided in the account, "fixed capital, Dec. 31, 1908") and the original money cost of such capital, less salvage, if any, shall be charged to the reserve account "accrued amortization of capital," any necessary adjusting entry being made in the proper account under "corporate surplus or deficit." Where capital is substantially continuous, such as track, and cannot be satisfactorily individualized, the capital shall be kept in efficient operating condition through repair, and the renewals and replacements of parts thereof shall be considered repairs. In the case of buildings, towers, bridges, trestles and other separate structures capable of being readily individualized, charges to this account must be sufficient to provide (in respect of such capital, and except as provided in the account "fixed capital, Dec. 31, 1908") in the account "accrued amortization of capital" by the time such structures go out of service a reserve equal to the original cost thereof, less salvage, to which account such original cost, less salvage, may be charged. Note.—Until otherwise ordered, the "amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during" any month shall be based on a rule determined by the accounting corporation. Such rule may be derived from a consideration of the said corporation's history and experience during the preceding five years, and the accrual may be on the basis of revenue car-miles. Whatever may be its basis, such rule and a sworn statement of the facts and expert opinions and estimates upon which it is based shall be filed with the Public Service Commission on or before July 1, 1909; each amendment of such rule and a sworn statement of the facts and expert opinions and estimates upon which such amendment is based shall be filed with the Public Service Commission before it is used by the accounting corporation, and shall show the date when it is to be effective. Such rules and statements shall be filed upon sheets 9½ in. x 12 in. and shall be entitled "rule of the (here naming the accounting corporation) concerning depreciation of way and structures."

Depreciation of Equipment.—Charge to this account month by month the amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during the month on all equipment of the accounting company. Credit to this account each month an amount equal to the sum of the amounts charged for that month to the various repair accounts in "maintenance of equipment." The net amount charged (or credited) to this account for any month shall be concurrently credited (or charged) to the reserve account "accrued amortization of capital," and (with the exception below noted) must be sufficient to provide in that account, in respect of the several items of equipment by the time such items go out of service, a reserve equal to the original cost thereof, less salvage. When any capital is retired from service, the amount (estimated if not known) originally charged to a capital account in respect thereof shall be credited to such capital account, and (except as provided in the account "fixed capital, Dec. 31, 1908") the original money cost of such capital, less salvage, if any, shall be charged to the account "accrued amortization of capital," any necessary

adjusting entry being made in the proper account under "corporate surplus or deficit." Note.—Until otherwise ordered, the "amount estimated to be necessary to cover such wear and tear and obsolescence and inadequacy as have accrued during" any month shall be based on a rule determined by the accounting corporation. Such rule may be derived from a consideration of the said corporation's history and experience during the preceding five years, and the accrual may be on the basis of revenue car-miles. Whatever may be its basis, such rule and a sworn statement of the facts and expert opinions and estimates upon which it is based shall be filed with the Public Service Commission on or before July 1, 1909; each amendment of such rule and a sworn statement of the facts and expert opinions and estimates upon which such amendment is based shall be filed with the Public Service Commission before it is used by the accounting corporation, and shall show the date when it is to be effective. Such rules and statements shall be filed upon sheets 9½ in. x 12 in. and shall be entitled "rule of the (here naming the accounting corporation) concerning depreciation of equipment."

PRIMARY ACCOUNTS

The titles of the various accounts are as follows:

SCHEDULE A: BALANCE SHEET OR INDICANT ACCOUNTS

FIXED CAPITAL

Fixed capital, Dec. 31, 1908.

Land

Right of way.

Other street railroad land.

Intangible Street Railroad Capital

Organization.

Franchises (street railroad).

Patent-rights (street railroad).

Other intangible street railroad capital.

Roadway

Grading.

Ballast.

Ties.

Rails, rail fastenings and joints.

Special work.

Underground construction.

Track laying and surfacing.

Paving.

Roadway tools.

Tunnels.

Elevated structures and foundations.

Bridges, trestles and culverts.

Crossings, fences and signs.

Interlocking and other signal apparatus.

Telephone and telegraph lines.

Electric Line

Poles and fixtures.

Underground conduits.

Transmission system.

Distribution system.

Buildings and Structures

Dams, canals and pipe lines.

Power plant buildings.

Sub-station buildings.

General office buildings and equipment.

Shops and car houses.

Stations, waiting rooms and miscellaneous buildings.

Docks and wharves.

Park and resort properties.

Power Plant Equipment

Furnaces, boilers and accessories.

Steam engines.

Turbines and water-wheels.

Gas power equipment.

Power plant electric equipment.

Miscellaneous power plant equipment.

Sub-station equipment.

Cable power equipment.

Rolling Stock and Miscellaneous Equipment

Shop equipment.

Locomotives.

Revenue cars.

Electric equipment of cars.

Other rail equipment.

Miscellaneous equipment.

Undistributed Construction Expenditures

Engineering and superintendence.

Law expenditures during construction.

Injuries during construction.

Taxes during construction.

Miscellaneous construction expenditures.

Interest during construction.

Fixed Capital in Other Departments

Electric capital, gas capital and railroad capital.

Land in other departments.

Franchises in other departments.

Patent-rights in other departments.

Other intangible capital in other departments.

Tangible capital in other departments.

FLOATING CAPITAL
Materials and Supplies

Materials and supplies.

Current Assets

Cash.

Bills receivable.

Accounts receivable.

Interest and dividends receivable.

Other current assets.

INVESTMENTS

Investments.

SPECIAL DEPOSITS

Coupon special deposits.

Dividend special deposits.

Other special deposits.

PREPAYMENTS

Prepaid taxes.

Prepaid insurance.

Prepaid rents.

Other prepayments.

SUSPENSE ACCOUNTS

Unamortized debt discount and expense.

Other suspense.

REACQUIRED SECURITIES

Reacquired securities.

DEBT

Funded.

Unfunded—

Taxes accrued.

Receiver's certificates.

Judgments unpaid.

Interest accrued.

Dividends declared.

Bills payable.

Accounts payable.

Other unfunded debt.

RESERVES

Permanent—

Premiums on stocks.

Other permanent reserves.

Temporary—

Contractual.

Required—

Accrued amortization of capital.

Unamortized premium on debt.

Other required reserves.

Optional—

Casualties and insurance reserve.

Other optional reserves.

STOCKS

Stocks.

SCHEDULE B: INCOME ACCOUNT

STREET RAILROAD OPERATING REVENUES

I. Revenue from Transportation

Passenger revenue.

Baggage revenue.

Chartered car revenue.

Parlor and chair car revenue.

Mail revenue.

Express revenue.

Milk revenue.

Freight revenue.

Switching revenue.

Miscellaneous transportation revenue.

II. Other Street Railroad Revenues

Advertising and other privileges.

Parcel room receipts.

Storage.

Car service.

Telephone and telegraph service.

Rent of tracks and terminals.

Rent of equipment.

Rent of buildings and other property.

Sale of power.

Joint electric power revenue.

Park and resort revenue.

Miscellaneous.

Revenue from outside operations.

STREET RAILROAD OPERATING EXPENSES

I. Maintenance of Way and Structures

Superintendence of way and structures.

Ballast.

Ties.

Rails.

Rail fastenings and joints.

Special work.

Underground construction.

Roadway and track labor.

Paving.

Miscellaneous roadway and track expenses.

Cleaning and sanding track.

Removal of snow, ice and sand.

Repairs of tunnels.

Repairs of elevated structures and foundations.

Repairs of bridges, trestles and culverts.

Repairs of crossings, fences and signs.

Repairs of signal and interlocking systems.

Telephone and telegraph repairs.

Other miscellaneous way expenses.

Pole and fixture repairs.

Underground conduit repairs.

Transmission system repairs.

Distribution system repairs.

Miscellaneous electric line expenses.

Repairs of buildings and structures.

Other operations—Dr.

Joint way and structures—Dr.

Other operations—Cr.

Joint way and structures—Cr.

Depreciation of way and structures.

II. Maintenance of Equipment

Superintendence of equipment.

Repairs of furnaces, boilers and accessories.

Repairs of steam engines.

Repairs of hydraulic power plant.

Repairs of gas power equipment.

Repairs of power plant electric equipment.

Repairs of miscellaneous power plant equipment.

Repairs of cable power equipment.

Repairs of sub-station equipment.

Repairs of passenger and combination cars.

Repairs of freight, express and mail cars.

Repairs of locomotives.

Repairs of service cars.

Repairs of electric equipment of cars.

Repairs of electric equipment of locomotives.

Repairs of shop machinery and tools.

Shop expenses.

Repairs of vehicles.

Other miscellaneous equipment expenses.

Other operations—Dr.
Maintaining joint equipment—Dr.
Other operations—Cr.
Maintaining joint equipment—Cr.
Depreciation of equipment.

III. Traffic.

Superintendence and solicitation.
Advertising.
Parks and other attractions.
Miscellaneous traffic expenses.

IV. Conducting Transportation

Superintendence of transportation.

GROUP I. POWER

Power plant labor.
a. Power plant superintendence and care.
b. Boiler room labor.
c. Product labor.
d. Engine labor.
e. Electric labor.
f. Cable power plant labor.
Sub-station labor.
Fuel for power.
Water for power.
Lubricants for power.
Miscellaneous power plant supplies and expenses.
Sub-station supplies and expenses.
Horse power—Revenue car service.
Power purchased.
Jointly produced power—Dr.
Power exchanged—Balance.
Other operations—Dr.
Other operations—Cr.
Jointly produced power—Cr.

GROUP II. OPERATION OF CARS

Passenger motormen.
Passenger conductors.
Horse car drivers.
Other passenger trainmen.
Freight and express motormen and trainmen.
Miscellaneous car service employees.
Miscellaneous car service expenses.
Station employees.
Station expenses.
Car house employees.
Car house expenses.
Operation of signal and interlocking systems.
Operation of telephone and telegraph systems.
Express and freight collections and delivery.
Loss and damage.
Other transportation expenses.
Joint operation of cars—Dr.
Joint operation of cars—Cr.

V. General and Miscellaneous

Salaries and expenses of general officers.
Salaries and expenses of general office clerks.
General office supplies and expenses.
General law expenses.
Insurance.
Relief department expenses.
Pensions.
Miscellaneous general expenses.
General amortization.
Other operations—Dr.
Joint general expense—Dr.
Other operations—Cr.
Joint general expense—Cr.
Accidents and damages.
Law expenses connected with damages.
General stationery and printing.
Store expenses.
Stable expenses.
Undistributed adjustments—balance.

TAXES

Taxes.

NON-OPERATING REVENUES

Rents accrued from lease of road.
Miscellaneous rent revenues.
Interest revenues.
Dividend revenues.
Profits from operations of others.
Miscellaneous non-operating revenues.

NON-OPERATING REVENUE DEDUCTIONS

Non-operating revenue deductions—
a. Rent expense.
b. Interest expense.
c. Dividend expense.
d. Others' operations expense.
e. Miscellaneous non-operating expense.
f. Non-operating taxes.
g. Uncollectible non-operating revenues.

INCOME DEDUCTIONS

Interest deductions.
Rent for lease of other road and equipment.
Other rent deductions.
d. Track and terminal privileges.
e. Hire of equipment.
f. Joint facility rents.
g. Miscellaneous rent deductions.
Sinking fund accruals.
Guaranties of periodic payments.
Loss on operations of others.
Other contractual deductions from income.
Amortization of landed capital.
Amortization of debt discount and expense.
Amortization of premium on debt—Cr.

APPROPRIATION ACCOUNTS

Bad debts collected.
Other additions to surplus.
Expenses elsewhere unprovided for.
Dividends on outstanding stocks.
Amortization elsewhere unprovided for.
Appropriations to reserves.
Gifts to controlled corporations.
Other appropriations.
Bad debts written off.
Other deductions from surplus.

SCHEDULE C: CLASSIFICATION OF CAR-MILES, CAR SEAT-MILES AND CAR-HOURS

CAR-MILES AND CAR SEAT-MILES

Passenger car-miles—active.
Passenger car-miles—idle.
Special passenger car-miles.
Mail car-miles.
Express car-miles.
Freight car-miles.
Mixed car-miles.
Non-revenue car-miles.
Electric locomotive-miles.

CAR-HOURS

Car-hours.

REPORT ON THE UNION ELEVATED RAILROAD OF CHICAGO

The following report, discussing the "causes of congestion," "noise in operation," "unsightly appearance," and "obstruction to light" of the Union Elevated Loop of Chicago, and including suggested remedies, has just been submitted to the Loop Protective Association (incorporated) by Charles K. Mohler, consulting engineer.

Mr. Mohler was commissioned by the Loop Protective Association to investigate and report on what, in his judgment, were the causes of, and what could best be done to remedy, in whole or in part, the following features of the Union Elevated Railway "Loop" and its operation:

(1) Congestion and delay in handling traffic.

(2) Noise resulting from the operation of trains over the structure.

(3) Unsightly appearance of the structure and obstruction to light.

The Union Elevated Railroad "Loop" comprises about 2 miles of double-track elevated structure in the business district of Chicago, occupying portions of Lake Street, Wabash Avenue, Van Buren Street and Fifth Avenue. There are 11 double stations for each track. At the present time it serves as a "Loop" terminal for the South Side Elevated Railroad and the Metropolitan West Side Elevated Railway, operating on the inner track. On the outer track are operated the trains of the Chicago & Oak Park Elevated Railroad and the Northwestern Elevated Railroad. The South Side line is composed of five branches, the Metropolitan of four branches, the Chicago & Oak Park of one line, and the Northwestern of two branches, one of which includes the Evanston extension.

All of the above roads, with the exception of the Northwestern, have stub terminals outside of the "Loop," which are in service for a time during rush hours. The Northwestern has nearly completed an outside stub terminal.

Chicago, with a total area of over 190 square miles, and drawing from a large suburban territory, has its main business center or "Loop" district confined to less than one square mile. The area inside the "Loop" belt is less than one-quarter of a square mile, and Mr. Mohler says that if every possible device should be employed in connection with the present elevated loop structure for relieving congestion, it would only be a short time until conditions were again practically the same as at present.

Here follows a brief statement of the more important features of the report:

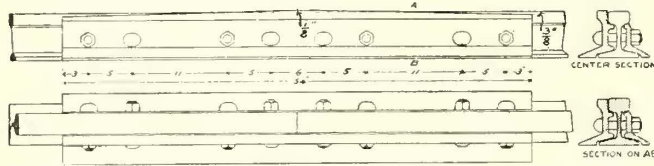
DELAY AND CONGESTION

The aggregate delay of a train in approaching and getting around the "Loop" may amount to 15 minutes or more per trip during the rush hours, 7:45-9:15 and 5:00-6:30. A large per cent of the trains have delays outside of the "Loop" before entering, ranging from a slow-down to a wait of 10 minutes or more. This is a large factor in aggregate delay. The average excess time for rush-hour trips over non-rush-hour on the "Loop" is about 3 minutes and 10 seconds, made up of: Junction delays, delays at the first station after entering, delays from handling longer

and heavier trains, and delays from longer station stops on account of crowded cars, insufficient number and width of gates and doors, trains not having proper and sufficient signs to show destination and class.

MEANS FOR INCREASING THE OPERATING CAPACITY

Through routing to the greatest degree practicable would increase the number of trains which could be passed through the "Loop" nearly 100 per cent. Six or seven car trains could be loaded at the present platforms, the seven-car trains making an increased car capacity of 40 per cent. Through routing seven-car trains would give



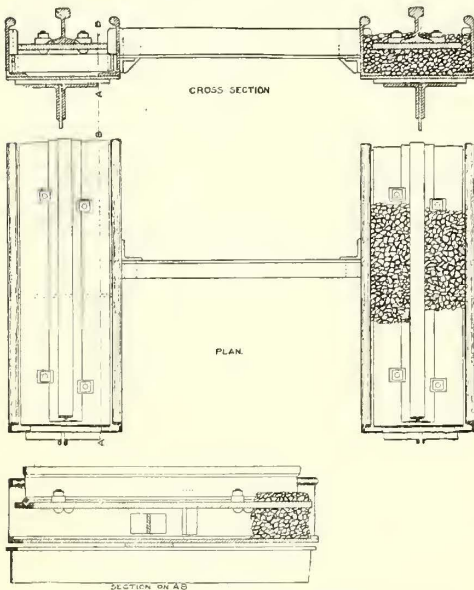
Proposed Design of Wheel Carrying Joint to Reduce Noise on the Elevated Loop

a total increase in car capacity of 130 to 140 per cent. Through routing has been included as a leading feature in the reports of Mr. Bion J. Arnold, Messrs. Ford, Bacon & Davis, and Mr. George Weston.

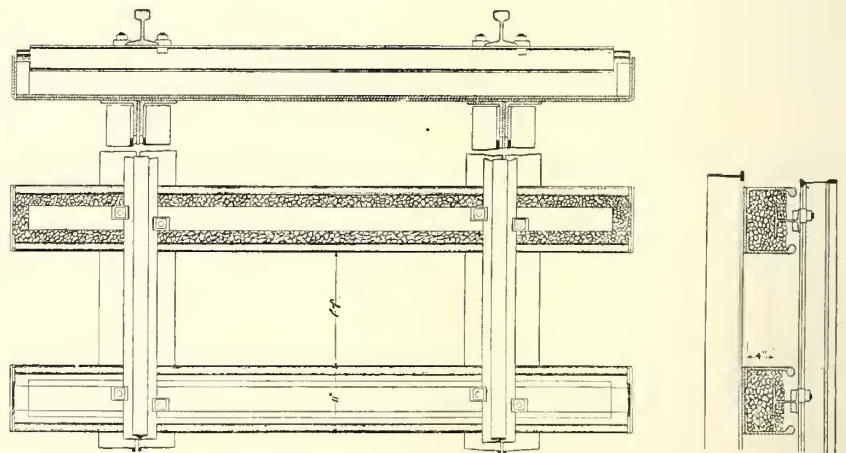
Among the most practical through routings suggested are: (A) The Northwestern with the South Side lines; (B) inter-route the two systems of the West Side, the Metropolitan and the Chicago and Oak Park lines.

In general, by through routing part of the trains and sending the remainder around the "Loop," each road would be enabled to accommodate passengers at all stations. The number of trains on the side of the "Loop" over which through routed trains passed would be increased in proportion to the number of trains through routed.

The present platforms are long enough to accommodate seven-car trains under unified operation or with methods of loading suggested below. The saving in time and mileage and the increase in capacity and encouragement of short-haul traffic by through routing should more than



Proposed Longitudinal Trough Ballasted Track for Elevated Loop



Proposed Cross Trough Ballasted Track for Elevated Loop

offset the loss of one fare from the through traffic which now pays two. During the non-rush-hours all trains could still be sent around the "Loop" as at present, if desired.

It is suggested that certain stations might be abandoned, or replaced by others in new locations, and changes be made in station stops to enable the loading of longer trains. Eight-car trains could be loaded at the present independent platforms by making the stops so as to load five cars from the front of the train at one station and five from the rear of the train at the next. By making the stops alternately in that way the train would be evenly loaded throughout. The incoming traffic during the eve-

ning rush-hour is light, and could best be taken care of by requesting incoming passengers to ride on the center cars of the long trains. Eight-car trains would increase the capacity of the "Loop" from 50 to 60 per cent. Seven-car trains could unload at the present platforms during the morning rush-hours. As now operated, trains stop at either end of the platform in the morning as found convenient. It is believed that the proportion of seven-car trains for the morning rush-hour and eight-car trains for the evening rush-hour service on the same schedule would more nearly meet the requirements than using the same number of cars in both.

There is, perhaps, no other expedient for relieving congestion which could be adopted with as little delay or complication. It is not suggested as a means of fulfilling the transportation needs of the city in the larger measure.

The use of wider sliding end doors and center side doors, with electric door signals for starting trains, would save time in making station stops to load and unload passengers and getting the train started.

Train signs should be placed at each car entrance to give destination and class of train. Movable display signs should be used at each station platform to indicate before the arrival of the train its destination and class. If the waiting rooms are moved to the space beneath the tracks and platforms, illuminated signs and signal bells should be installed in the waiting rooms to indicate the approaching trains.

Brake hanger attachments should be of such design as to allow the train brakes to be applied to their maximum efficiency. The hangers in use allow an unsteady, jerky motion when the train is coming to a stop, and a dangerous backward lurch at the instant the forward motion ceases.

Protection of the third rail should be employed to insure more reliable service during winter rain and sleet storms. (It would also be the means of reducing the danger to passengers where, in case of accident, they are compelled to leave the trains and walk on the structure.)

The adoption of universal transfers probably would not affect the operating capacity of the "Loop," but it is believed that they would increase the efficiency of the service

and that the roads would ultimately gain by their adoption. They should properly be adopted under such limitations as to prevent abuse of the privilege as far as possible.

STATIONS AND STUB TERMINALS

Extension of platforms has long been advocated. The results of this investigation show the advantages to be gained are very small and would not warrant adoption on the grounds which have been advocated. Extensions called for in the recent report to the committee on local transportation would mean 6000 ft., or over a mile, of added new platform. As previously mentioned, the total length

of the station platforms on the Loop are long enough to load seven-car trains with little, if any, extension, and with through-routing and unified operation would be ample for present requirements.

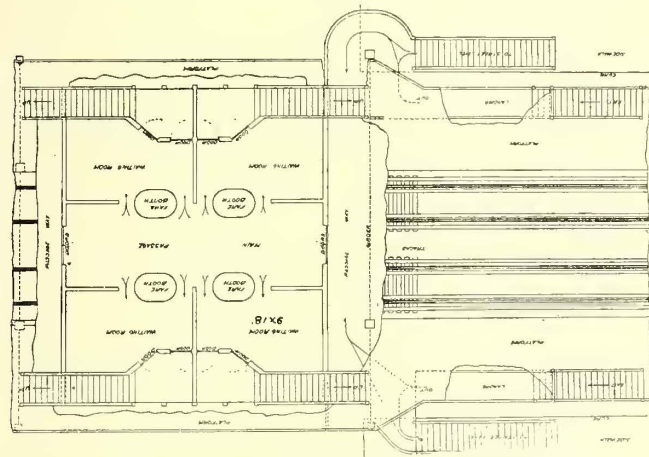
NOISE IN OPERATION

The roadbed should be of stone ballast, or equally effective construction, to break up and dissipate the noise producing vibration. The mass of the supporting bed should be large, to still further absorb the vibration.

Sixty-foot rails should be used instead of 30-ft., reducing the number of joints one-half. The joints are responsible for most of the noise caused by the trains moving over the track. An improved splice bar should be used for the rail joints. They should carry the wheel over the joint without the instant reversal of shear when the wheel passes from one rail to another.

Noise resulting from the motor gears can be remedied in part by the ballasted roadbed. Housing the gears and motors should give some relief. The gears should be well maintained. In some cases it may be necessary to bolt creosoted planks to parts of the structure, or cover them with some such material as concrete, to reduce the noise.

Noise from air-brake exhaust can be entirely eliminated by the use of properly designed exhaust ports and mufflers. Rattling of loose parts can be largely prevented by proper maintenance. The screeching of wheels over curves can be prevented to some extent by the use of lubricant on one rail. Noise from the interlocking exhaust can be prevented by mufflers. The noise from crossing and switch



Suggested Arrangement of Stations on Elevated Loop

frogs at the junctions can be eliminated in part by the use of solid floor construction and stone ballast. Screeching and chattering of brake shoes can be largely prevented by using a shoe of the proper combination of metals and properly hung.

SUGGESTED STATION CHANGES

The stations should be reconstructed by removing the ticket offices and waiting rooms from the present level and placing them beneath the tracks and platforms on the level now occupied by the cross-over footways. This would reduce the width of some of the stations from over 100 ft. to about 50 ft., and leave no part of the station above the platforms.

The canopies over the platforms should be replaced by others, preferably of saw-tooth design, and the height reduced at the center about 4 ft. Wire glass could be used for covering. For lighting the interior of the station as well as the street below the sidewalk, prism glass could be used in part for the station platforms.

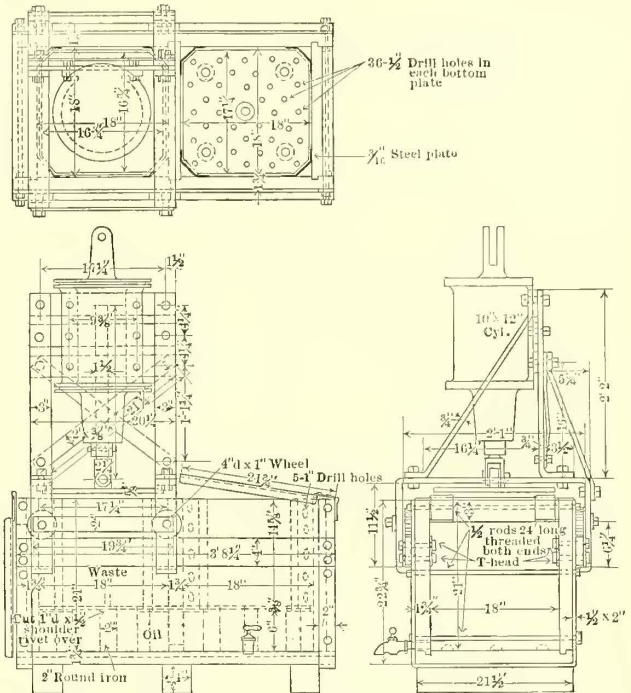
The present "exit only" stairs serve but little purpose. At stations where congestion occurs additional stair facilities could be provided, as follows:

- (a) At congested points where stairs are used for both entrance and exit they could be built wider than those now in use.
- (b) Some exits might be made through business houses.
- (c) Exit stairs, if necessary at any point, could be built directly above the entrance stairs, to serve as a covering, and glass canopies used over the higher stairs.

RECLAIMING OIL AND WASTE WITH A PNEUMATIC PRESS

The Brooklyn Rapid Transit Company has installed in both its Southern and Eastern Division shops an air-operated oil press and a waste tank made as shown in the accompanying drawing. The tank into which the oily waste is thrown is divided into two 18-in. x 18-in. sections by a 1 3/4-in. block extending nearly to the bottom. These sections in turn are divided horizontally by perforated trays carried high enough to secure in the bottom an oil chamber 6 in. deep. The trays, which have 36 1/2-in. holes each, are of steel plate 3/8 in. thick, to withstand the pressure exerted from the 50-lb. air line.

The pneumatic equipment consists simply of an old 10-in. x 12-in. cylinder and piston attached to the 17 1/4-in. x 17 1/4-in. x 3/8-in. plate which bears on the waste. The braced



Pneumatic Oil Press used by the Brooklyn Rapid Transit Company

framework on which this apparatus is carried is mounted on wheels so that it can be rolled from one chamber to the other by means of the track along the top of the tank.

In operating this oil and waste reclaimer, it is customary to fill one compartment with oily waste and then allow the press to work while the other compartment is being filled. When the first lot has been squeezed dry the press is shifted to the other chamber where it repeats the process. In the meantime, the waste in the first chamber is teased and the unglazed portions returned to stock after the dirt in them is shaken out. The reclaimed oil is drawn off from time to time through only one faucet, thus accounting for the space left between the base of the tank and the bottom of the division block.

It will be noted that the tank is provided with two hinged tops, so that one chamber can be kept under cover while the other is under the press. The construction of the tank permits the easy removal of the trays whenever cleaning is necessary.

The United Railways of St. Louis has lost a test case in an attempt to keep newsboys from its pay-as-you-enter cars. The court decided that the defendant had not disturbed the peace within the meaning of the ordinance by jumping on cars to sell newspapers.

THE INTERSTATE CLASSIFICATIONS OF OPERATING EXPENSES FOR ELECTRIC AND STEAM RAILWAYS

BY M. W. GLOVER, AUDITOR, OHIO ELECTRIC RAILWAY

The classification of operating expenses for electric railways adopted by the Interstate Commerce Commission, effective on Jan. 1, 1909, is more satisfactory than the classification proposed by Circular No. 20, dated Jan. 10, 1908. A number of suggestions made by representatives of electric lines have been accepted, and, as a result, the proposed classification will be used by a large number of lines with comparatively few complaints, some of these resulting from the perversity of human nature in refusing to accept anything new without finding something to criticize.

The new classification provides 88 primary accounts against 122 proposed by Circular No. 20; this concession should be appreciated, as the steam railway classification provides 116 primary accounts. As most lines will not have items to charge against several of the accounts provided, the number of active accounts will probably not exceed 75 for the largest lines, and the condensed classification provided for smaller lines will not prove burdensome.

The difficulties in accounting arising from the operation of the same line by both steam and electricity are set forth in a paper by A. B. Bierck, general auditor of the Long Island Consolidated Electrical Companies, read at the meeting of the American Street & Interurban Railway Accountants' Association, at Atlantic City, N. J., on Oct. 12 to 16, 1908.

A comparison of the Interstate classifications for steam and electric railways shows how few fundamental differences exist; and one cannot help thinking that a single classification might have been devised which would prove suitable for both steam and electric railways. A number of steam railways are gradually electrifying portions of their lines and the Ohio Electric Railway, with 600 miles of electric line, operates one division by steam. It is necessary, therefore, for a number of roads to use both classifications and the Interstate Commerce Commission, in the supplement to the third revised issue of the steam railroad classification, suggests that appropriate electric railway accounts be used to subdivide expenses arising from the operation of electric divisions; in the same way, I presume, an electric railway operating a steam division will be required to use appropriate steam railway accounts to take care of charges arising from the operation of steam divisions. This is unsatisfactory both to the commission and to the railway companies themselves, as it fails to afford uniformity in statistics, which the commission is endeavoring to bring about.

DETERMINATION OF STEAM OR ELECTRIC RAILWAY

The question naturally arises: When is a railway an electric railway and when a steam railway? If a steam railway electrifies 50 per cent of its mileage should it be considered a steam or an electric railway and which classification of accounts should it use?

A statement is presented in parallel columns showing the primary accounts provided by the Interstate Commerce Commission for electric railways, for steam railways and the accounts now used by the Ohio Electric Railway. This statement shows clearly how few material differences exist between the classifications.

Under "general expenses" the electric classification shows

seven miscellaneous accounts which under the steam and Ohio Electric Railway classifications are distributed under the five general heads, the latter appearing to be the most logical arrangement.

Under "way and structures" the electric classification provides 28 accounts, the steam 23 and the Ohio Electric Railway 18. The accounts are almost identical in each classification, practically the only differences being the "joint facilities" accounts in the steam classification and the "undistributed accounts" in the electric classification above mentioned.

Under "equipment" the electric classification provides 16 accounts, the steam 29 and the Ohio Electric Railway 12, the accounts being practically identical, although the steam classification is more amplified.

"Traffic expenses" are practically the same, except that the steam and Ohio Electric Railway classifications enter more into detail than the other classifications.

"Transportation expenses" present more apparent differences than any other general account, the electric classification providing 25 primary accounts, the steam 45 and the Ohio Electric Railway 29; but upon close examination it will be seen that the differences occur principally through accounts necessary under steam and not under electric operation, and through the necessity for more detail covering the generation and distribution of power on electric lines.

UNDISTRIBUTED ACCOUNTS UNJUSTIFIED

Under "general expenses" the accounts are almost identical with the exception of the so-called "undistributed accounts," the principle of which I think cannot be justified. There is no objection to including insurance in "general expenses," as this is in line with the steam railway classification, but the other accounts should be shown under the proper general heads.

Over 90 per cent of the expenses chargeable to "injuries and damages" are the direct result of the operation of cars or the generation and distribution of power, and this account is carried under "transportation expenses" in both the Ohio Electric Railway and the steam railway classifications. Under the new electric classification the account is shown under "general expenses," which does not appear consistent.

Apparently recognizing that the principle of the "undistributed accounts" is not theoretically correct, the electric classification provides that the cost of printing tickets, transfers, cash fare receipts, etc., should be charged to "miscellaneous car service expenses" under "conducting transportation" and the cost of printing signs, posters and other advertising matter is chargeable to "advertising," which is a traffic expense.

There does not appear any reason why store expenses should be handled differently in the electric from the steam classification, and stable expenses are not properly a "general expense" unless some lines furnish horses for their general officers to ride, as is done by the National Cash Register Company.

"Rent of tracks and terminals" and "rent of equipment" are strictly transportation expenses and should be so shown in the classification.

While the classification in its present shape can be used by electric lines in connection with such items of the steam classification as may be needed, it would be more satisfactory if one classification could be provided for both steam and electric lines; such accounts as are not needed could be omitted by lines not requiring them.

COMPARISON OF CLASSIFICATIONS OF OPERATING EXPENSES OF THE INTERSTATE COMMERCE COMMISSION, STEAM AND ELECTRIC ROADS, AND THE OHIO ELECTRIC RAILWAY COMPANY

Interstate Commerce Commission Electric Roads	Interstate Commerce Commission Steam Roads	Ohio Electric Railway
I—WAY AND STRUCTURES	I—MAINTENANCE OF WAY AND STRUCTURES	I—MAINTENANCE OF WAY AND STRUCTURES
1 Superintendence of Way and Structures 2 Ballast 3 Ties 4 Rails 5 Rail Fastenings and Joints 6 Special Work 7 Underground Construction 8 Roadway and Track Labor 9 Paving 10 Misc. Roadway and Track Expenses 11 Cleaning and Sanding Track 12 Removal of Snow, Ice and Sand 13 Tunnels 14 Elevated Structures and Foundations 15 Bridges, Trestles and Culverts 16 Crossings, Fences, Cattle Guards and Signs 17 Signal and Interlocking Systems 18 Telephone and Telegraph Systems 19 Other Miscellaneous Way Expenses 20 Poles and Fixtures 21 Underground Conduits 22 Transmission System 23 Distribution System 24 Miscellaneous Electric Line Expenses 25 Buildings and Structures 26 Depreciation of Way and Structures 27 Other Operations—Dr. 28 Other Operations—Cr. (See V) (See V)	1 Superintendence 2 Ballast 3 Ties 4 Rails 5 Other Track Material 5 Other Track Material 6 Roadway and Track 6 Roadway and Track 6 Roadway and Track 6 Roadway and Track 7 Removal of Snow, Sand and Ice 8 Tunnels 9 Bridges, Trestles and Culverts 9 Bridges, Trestles and Culverts 10 Over and Under Grade Crossings 11 Grade Crossings, Fences, Cattle Guards and Signs 13 Signals and Interlocking Plants 14 Telegraph and Telephone Lines 21 Other Expenses 15 Electric Power Transmission 15 Electric Power Transmission 15 Electric Power Transmission 15 Electric Power Transmission 15 Electric Power Transmission 16 Buildings, Fixtures and Grounds 12 Snow and Sand Fences and Snowsheds 17 Docks and Wharves 19 Injuries to Persons 20 Stationery and Printing 22 Maintaining Joint Tracks, Yards and other Facilities—Dr. 23 Maintaining Joint Tracks, Yards and other Facilities—Cr.	1-A Superintendence 1-B Ballast 2 Ties 3 Rails 3 Rails 3 Rails 1-E Other Expenses 4 Paving 15 Miscellaneous Expenses 1-C Cleaning, Sanding and Watering Track 1-D Removal of Snow and Ice 5 Bridges, Trestles and Culverts 6 Fences, Road Crossings, Cattle Guards and Signs 11 Signal and Interlocking Plants 10 Telephone and Telegraph Lines 15 Miscellaneous Expenses } 8 Electric Line } 9 High Tension Transmission Lines 9 High Tension Transmission Lines } 7 Track Bonding } 8 Electric Line } 8 Electric Line 12 Buildings, Fixtures and Grounds 13 Docks and Wharves (See IV) 14 Stationery and Printing
II—EQUIPMENT	II—MAINTENANCE OF EQUIPMENT	II—MAINTENANCE OF EQUIPMENT
29 Superintendence of Equipment 30 Power-Plant Equipment 31 Substation Equipment 32 Passenger and Combination Cars 33 Freight, Express and Mail Cars 34 Locomotives 35 Service Cars 36 Electric Equipment of Cars 37 Electric Equipment of Locomotives 38 Shop Machinery and Tools 39 Shop Expenses 40 Horses and Vehicles 41 Other Miscellaneous Equipment Expenses 42 Depreciation of Equipment 43 Other Operations—Dr. 44 Other Operations—Cr. (See V) (See V)	24 Superintendence 47 Power-Plant Equipment 47 Power-Plant Equipment } 31 Passenger-train Cars—Repairs } 32 Passenger-train Cars—Renewals } 34 Freight-train Cars—Repairs } 35 Freight-train Cars—Renewals } 28 Electric Locomotives—Repairs } 29 Electric Locomotives—Renewals } 43 Work Equipment—Repairs } 44 Work Equipment—Renewals } 37 Electric Equipment of Cars—Repairs } 38 Electric Equipment of Cars—Renewals } 28 Electric Locomotives—Repairs } 29 Electric Locomotives—Renewals 46 Shop Machinery and Tools 50 Other Expenses 50 Other Expenses { 30 Electric Locomotives—Depreciation { 33 Passenger-train Cars—Depreciation { 36 Freight-train Cars—Depreciation { 39 Electric Equipment of Cars—Depreciation { 45 Work Equipment—Depreciation 25 Steam Locomotives—Repairs 26 Steam Locomotives—Renewals 27 Steam Locomotives—Depreciation 40 Floating Equipment—Repairs 41 Floating Equipment—Renewals 42 Floating Equipment—Depreciation 48 Injuries to Persons 49 Stationery and Printing 51 Maintaining Joint Equipment at Terminals—Dr. 52 Maintaining Joint Equipment at Terminals—Cr.	27 Miscellaneous Shop Expenses } 16 Steam Plant } 17 Electric Power Plant 18 Electric Substations } 19 Passenger, Mail and Baggage Cars } 20 Freight and Express Cars } 23 Locomotives: } (A) Electric } (B) Steam } 24 Miscellaneous Equipment } 21 Electric Equipment of Passenger, Mail and Baggage Cars } 22 Electric Equipment of Freight and Express Cars } 23 Locomotives: (A) Electric 25 Shop Machinery and Tools 27 Miscellaneous Shop Expenses 24 Miscellaneous Equipment 27 Miscellaneous Shop Expenses } 23-B Steam Locomotives. (See IV) 26 Stationery and Printing
III—TRAFFIC	III—TRAFFIC EXPENSES	III—TRAFFIC EXPENSES
45 Superintendence and Solicitation 46 Advertising 47 Miscellaneous Traffic Expenses	} 53 Superintendence } 54 Outside Agencies 55 Advertising } 56 Traffic Associations } 57 Fast Freight Lines } 58 Industrial and Immigration Bureaus } 60 Other Expenses 59 Stationery and Printing	} 28 Superintendence } 29 Outside Agencies 30 Advertising } 32 Miscellaneous Expenses 31 Stationery and Printing

Interstate Commerce Commission
Electric RoadsInterstate Commerce Commission
Steam Roads

Ohio Electric Railway

IV—CONDUCTING TRANSPORTATION

48	Superintendence of Transportation
49	Power-Plant Employees
50	Substation Employees
51	Fuel for Power
52	Water for Power
53	Lubricants for Power
54	Miscellaneous Power Plant Supplies and Expenses
55	Substation Supplies and Expenses
56	Power Purchased
57	Power Exchanged—Balance
58	Other Operations—Dr.
59	Other Operations—Cr.
60	Passenger Conductors, Motormen and Trainmen
61	Freight and Express Conductors, Motormen and Trainmen
62	Miscellaneous Car Service Employees
63	Miscellaneous Car Service Expenses
64	Station Employees
65	Station Expenses
66	Carhouse Employees
67	Carhouse Expenses
68	Operation of Signal and Interlocking Systems.
69	Operation of Telephone and Telegraph Systems.
70	Express and Freight Collections and Delivery
71	Loss and Damage
72	Other Transportation Expenses
(See V)	
(See V)	
(See V)	
(See V)	
(See V)	
(See V)	

V—GENERAL AND MISCELLANEOUS

73	Salaries and Expenses of General Officers
74	Salaries and Expenses of General Office Clerks.
75	General Office Supplies and Expenses
76	Law Expenses
77	Relief Department Expenses
78	Pensions
79	Miscellaneous General Expenses
80	Other Operations—Dr.
81	Other Operations—Cr.

UNDISTRIBUTED ACCOUNTS

82	Injuries and Damages
83	Insurance
84	Stationery and Printing
85	Store Expenses
86	Stable Expenses
87	Rent of Tracks and Terminals
88	Rent of Equipment

IV—TRANSPORTATION EXPENSES

61	Superintendence
62	Dispatching Trains
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
86	Operating Power Plants
87	Purchased Power
79	Motormen
88	Road Trainmen
89	Train Supplies and Expenses
63	Station Employees
66	Station Supplies and Expenses
90	Interlockers and Block and Other Signals—Operation
94	Telegraph and Telephone—Operation
96	Express Service
99	Loss and Damage—Freight
100	Loss and Damage—Baggage
93	Clearing Wrecks
98	Other Expenses
64	Weighing and Car Service Associations
65	Coal and Ore Docks
67	Yardmasters and their Clerks
68	Yard Conductors and Brakemen
69	Yard, Switch and Signal Tenders
70	Yard Supplies and Expenses
71	Yard Enginemen
72	Enginhouse Expenses—Yard
73	Fuel for Yard Locomotives
74	Water for Yard Locomotives
75	Lubricants for Yard Locomotives
76	Other Supplies for Yard Locomotives
77	Operating Joint Yards and Terminals—Dr.
78	Operating Joint Yards and Terminals—Cr.
80	Road Enginemen
81	Enginhouse Expenses—Road
82	Fuel for Road Locomotives
83	Water for Road Locomotives
84	Lubricants for Road Locomotives
85	Other Supplies for Road Locomotives
91	Crossing Flagmen and Gatemen
92	Drawbridge Operation
95	Operating Floating Equipment
97	Stationery and Printing
101	Damage to Property
102	Damage to Stock on Right-of-Way
103	Injuries to Persons
104	Operating Joint Tracks and Facilities—Dr.
105	Operating Joint Tracks and Facilities—Cr.

V—GENERAL EXPENSES

106	Salaries and Expenses of General Officers
107	Salaries and Expenses of Clerks and Attendants.
108	General Office Supplies and Expenses
109	Law Expenses
111	Relief Department Expenses
112	Pensions
114	Other Expenses

(See IV)	
110	Insurance
113	Stationery and Printing

115	General Administration Joint Tracks, Yards and Terminals—Dr.
116	General Administration Joint Tracks, Yards and Terminals—Cr.

IV—TRANSPORTATION EXPENSES

40	Superintendence
33	Power Plant Wages
34	Substation Wages
35	Fuel for Power
36	Water for Power
37	Lubricants and Waste
38	Miscellaneous Supplies and Expenses
38	Miscellaneous Supplies and Expenses
39	Purchased Power
45	Wages of Passenger Conductors
47	Wages of Passenger Motormen
46	Wages of Freight and Express Conductors
48	Wages of Freight and Express Motormen
49	Wages of Miscellaneous Car Service Employees
51	Train Supplies
(A)	Car Service Supplies
52	Lubricants and Waste
59	Miscellaneous Car Service Expenses
60	Stationery and Printing
41	Station Service
42	Station Supplies and Expenses
43	Rent of Land and Buildings
50	Wages of Carhouse Employees
54	Interlockers, Block and Other Signals—Operation
55	Telegraph and Telephone—Operation
56	Loss and Damage
59	Miscellaneous Car Service Expenses
60	Stationery and Printing
57	Injuries and Damages
44	Rent of Tracks and Terminals
53	Dining and Buffet Service
58	Law Expenses Account Damages
61	Hired Equipment

V—GENERAL EXPENSES

62	Salaries of General Officers
63	Salaries of Clerks and Attendants
64	General Office Supplies and Expenses
65	Law Expenses
69	Miscellaneous General Expenses

(See IV)	
67	Insurance
68	Stationery and Printing
66	Store Expenses

(See IV)	
(See IV)	

STEEL TIE AND CONCRETE TIE CONSTRUCTION*

BY CHARLES H. CLARK, CHIEF ENGINEER, NEW YORK & NORTH SHORE TRACTION COMPANY

The railroads in the United States have been and still are using enormous quantities of timber in their construction. Year after year they have been paying more and more and receiving poorer and poorer timber for ties. There was a time when the farmers around the outskirts of the cities could be depended upon to furnish white oak ties at a price between 30 and 50 cents for a 6-in. x 8-in. x 8-ft. tie of the choicest quality; none of these can now be purchased, except at a price prohibitive for use as tie timber. Only a few weeks ago the writer had occasion to order some oak stakes, for which the manufacturer wanted \$90 per thousand for the wood alone. It suffices to say that a cheaper wood was purchased. Then, again, when white oak is specified, chestnut, burr oak, port oak and rock oak, together with the red oak, black oak, elm, sassafras, cherry, walnut, etc., are furnished. These woods can be smuggled in covered with mud and slime, making the timber unrecognizable even to a timber expert, of which, by the way, there are but few not already retained by the tie and lumber companies. Timber purchased as long leaf yellow pine will be found to be mixed with loblolly or Virginia pine, the life of which is probably less than half that of the long leaf pine. These are some of the troubles incurred in trying to get the quality of timber which is asked for, and for which the specifications call.

Not so with the steel tie. The principal trouble with this tie is the shape, the difficulty of getting the maximum strength for the minimum weight, or the greatest service for the cost of the tie.

The earlier forms of steel ties for electric railways consisted of a 7-in. channel 7 ft. long, which was placed on top of a 6-in. bed of concrete. This form had little more strength per unit of weight than a flat piece of steel. A comparison of the properties of channels with I-beams of the same weight for standard sections shows that the moment of inertia for the channel on its longitudinal axis is for a 7-in. channel weighing 14¾ lb. per foot, 1.40; whereas a standard 5-in. I-beam has a moment of inertia for the same weight beam of 15.1, showing 10 times the strength when used as a beam. It may be claimed that the channel lies flat on the concrete, and is not, therefore, used as a beam. This might be true theoretically, but experience has taught us that the continual pounding of the heavy cars has broken the concrete under the rail, and the steel tie has buckled up and thrown the track into a wide gage, which it is almost impossible to correct without complete reconstruction. This has only been true of the old type of steel channel tie.

With steel ties the usual construction for paved streets is generally as follows: The spacing of the ties usually decided upon is from 4 ft. to 6 ft. centers. The old pavement is removed and an excavation made to the required depth for the pavement, sand cushion and concrete, generally 15 in. deep. Cross trenches for the ties are dug; these are made about 5 in. or 6 in. below the bottom of the tie and about 12 in. wide. A trench 10 in. deep and 15 in. wide is then excavated directly under the rail; the ties are placed in the tie holes and the rails laid upon the ties and clipped, and then surfaced and lined as usual. The

ties must be blocked up with pieces of old wooden ties placed under the rail, but not under the ties; the alignment is held by wedging the ends of the steel ties against the bank. The concrete is then placed under and around the tie and under the rail. This concrete should be of the very best composition, and, preferably, 1:2½:5 for the ordinary run of stone. If gravel is used, 1 part cement to 6 of gravel is a good mixture. For the concrete under the pavement alone a leaner mixture can be used at a reduced price per cubic yard. When the concrete is mixed by hand it is more economical; the work can be carried along systematically by organizing two concrete gangs. The concrete is thoroughly mixed and tamped under the ties and rails with the ordinary tamping bar. The part under the pavement only is rammed thoroughly into place and kept to a templet. With this method of construction and using an I-beam steel tie 5 in. deep, 7 ft. long, and allowing for concrete 9 ft. wide over all, it requires an average of 0.116 cu. yd. of concrete per running foot under the ties and rail and 0.06 cu. yd. per foot for the balance, making 0.176 cu. yd. of concrete per foot of track, allowing for the concrete coming only to the top of the tie. The cost of this work varies in all localities and with all weather conditions.

The Carnegie Steel Company has developed a steel tie which meets most of the requirements of the track engineer. It is a tie which will give the greatest strength and holding power for the least weight of material. This tie is made in three weights: Sec. M-21, weighing 20 lb. per foot; Sec. M-25, 14½ lb. per foot, and Sec. M-24, 9.5 lb. per foot. The largest section, M-21, has a depth of 5½ in. with top flange of 4½ in. and bottom flange of 8 in.; section M-25 has a depth of 4½ in., top flange 4 in. wide, and bottom flange 6 in. wide; section M-24 has a depth of 3 in., top flange 3 in. wide, and bottom flange 5 in. wide. It has been the general practice to lay these ties with the wide flange on the bottom, the idea being that the greatest bearing resistance was obtained. The writer does not believe this to be true. The Chicago Board of Supervising Engineers conceived the idea of reversing this method, and laid the ties with the wide base on top. If the tendency of a tie is to buckle, all other strains being equal, the tie laid in this position, with the wide flange on top, has the greatest resistance to buckling on account of the increased area of the wider base. Then, again, the concrete can be placed and tamped more thoroughly under the flanges.

The most common fastening is the steel clip with a bolt. This is a very simple construction, and so far has proved satisfactory. However, the Chicago roads have deviated somewhat from this mode of fastening and are using a tie plate ¼ in. thick, with special punching of the tie and special bolts and clips, which can be removed from the top when it becomes necessary to renew the rail. This removes the objection raised by some engineers to steel ties on account of the difficulty of renewing rail. The steel tie has not been in use long enough to form an opinion of its ultimate durability. The writer had occasion in Cleveland to remove some track, where the franchise had expired, which was laid with Lorain steel ties, spaced 10 ft. apart and alternating with wood ties spaced the same distance apart, with 10 in. of concrete under the rail. This track was in perfect condition. The concrete was perfect, and no pulverizing of concrete was found under the rail. The track was laid under the writer's supervision in 1903, and removed in 1907. The concrete was a 1:3:5 Portland ce-

*Abstract of paper read at the quarterly meeting of the Street Railway Association of the State of New York, held in Utica, N. Y., Nov. 10, 1908.

ment mixture of best quality. In removing the ties the nuts had to be cut from the bolts. In contrast with this, the writer had occasion within the last year to repair track laid under similar conditions, but with only 4 in. to 6 in. of concrete under the rail. This track was badly out of surface, the concrete was broken and the rails were corrugated. This condition may be attributed to the poor workmanship when the track was laid and the racing of the gangs to cover the most distance in a day. The engineer must evolve, first, a correct design, then see that it is carried out. Quality and quantity of concrete tell how much work a gang is doing, not the number of feet of track laid per day, for the unscrupulous foreman will skimp his measurements and get over the distance with the least amount of concrete. Track built to stand the pounding of heavy cars must be given close attention in every detail. It costs money in the beginning, but the saving in maintenance of track and pavement comes for each succeeding year, and the capitalized cost of the roadway is a great deal less.

The following is a comparison of the original cost of oak tie construction with steel tie construction.

For 100 ft. of track, all labor being the same, for oak ties:

50 oak ties at 80 cents, delivered.....	\$40.00
200 spikes	2.00
Extra excavation, 5 yd. at 40 cents (low).....	2.00
24 cu. yd. concrete under and between ties, at \$5..	120.00

Total for 100 ft. \$164.00

For steel ties for 100 ft. track:

25 steel ties at \$1.80 (average).....	\$45.00
17.6 cu. yd. concrete at \$5.....	88.00

Total for 100 ft. \$133.00

This shows a saving by using steel ties of 31 cents per foot of track, or a saving of \$1,636.86 per mile. Of course, this saving will vary for different localities, and by using local unit prices exact comparisons can be made.

Steel ties of every shape imaginable have been devised, but the one great fault of most of them, in general, has been the amount of work needed to make them and the insufficient strength attained, together with the complex fastenings devised, which have prevented their manufacture as practical commercially. The writer believes steel ties have come to stay. They will stand the severe tests placed upon them. It is only necessary to look at the old cable construction for an answer as to the durability of metal in track. The Superior Street and Payne Avenue lines of Cleveland, Ohio, which were laid in 1890, still have the original rails and foundation in use.

Some inquirers believe that corrugated rails are caused by rigid foundations. In answer to this the writer would point to Niagara Street, Buffalo, which is laid upon and tamped with the dirt excavated. Here may be found the worst case of rail corrugation in Buffalo. On the concreted track the corrugations are found where the concrete was poorly laid. The conclusion may be drawn, therefore, that rigidity does not cause corrugation. Look after joints, which are the weakest parts of the track. Do not be led to believe that the common splice bar, with 12 bolts, is good enough. It is not. Use 2-in. x $\frac{3}{8}$ -in. tie rods, spaced not more than 5 ft. apart; or, better still, a tie rod over every steel tie. Do not depend upon brace chairs, as they work loose and corrode under the rail. Do not use the girder rail unless absolutely required and compelled to do so. The best track for city streets to-day is laid with T-rail. In Minneapolis, St. Paul, Milwaukee, Syracuse, Utica, Auburn, Lockport and other cities where T-rail is

used will be found the best tracks in the country. Do not be misguided by those who advise that city streets cannot be successfully paved where the T-rail is used. They can and are being paved, and with the best results.

Concrete beam construction has not been very successful, judged from reports of the few engineers who have used this method. The difficulty has been in keeping the track to gage and surface. Soft spots in the foundation of the beam cause wide gage and bad surface. The pavement breaks away from the rails, and its use is not to be recommended.

Concrete ties may perhaps come into use, on account of the ease of making them. The Correll tie, made in two sections and connected with a tie bar, is a good example. Sixty of these ties were placed in the suburban tracks on the Lockport line at Buffalo, N. Y., early this spring. They were tamped with ordinary loam and gravel. The writer has not examined them since August, at which time, after having been in the ground only about four months, they were in fine condition. By using concrete ties certainly no trouble will be experienced with ties rotting for want of good drainage, and the material for tamping need not be of the best.

T-RAIL IN PAVED STREETS *

BY R. A. DYER, JR., ASSISTANT GENERAL MANAGER, AUBURN & SYRACUSE ELECTRIC RAILROAD

The two railways with which the writer is connected, the Auburn & Syracuse Railroad and the Rochester, Syracuse & Eastern Railroad, have now the greater part of their city lines laid with T-rail. On the Auburn & Syracuse line 90-lb. A. S. C. E. section rail has been laid, to replace girder rail, in several streets in Auburn and Skaneateles where the street is paved with brick or macadam. So far, the results have been generally satisfactory to the company, to the city authorities and the public. T-rail in Auburn is not new, for in 1891, when the first electric lines were built there, the Seymour Street and Owasco Street lines were constructed with T-rail, and some of it is still in service. This was a 45-lb. rail about $4\frac{1}{4}$ in. high, and was laid in macadam road, but with a scarcity of ties and ballast which would not be considered as even fair construction to-day. The rail fastening used was the old fish plate, and the natural result was a rough track. Many rails were surface bent at the joints and the whole track was in bad condition. Although considerable money was spent each summer for maintenance, the greater part of it was practically wasted. It is proper at this point to explain that T. H. Mather, the present chief engineer of the company, was not then connected with the company. If he had been, the writer is quite sure conditions would have been different.

A few years later these tracks were rebuilt, new ties and stone ballast being used under the old rail, and Weber joints taking the place of the old fish plates. The track was not an ideal one, for, notwithstanding the good foundation, the rails were still surface bent, but after a time these deformations gradually disappeared. As the cars running over this track are comparatively light, the track has for some years past been in fair condition, the chief expense being the occasional raising of a joint and the filling in between the rails with fine broken stone to maintain the road surface and to fill the ruts worn by wagon wheels driven close to the rail.

*Paper read at quarterly meeting of the Street Railway Association of the State of New York, held at Utica, N. Y., Nov. 10, 1908.

About 12 years ago, considerable additional trackage was laid in Auburn, largely of the 6-in. 70-lb. girder rail. The head of the rail was only about $15/16$ in. above the tram, as was common practice at the time, the wheel flanges usually being $5/8$ in. or $3/4$ in. high. This rail answered very well until the advent of the interurban cars, with wheel flanges $7/8$ in. high or over, due to the wear of wheel treads. While some of this rail is still in service in streets not used by the interurban cars, it has been necessary to replace it in streets through which the interurban cars enter and leave the city. With the necessity of renewal, the question of using T-rail came up, and the city authorities finally gave consent that a short section of one street should be relaid with 90-lb. T-rail. The rail was laid on new ties, with 6 in. of stone ballast under the ties, and the space to the top of the rail was filled with broken stone, with a top dressing of fine stone for a binder. No repairs have been made to this track since it was put down, except to keep the space between the rails up to the level of the street by spreading fine broken stone over it about once or twice a year. The track is in a very satisfactory condition. Since that time no girder rails have been laid in Auburn, and several miles of T-rail are now in service in both brick, asphalt and macadam paved streets.

In macadam roads the space between the rails is filled with crushed stone, but in all streets paved with brick or asphalt the space between rails, and for 6 in. or 8 in. outside of the rails, is paved with brick, a special block being used to form the flangeway along the inside of rail. This block is nothing but the ordinary paving brick, with a beveled corner, made in full size and half-size for breaking joints.

The usual construction is 6 in. of broken stone under the ties, and in case of paved streets the space between the ties is filled with concrete to the top of tie. Then $1\frac{3}{8}$ in. of sand for bedding the bricks is put down, and the bricks are laid on this in the usual manner.

To form the flangeway, a mortar composed of one part Portland cement and two parts sand is plastered against the web of the rail. The ends of the beveled bricks are embedded in this as they are laid, and finally the whole surface is flushed with a thin grout of cement and water in the usual way, care being taken, however, to prevent the flangeway from being filled with cement. Judging from the approval which has been expressed by succeeding city officials, no opposition is anticipated to laying of T-rail in any of the streets of Auburn in future. A better looking street can be made by the use of T-rail than with any other type of rail which engineers consider practicable to use. At the same time the track can be crossed by a narrow-tired vehicle at any angle which is safe with any kind of rail. There appears to be less difficulty in turning off of the track with T-rail in brick pavement than with girder rail, as the tire of a wheel will cling to the brick much more than is the case where the tires of both wheels come in contact with the rail. Just what the life of the brick forming the flangeway will be, of course depends largely on the amount of travel on the track and in the street. In Auburn, where this style of construction has been in service for three years, the brick does not yet show wear to any extent that is detrimental or inconvenient to vehicles of any class. It will readily be appreciated that even should the pavement require repairs or renewal of the brick forming the flangeway, the long life of the T-rail in comparison with any type of girder rail will show a large saving both in first cost and maintenance at the time the T-rail would have to be replaced.

Not only can the head of the T-rail be worn down several times the amount possible with present girder rails, but the maintenance of the track will be greatly reduced, particularly under heavy travel, because of the center-bearing feature of the T-rail and the possibility of applying rail fastenings which support the joint better than the plates used with girder rails. This refers only to the angle-bar type of fastenings, as the writer has had no experience with any of the welding processes.

On the Rochester, Syracuse and Eastern, which passes through the streets in seven villages, 90-lb. T-rail was laid and has been in service $2\frac{1}{2}$ years under cars with a light weight of as high as 84,000 lb. The cost of track maintenance has been small both with brick and macadam paved roads, and the construction has been very satisfactory.

While these two companies have voted the T-rail in streets a success and are laying it in nearly all cases on new construction and where tracks are being replaced, they have found one objection to it where laid in brick pavement, the trouble being somewhat in a ratio to the profile of road. This trouble comes in winter, from ice and snow freezing to the brick flangeway very much more than is the case with girder rail; it is also much more difficult to remove. In stormy weather, when snow is drifting and the frequency of service is not sufficient to prevent the flangeway filling between the interval of cars, considerable difficulty has sometimes been experienced in maintaining operation on grades from 4 per cent to 8 per cent, and it has been necessary to keep a sweeper on this track almost constantly to prevent snow filling the flangeway and being packed to such an extent that it would freeze to the brick immediately. In some localities this might be a serious objection, and no remedy has been found except as stated, or perhaps the use of salt, if the city authorities will allow it. Otherwise, the experience has been much in favor of the use of T-rail in streets, and so far has brought only the objection noted.

INDIFFERENCE OF CARMEN

Any car is liable to dangerous defects that normally should be detected in the course of the car house inspection. Unfortunately, this cannot always be done, especially with regard to apparently trivial but really serious irregularities overlooked by the conductor and motorman. For examples: loose, bent, or broken grab handles; weak or broken pole straps; broken, splintered or badly spliced strap poles; steps loose or bent; raised, broken or missing floor mats or strips; broken window glass, with jagged edges; bent draw bars or hangers; open car step worn below the surface of its iron guard, thereby leaving a sharp edge to catch the shoe of an alighting passenger; a dozen other small irregularities easily and quickly rectified. On a new style of drop sash, unfamiliar to the average rider, who wishes to open a window, people get their knuckles cut owing to the absence of any positive means for holding the sash over the runway just before dropping it. If two enthusiasts work together somebody is likely to be hurt, because the natural tendency of pressure on the top is to force the sash to its back position, and when it comes down one man may have his fingers between the bottom and the sharp edge of the hinged cap. There should be some strictly enforced rule whereby the existence of such defects will be brought to the attention of the proper official.

Work will shortly be commenced by the Havana Electric Railway on the extension of several of its lines.

QUARTERLY MEETING OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK

The regular quarterly meeting of the Street Railway Association of the State of New York was held Nov. 10, in the Utica clubrooms of the Utica & Mohawk Valley Railway Company's employees. The papers and discussion related to track construction in city streets.

The meeting was opened at 10:15 a. m., with President Fassett in the chair, who announced that he had appointed committees on the following subjects, recommended last July, at the preceding annual meeting, by J. M. Barnes, electrical expert for the New York Public Service Commission of District No. 2, to confer with the commission: Devices for signaling passengers at way stations: George L. Radcliffe, superintendent, Schenectady Railway Company; J. G. Phillips, assistant general manager, Hudson Valley Railway Company, and S. J. Dill, general manager of the Elmira Water, Light & Railroad Company. Use of car curtains: W. R. W. Griffin, general superintendent, Rochester Railway Company; J. E. Duffy, superintendent, Syracuse Rapid Transit Company, and C. A. Coons, superintendent, International Railway Company. Carrying musical instruments: Albert Eastman, general passenger and freight agent, Utica & Mohawk Valley Railway Company; C. H. Smith, superintendent of transportation, United Traction Company of Albany, and J. P. E. Clarke, general manager of the Binghamton Railway Company.

The first paper was on "Steel and Concrete Ties," by C. H. Clark, chief engineer, New York & North Shore Traction Company. This paper is printed on page 1381 of this issue.

DISCUSSION ON MR. CLARK'S PAPER

B. E. Tilton, engineer maintenance of way, Rochester Railway Company, said he had seen the Correll tie as installed for the International Railway Company on the Lockport division. He had found the line and gage perfect, but the surfacing was very poor, and it appeared difficult to keep it surfaced. Referring to steel tie construction, he would point out that it brought about a loss of weight in the substructure. Using Carnegie M-25 ties spaced 4 ft. centers gives a weight of 101 lb. every 4 ft., against 260 lb. with two wooden ties in 4 ft. The difference, therefore, amounted to 159 lb. for that distance, or about 40 lb. per foot. He could not say, however, whether this fact was a point for or against the steel tie, although it was desirable on general principles to have closer spacing. He stated the Rochester Railway Company had received tentative permission to put in some T-rail next year, and it wished to use steel ties. In calculating the proper size of the tie he assumed that the only way the steel tie could fail would be due to the shrinkage of the concrete beneath. The problem was worked out for two classes of traffic, treating the tie as a simple beam. For interurban cars up to 50 tons, running over the same tracks as the city cars, the section modulus of the tie needed would be 5, while the section modulus of the M-25 tie is 5.6, making the corresponding weights 12.95 lb. and 14.5 lb. Carrying out this computation for track for city cars only, he had found a section modulus of $2\frac{1}{2}$ satisfactory, this corresponding to the lighter M-24 Carnegie tie, weighing 9.5 per foot. This indicated that for city traffic with 25-ton ties the lighter tie is of the proper section, but that for interurban service added, the proper weight would be 13 lb. (12.95 lb.), instead of $14\frac{1}{2}$ lb. per foot.

R. M. Hannaford, chief engineer of the Montreal Street Railway Company, brought up the question of clips. On

one street his company put in double track, where two years before it had laid a single track with 87-lb., $7\frac{1}{4}$ -in. T-rail, with clips fastened to the steel ties which consisted of 3-in. x 4-in. heavy angles. The concrete was over the base of the rail. It was found necessary to destroy the clips in order to release the rails for relaying. He therefore wanted to learn something about a method for fastening clips which will allow their re-use.

Mr. Clark, replying to Mr. Hannaford, said that at the 1906 convention of the American Street & Interurban Railway Association, in Columbus, he had recommended the placing of a sand-filled pocket underneath the bolt, so that when rails are taken up the sand can easily be removed, and only the bolt is lost. In the latest Chicago construction, a renewable bolted plate is put on the top of the steel tie. Replying to a question by M. J. French, engineer maintenance of way, Utica & Mohawk Valley Railway Company, the speaker said that the Correll tie rests directly on the concrete.

Mr. French then read as a contribution to the discussion the following paper, accompanying it by samples of the rails, paving blocks, reamers and some other parts referred to in his remarks:

T-RAIL CONSTRUCTION AND COSTS WITH CARNEGIE STEEL TIES AND VITRIFIED BLOCK PAVEMENT ON BLEECKER STREET, UTICA, N. Y.

Realizing the advantages of T-rail over girder-rail construction from both the maintenance and cost standpoint, the Utica & Mohawk Valley obtained permission from the city authorities of Utica this year to replace a stretch of 9-in. tram-head girder rail double track on Bleecker Street with 100-lb. A. S. C. E. section T-rail, laid on steel ties and paved with vitrified blocks. The girder rail removed was laid in 1902 on 6 in. of crushed limestone and slag ballast. The ties were 6-in. x 8-in. sawed chestnut ties, 8 ft. long, spaced 2 ft. centers, with suspended joints. No tie rods or brace plates were used. The old track was filled with crushed slag. This track was going down at the joints, was at least $\frac{1}{2}$ in. wide gage and considerably out of line at the joints. The 24-ton interurban cars operated on half-hour schedule and 19-ton city cars operated on $7\frac{1}{2}$ -minute headway, with an occasional Oneida Railway passenger car of 39 tons and express cars reaching a maximum of 65 tons when loaded, were cambering the rails, and maintenance of schedule speed would have soon made uncomfortable riding. T-rail construction was therefore decided upon to give relief.

As the total street distance to be improved was only 1230 ft., with a permanent cross-over 800 ft. from the east end, it was decided to place a portable cross-over at the west end and operate all cars on one track while rebuilding the other. Flagmen furnished by the transportation department and stationed at the cross-overs controlled the movements of the cars. The dead track was used to haul in the track and paving materials. A trench 12 in. deep was excavated, leaving the stone and slag ballast of the girder construction undisturbed. On this sub-grade Carnegie steel ties $4\frac{1}{4}$ in. high, with 4-in. top and 6-in. bottom flanges, 7 ft. long and weighing 101.5 lb., were placed 4 ft. centers with two ties per joint 2 ft. centers. Joints were staggered and $\frac{3}{8}$ -in. x 2-in. tie rods were placed 8 ft. centers with one 2 ft. from each joint to bring the track to accurate gage. Clark joints were used. They consisted of the regular 36-in. angle plates with $1\frac{3}{16}$ -in. holes spaced for drillings $2\frac{1}{2}$ in. x 6 in. x 7 in. from the rail end to allow for tie clips. The lower flange of the joint plate was sheared off so as not to project beyond the rail

base, and the plates were slotted to receive the steel tie clips. Joints were bolted up temporarily with two 1 1/8-in. bolts, drift pins being used to bring the holes in plates and rails accurately into line. The 1 3/16-in. holes were reamed to 1 5/16 in. with Ludlow adjustable reamers operated by hand in a Cleveland electric drilling machine. The motor of this machine could not be used, and consequently the reaming of each hole cost about 6 1/2 cents, instead of about 1 cent if motor driven. Six 1 1/4-in. x 4 3/4-in., square-head, hexagonal-nut bolts, 1/64 in. larger than the holes were driven into the holes. These were special bolts, with threads 1 3/8 in. long to give the full body of bolt in the hole of the plate. The track was surfaced on blocks cut from old wooden ties, being raised with jacks slightly above grade in sections of 100 ft. to 200 ft. and brought to surface by driving down the blocks with a heavy sledge. Trenches 6 in. deep and 18 in. wide were dug under the steel ties and the ties were tamped up with 1:3:6 mixture of slightly damp concrete. Concrete of the same mixture was placed 1 1/4 in. over ties at centers, with a crown of 1/2 in., the surfacing blocks being removed as the work progressed. A space about 1 in. deep was smoothed out under the rails and after 24 hours this space was filled and solidly tamped with a mixture of 1 part cement to 4 parts coarse quartz sand slightly moistened to insure packing. The track was lined after surfacing and carefully touched up immediately after concreting, all bar-holes and spaces in the concrete being carefully tamped. Regular paving blocks were laid flat under the rail head to form a tram and were tamped by hand with a mixture of 1 part cement to 4 parts sand, these blocks being cut to fit over tie clips and at tie rods. The rest of the labor of paving and grouting was done by contract at 17 cents per sq. yd. The tram bricks were omitted at joints, the space around the bolts being filled with grout when the pavement was grouted. The pavement between the rails of each track was crowned 1/2 in., being flush with the tops of the rails at the center. The paving was kept 1/4 in. below the rail head along the back of the rail head to prevent chipping by worn overhanging treads.

The total length of single track construction was 2460 ft. The cost of materials per foot of track is as follows:

	Dollars
Crushed stone, figured as all new stone.....	.285
All stone used was screened from excavated material.	
Concrete sand, labor only, given in labor items:	
Portland cement for concrete at \$1.23 per bbl. ....	.287
Steel ties complete, with clips and bolts, \$1.66 each... .	.443
T-rail, 100-lb. A.S.C.E., \$33.80 per gross ton 60 ft. length	1.006
Clark joint plates, per pair, sheared and slotted, \$1.45 each.....	.0483
Joint bolts, 1 1/4 in. x 4 3/4 in., each 9.53 cents.....	.0191
Tie-rods, 3/8 in. x 2 in. x 5 ft. 2 in., each 26.3 cents..	.0351
Track inlets with connections, Syracuse type, \$8.75 each .....	.0360
Thermit, 8 lb. per joint at 25 cents.....	.0667
Welding supplies, crucibles, thimbles, etc.....	.005
Paving sand, 1 cu. yd. to 27 ft. of track at 63 cents..	.0233
Paving blocks, 42 per sq. yd., price \$25.50 per M....	1.146
Portland cement, for grouting and flushing, mixed (1:2 covers 20 lineal ft.).....	.0615
Total cost of materials per foot of track.....	3.4620
Add 10 per cent for use of tools and power.....	.346
Total cost for materials and power.....	3.808
The actual labor cost per foot of track was:	
Excavation, while cars were operating, 0.365 cu. yd..	.01455
Hauling old materials to storeyard.....	0.0797

	Dollars
Delivery of track materials.....	0.0398
Track laying, including drilling for and placing tie rods .....	.1379
Delivery of concrete materials, including loading of sand at Little Falls bed and hauling 15 miles....	.1141
Concreting track to pavement grade, 0.233 cu. yd....	.3509
Placing track inlets, per basin \$1.04.....	.0034
Placing Clark joints, reaming and bolting up.....	.0230
(Cost per joint, 68 cents; if holes had been reamed by electric power, cost would have been 35 cents.)	
Welding joints, including making of molds and crucibles .....	.0325
(Cost per joint, 97 cents, including four combination joints.)	
Delivery of paving materials, sand, cement and blocks .....	.1297
Street paving, pounding, grouting and rail batter....	.2607
(or .2356 per sq. yd.)	
Cleaning up street, including hauling of surplus screened stone and fine screenings, grading lawns, adjusting sidewalks, etc.....	.1101
Watching and timekeeping .....	.0380
Flagmen and switchmen .....	.1050
(Two flagmen from transportation department at 24 cents per hour, and one switchmen at 15 cents per hour, 20 hours a day.)	
Superintendence, engineering and inspection.....	.0357

Total cost of labor per foot of single track.....1.6060
 The cost of screening stone used for concrete was 5-7 cents per foot of track, but is not included as labor, because stone is figured in material cost as new stone. The total cost per foot of track, with 5-ft. center strip and 25 in. of pavement outside of outer rails, is \$5.4106.

The cost of labor on 9-in. tram-head girder construction on Whitesboro Street in 1907, maintaining operation of cars and employing the same type of steel-tie construction with vitrified block paving was \$2.19 per foot of single track. This construction was done under the same conditions as to maintenance of traffic, and the same cars were operated with the exception of the Oneida Railway cars. The same type and size of steel tie was used as on Bleecker Street this year, but the spacing was 6 ft. centers; the concreting methods were identical, but all joints were thermit welded. The excavation included removal of asphalt pavement and concrete base outside the rails of a single track paved with cobbles.

	Dollars
The itemized labor cost per foot of single track on Whitesboro Street was as follows:	
Placing and removing temporary track, per linear foot .....	.31
Excavation, including hauling, per cubic yard, partly concrete, \$1.05, or per foot on track.....	.46
Hauling away old materials, including old rails, wooden ties, scrap, old paving materials and cobbles, per foot of track .....	.03
Delivering track materials per foot of single track...	.04
Track laying and surfacing per foot of single track..	.19
Delivering concrete materials, including loading and hauling of sand 19 miles by work train, and breaking of old concrete and stone to use in new concrete, per foot of single track.....	.13
Concreting, including dry mixture under ties and under rail bases, per cubic yard, \$1.51; or concreting per foot single track.....	.45
Placing track basins, two basins being located every 500 ft. of single track; price per basin \$8.64, or per foot of track.....	.02
Thermit welding, including labor on molds and crucibles, per joint, \$1.24; per foot of track.....	.04
Delivery of paving materials, including loading of blocks at storeyard, per foot single track.....	.11
Cleaning up street, including removal of unused materials, broken bricks, and regrading of lawns between sidewalk and curb, per foot of track.....	.06

	Dollars
Flagmen and switchmen per foot of single track.....	.01
Engineering, superintendence and inspection, not including time of foreman, per foot of single track..	.09
Brick paving, per foot of track.....	.21
Timekeeping and watching.....	.05

Total cost labor per foot, including paving.....\$2.19

The total labor cost is thus 58.4 cents per foot, or 36 per cent, greater than that of the Bleecker Street T-rail construction. A considerable saving on materials is evident, as 3 in. less of excavation and concrete materials is required and the cost of rails is \$4.60 per gross ton less. The Whitesboro Street construction was described in detail in the STREET RAILWAY JOURNAL of Oct. 12, 1907.

This year there has been laid on Mohawk Street 6985 ft. of this same 9-in. tram-head rail, Lorain Steel Company section 95—297, with 763 ft. of special work track. The type of construction was the same as that on Whitesboro Street, except that Clark joints were substituted for thermit joints and the joints were placed opposite as an experiment. Two steel ties were placed at the joints, and the last upper joint holes were used for tie rods. As the rails were already drilled with 1/4-in. holes for regular 12-bolt joints with 1-in. button-head bolts, 1 5/16-in. bolts were used to secure the driven fit, 10 bolts to a joint.

The details of labor cost per foot of single track on Mohawk Street are as follows:

	Dollars
Temporary track.....	.0105
Excavation .....	.3186
Track laying .....	.2150
Delivery of track material .....	.0700
Delivery of concrete material .....	.1376
Delivery of paving material .....	.0952
Timekeeping and watching .....	.0572
Engineering .....	.0888
Clark joints, placing and reaming.....	.0386
Welding .....	.0226
Bonding specials .....	.0289
Concreting track .....	.4344
Drains and sewers .....	.0067
Cleaning up street .....	.0664
Brick paving .....	.1914
Hauling old materials .....	.0025
City inspector .....	.0204

Total cost per foot of single track..... \$1.805

Compared with the Whitesboro Street construction of \$2.19 for labor, there is a saving of 38.5 cents, or 21 per cent. It is quite evident that this saving is due to the fact that there was no car traffic to be maintained and that the first track constructed could thus be used for delivery of materials.

Following Mr. French, R. A. Dyer, Jr., assistant general manager, Auburn & Syracuse Electric Railroad, presented a paper on "T-Rail in City Streets," which is printed on page 1382 of this issue.

Mr. Tilton then presented some interesting data on T-rail computations, which will be published in a later issue.

B. Penoyer, engineer maintenance of way of the Schenectady Railway Company, said, relative to the different kinds of pavement, that three years ago his company had laid about 500 ft. of 80-lb. T-rail, using a beveled brick, as referred to by Mr. Dyer. The brick is now practically gone, although the wagon traffic is light. If T-rail is to be used, it should be of such height as to allow ordinary brick under the head of the rail. In subsequent renewal work his company will employ a 7-in. rail to make use of the 5-in. granite block street pavement already in place. He had not come to any satisfactory decision on steel ties,

because three years ago he had occasion to relay a piece of track on a grade where traffic is heavy. This track had been down for 8 to 9 years, and upon opening it up for entire renewal, he found that despite the fact that the wooden ties were dirt-tamped below, and had concrete only between and for 1 in. above, they were in such good condition that only new rails were needed. If 65-cent ties spaced 2 1/2 ft. apart showed such results, he did not see why steel ties need be considered.

Mr. French replied that steel ties produced quite a saving in labor and material. There is less excavation; with wooden ties the tamping and surfacing of track is a great expense, as it is necessary to go over the track at least three times to be sure it is properly surfaced, while steel ties allow rapid surfacing, which is practically perfect. As to rails, he would advocate a section with a head like the 100-lb A. S. C. E., but with a deeper section, as given by the web and base of the Pennsylvania Steel Company's 95-lb. 7-in. rail. He had designed four rail sections along these lines, figuring about 105 lb. per yard. Rather than adopt the Milwaukee T-rail, which cannot be used with the flanges of interurban car wheels, he would use a rail with a deeper head, which will accommodate even the M. C. B. flanges of steam railroad wheels.

E. P. Roundey, engineer maintenance of way, Syracuse Rapid Transit Company, said one disadvantage of the wooden tie was that at least 1 in. of concrete was required over it to avoid decay. The rails should be at least 6 1/2 in. to 7 in. high.

Mr. French, referring to Mr. Clark's experiences in Buffalo with track not properly supported and showing corrugation, believed they tended to prove that the more rigid the track the less liability of corrugation. For that one reason alone the steel tie is superior, for one cannot get a rail on a wooden tie without involving vibration which is bound to disintegrate the concrete and loosen it up, thus inviting the entrance of moisture.

Mr. Clark objected to Mr. French's method of laying the paving block on the side, as the brick is re-pressed on the top and bottom only, and this practice would shorten the available life. Mr. French replied that as the tramway fills with dirt the wear does not come directly on the brick.

President Fassett asked for opinions on rigid track from the maintenance of rolling equipment standpoint.

H. A. Benedict, electrical and mechanical engineer of the United Traction Company of Albany, said that his company had tried beam construction to secure rigidity, but not with steel ties. The experience with concrete beams and 9-in. girder rails was far from satisfactory, as the rigid construction thus secured was a great deal harder on the rolling equipment. At the time his company started welding its tracks, it exposed a large number of joints all over its lines. The ties, laid in sandy soil, were apparently as good after 12 to 14 years' service as when first laid, especially where grouted block pavement was used, even though the concrete did not come over the tie. In other soils they were badly decayed. Concluding, the speaker voiced his belief that street railways had reached the maximum in rigid roadway construction and heavy cars, and in future would take into greater account the necessity for absorbing the shocks the rolling stock endures in service.

T. H. Mather, chief engineer, Syracuse, Rochester & Eastern Railroad, said that decay of wooden ties was due to a fungus which entered only through the ends of the ties. As this fungus could not live if deprived of light, heat, air and water, the thorough sealing of the tie

ends with concrete should prevent the deterioration of the timber, making the tie last as long as the rail. Further, Mr. Mather said he was much pleased with the computations offered by Mr. Tilton, and he also regarded as important Mr. French's suggestion regarding rails, too much being expected of the old 9-in. girder rail with only 5-in. base.

In reply to a question, Mr. French stated that the rails mentioned in his paper are 62 ft. long.

J. E. Duffy, superintendent, Syracuse Rapid Transit Company, said he had laid T-rail in Syracuse only within the past year, and therefore could say nothing definite about the value from the operating man's standpoint. They did have some brick paving outside the city, but had experienced no trouble with it.

G. L. Radcliffe, general superintendent, Schenectady Railway Company, said he had had no experience in operating over tracks with brick flangeways, but saw no objection to it. The only trouble he had had was with narrow grooved or Trilby rails filling with snow and dirt.

Mr. French said that some 7-in., 70-lb. T-rail installed in Columbia Street, Utica, in 1895, and paved with brick in 1898, had stood up remarkably well under cars as heavy as 29 tons.

Mr. Hannaford said the Montreal Street Railway had secured good wear from Scoria slag block. The outer rail has five rows of these blocks placed lengthwise. He also showed three methods of concrete track construction used in Montreal, as follows: Concrete beam 8 in. high, containing 196 cu. yd. of concrete per mile of single track; 5-in. concrete, 8 ft. 11½ in. wide, containing 1173 cu. yd.; and a combination of 8-in. concrete 8 ft. 11½ in. wide, but with 12-in. stringers, containing in all 1629 cu. yd.

C. Gordon Reel, vice-president and general manager, Kingston Consolidated Railroad, said there is nothing so important as the question of track. The T-rail is superior to the girder rail because the latter lacks lateral stability, moving sidewise under loads. A second objection to girder rails was the difficulty of holding the joints, making it necessary to scrap the rail before it was worn out. Any type which has to be tied with tie rods, which rust out and break, which requires bracing or moves sideways, is essentially wrong in design. Mr. Reel referred to the New York law against a certain form of center-bearing rail, and related his experiences in Kingston, substantially as presented in his paper at the 1907 American Association convention. This paper was printed in the *STREET RAILWAY JOURNAL* of Oct. 26, 1907, page 883.

C. Loomis Allen, vice-president and general manager, Utica & Mohawk Valley Railway Company, said that the paving used must be one offering an equally good roadway for the railways and vehicle users, and one which could be maintained with the least expense. He had heard only brick paving discussed, but would like to hear about concrete, asphalt or bitulithic paving as applied to T-rail.

E. F. Seixas, general manager, St. Catherines & Toronto Railway, said his company used principally a bitulithic block laid on its side along an 80-lb. rail. This has been in successful use for three years on track carrying heavy standard freight cars and light passenger cars.

Mr. Allen said in view of the movement toward a rigid track made up of concrete, steel ties and T-rails, it might be possible to obtain a combination of track and pavement having equal life throughout, thus securing maximum economy. In 1909 his company will lay as an experiment a modified form of Hassam pavement (the original Hassam pavement is a rolled macadam flushed with Portland cement

grout). A groove made by the operation of the cars appeared less objectionable than one secured by beveling the corners of a paving block. He had seen some Hassam pavement in Portland, Maine, which showed no abrasion from horses' hoofs or from wagons.

Mr. Fassett asked what was the condition of the Pennsylvania Steel Company's 9-in. girder rail laid in Syracuse 15 years ago on wooden ties in rolled broken stone. Mr. Allen said Mr. Fassett referred to construction in which 8 in. of broken stone was used. This year 3 miles of the portion bearing the heaviest traffic was renewed and remaining portions are to be renewed from year to year. The ties in certain streets have been replaced, due largely to the deterioration caused by the soil. In dry soil, the ties were removable with a shovel, while those in damp soil were all tight. The original life estimate was 15 years, but in practice it varied from 13 to 18 years according to soil, traffic, etc. Tie rods had to be taken out at the end of 10 years owing to the distortion of the gage line. He could not say whether 8 in. of concrete would have given better results than 8 in. of broken stone.

Mr. Reel said that under the light traffic conditions in Kingston, a life of 50 years might be expected from the T-rail installed there.

Mr. Allen remarked that the composition of steel rails was an important factor in their wear and mentioned the varying life he had noticed in different kinds. The wheel base of trucks entered materially into the question of gage widening, as well as the lower center of gravity of electric cars as compared with steam locomotives. While he had no exact figures, there could be no doubt that the blow on a curve given by a 39-ton car has greater destructive power on the track than one given, say, by a 23-ton car.

E. J. Cook, general manager of the Rochester Railway Company, said he expected to lay some T-rail the coming year.

E. F. Peck, general manager, Schenectady Railway Company, remarked that more life would be obtained from wooden ties if more care was exercised in their purchase.

J. N. Shannahan, second vice-president and general manager, Baltimore, Washington & Annapolis Railway Company, asked Mr. French if the municipal authorities did not object to the cross-section shown, as it would seem difficult for a vehicle without rubber tires to ride in that track.

Mr. Allen said that in service the pavement, because of wear, would not be as high as the section shown by Mr. French. The two sections of T-rail track put in at Syracuse and Utica were permitted by the city engineers, although with some misgivings. He believed that the maintenance cost of track and pavements would be less for the T-rail because the greater stability of the latter prevents to some extent breaking up the pavement and the percolation of water to the sub-structure.

The next speaker was H. C. Allen, city engineer of Syracuse, who remarked that little was to be said with reference to T-rail construction in that city for the simple reason that it had only been laid down this year. In 1893 the Syracuse Rapid Transit Company had built what was then considered the best type of roadway. The franchises called for a 6-in. bed of broken stone, long-leaf yellow pine ties, 2½ ft. centers, and a 9-in., 90-lb. girder rail spiked to the ties. It had been his fate to come back to Syracuse as city engineer 15 years later and find some of this construction dying and other parts dead. He did not care to assign any definite cause to the rotting of the ties in this period, but he thought that there might have been a percentage of short-leaf pine.

although the specifications called for long leaf. After a number of years the rails began to spread because the load of the cars did not come central with the web of the rail, creating a tendency for the latter to turn outward.

Last spring an application had been made to the city to adopt a T-rail construction, first by Mr. Mather's company and then by Mr. Allen's company. As he had not had experience with this construction for a number of years, he was inclined at first to oppose these applications, but consented to make some investigations. He visited Auburn with Mr. Mather to see the T-rails there as installed on wooden ties with brick pavement over the entire street. This track had been in use for three years and was found in very satisfactory condition. He had thought that the groove between the T-rail and the pavement would be found a source of weakness, but what he saw indicated that a good brick would be likely to give little trouble. He objected to the shape of groove formed by brick with a rounded edge in an attempt to imitate the tram of a girder rail because of the steepness of the slope of the brick. Such a groove does not help a wagon wheel to raise itself from the groove, but rather binds it, the tendency of the wheel being to stick along the rail or edge of the brick. The form with the flat slope appealed to him, as it helped the wheel to leave the track.

He pointed out that in cities where the entire street is paved, there is evident a decreasing tendency on the part of wagons to use the rails as a runway. Therefore, it would not be a bad idea to make the grooves as uninviting as possible for wagons, yet permitting them to leave the groove easily if they do get into it. He could not give a definite opinion as to the ultimate value of the more recent forms of steel tie, T-rail and concrete construction, but they appealed to him because this construction represented the desire to improve upon the past, and for this reason he had consented to a trial.

Regarding a proposed form of construction in which the roadway and pavements would have uniform life, he mentioned the construction of the Denver Tramways Company, which uses concrete under steel ties placed 4 ft. centers with additional concrete above to cover the base of the rail. The concrete is left to set at that elevation and then the paving between rails is laid, consisting of basaltic blocks having a groove on the inside of the rail and a stringer of these blocks on the outside. Every 20 ft. a set of six blocks is laid across the rails apparently to take up the expansion and contraction of concrete. The concrete used for the top is composed largely of a hard stone like Hassam pavement and is left to set for a short time, the mortar flushing to the surface because of its richness. It is then gone over and made ready for traffic. This paving has been down in many important streets for six or seven years and appears to have served very well without any disintegration, except that the top dressing of mortar has worn off exposing the hard concrete below. He would be perfectly willing to experiment in some portion of Syracuse with this pavement to see how it would stand up under heavy traffic.

Mr. Clark called attention to the fact that the track gage in Denver is 3 ft. 6 in. and consequently there is less wear from wagon traffic.

Mr. French, referring to the objection urged against the groove shown by him, said that in the presence of City Engineer Allen he had a vehicle take the groove on upper Genesee Street to show how easily it could turn in and out.

The members then adjourned for luncheon and the announcement was made that after the meeting was over those

who desired would be taken over the T-rail construction laid down in Utica and that C. Loomis Allen, general manager of the Oneida Railway and the Syracuse Rapid Transit Company, had provided a special car for a trip to Syracuse over the electrified division of the West Shore Railroad.

AFTERNOON SESSION

At the request of President Fassett, J. B. Smiley, assistant sales agent of the Pennsylvania Steel Company, offered some remarks on the comparative value of open-hearth Bessemer and Manard steel rails, the latter being a special form made by his company. He hoped that railway men would come to some definite conclusions with regard to the adoption of standard sections, as the rolling of special types for a few systems involved the expenditure of \$3,000 to \$4,000 for new rolls in each case.

The question of the proper amount to lay aside annually for track maintenance was brought up by Mr. Allen, of Utica. He pointed out that 15 years ago when his company had installed 9-in. girder rail with wooden ties and broken stone, the construction was not planned to carry the much heavier cars of recent years. Consequently, the amounts spent on the track have been greater than originally expected. He believed that liberal expenditures in the first years following the installation would prove the most economical practice in the long run, considering that the track is expected to give good service for 20 years at least. Various members gave the amounts their roads and neighboring steam lines spend annually for track maintenance, showing such wide variations as to prove the difficulty of making comparisons between lines having different kinds of traffic.

Mr. Fassett stated that the track construction adopted in Albany during the last two years included a welded 141-lb. Lorain section with 6½-in. base, 6-in width at the head, 9-in. height and 9/16-in. web, placed on wooden ties and 8 in. of broken stone. As to pavements, he said that Albany is an old city where the water, gas and sewer mains are not situated under the sidewalks. It would be very expensive, therefore, in his case, to use a solid form of pavement that would have to be broken up every time the different kinds of piping need attention.

E. P. Roundey, engineer maintenance of way, Syracuse Rapid Transit Company, said that of 900 thermit joints on girder rail they had had 5 to 6 per cent break, these failures occurring especially where the weld was made on rails weakened by the old bolt holes. He has recently installed some Clark thermit joints which have shown a conductivity equaling 3½ ft. of the rail and none has broken yet. The majority of the breaks with the plain thermit joint occurred during the first year.

Mr. French said that in 1905, when re-laying the track on Genesee Street, he had applied 700 thermit weld. Welds had failed in both 1906 and 1907, but he thought that the later breaks were due to the running of heavier equipment. On a line laid in 1907, he put in 206 thermit joints and the following spring found five breaks, a little less than 2 per cent. It was his belief that a railway company could well afford to have such a small percentage of failures in view of the excellent bonding and fine riding track which the thermit joint affords. At the same time, he was in favor of the Clark joint because it did not have the line of recrystallization or re-heating which is the cause of most breaks in thermit welds.

Mr. Penoyer said that in September, 1905, he had electrically welded 1327 joints with the Lorain system. The

14 breaks since that time were repaired with thermit. Mr. Roundey said that if the thermit breaks were due to heavy cars why not place a 1/8-in. plate over the space between abutting rails and use the Clark joint in connection with it.

Mr. Hannaford said that in Montreal one of the greatest troubles was keeping up the many intersections. They are taking the rails from the original intersections, turning them upside down under the new intersections and concreting all around them. This is similar to the English method of carrying joints, in which an inverted rail is riveted to the upper or running rail. The Montreal Street Railway Company has eliminated hard steel centers and is using straight manganese all the way through.

The meeting was then adjourned to permit the members to visit Syracuse.

CLAIM AGENTS' QUESTION BOX

One of the important features of the convention of claim agents at Atlantic City was the Question Box, which had been edited by B. B. Davis, claim agent, Columbus Railway & Light Company and secretary of the Claim Agents' Association. The Question Box contained 110 closely printed pages and was so voluminous that it could not be published in the report of the convention which appeared in the daily issues of the ELECTRIC RAILWAY JOURNAL at the time of the convention. An abstract, however, is given below:

Question 1.—In settling with claimants direct, what advantages, if any, has payment by check over payment by cash? Give reasons.

To this question there were 47 answers, the majority of which favored payment by check. The advantages claimed for this method are as follows: That the voucher furnishes an additional evidence of payment; its presentation establishes the fact that the claimants knew what they were about and the claim cannot be made afterward that they were not responsible for what they were doing; it saves handling and carrying a large amount of money; it is preferred by a claimant who has a bank account. On the other hand, many companies state that with certain classes of people cash means more than a check and its visible presence is more persuasive. A number of companies use both methods, paying small claims in cash and larger claims by check. With such roads the limit of the claims paid by cash varies from \$50 to \$150.

Question 2.—Where there is no liability, which is the better policy to follow: Call on injured party immediately after accident for statement, or wait until claim is made?

To this question there were 46 replies, which disclosed greater variety of practice than on the subject discussed in the first question. Some companies in all cases have a representative visit the injured person whether there is any liability or not, partly to learn his side of the story and partly because they think it gives the company a reputation for fair dealing. If the injury is very slight and can be settled for \$2 or \$3, even if there is absolutely no liability, release can be secured at such a time. Other claim agents visit the injured person only in cases of a severe accident. Others interview the witnesses and if there are no good witnesses aside from the train crew, call on the patient. Others send a physician. The principal argument given for not visiting the injured person was that the call often gives the impression that the company considers itself liable and so excites a claim when none would have been made if the agent of the company had kept away. The practice of one large company is as follows:

Our method of treating personal injury cases is as follows: When an accident occurs, we see the injured person

as soon after the accident as the same can be done; take a statement from the person, if the same can be got; get the trainmen's report, see some of the witnesses and satisfy ourselves that there is no liability. After this is done, if it appears from our evidence that there is no liability, the case is filed. If, subsequently, a claim is made, we are in possession of enough facts to decide on what should be done with the case. There are so few cases occurring in the operation of a street railway company where there is no liability that it is always safer to prepare the case for the future, as there is a claim made in about 99 out of every 100 cases, and if a person is injured you are sure to hear from him whether you are liable for the injury or not. The safer and better way to pursue is to get your evidence, then you are prepared. This can be secured from the injured party (as well as from the witnesses to the occurrence) with better results, shortly after the accident, than it can be done after the person has made a claim and a suit has been brought. Secure your evidence, then let the other fellow do the worrying.

Question 3.—Where witnesses are in attendance at court, is it better to pay their expenses and regular earnings per day, or only the amount allowed by law, where the law does not prevent you paying more if you choose?

To this there were 55 replies. Most companies pay witnesses for their time and expenses, a matter of fairness, although some make an exception if the witnesses are summoned by process of law. Employees are usually paid what they would earn upon duty for the same time. A few companies pay only the legal amount.

Question 4.—What is your method of keeping track of and locating witnesses needed in court? Give plan in detail.

To this there were five replies. Most companies keep track of witnesses by occasional calls if they are in the city. Where the mail is depended upon it is not uncommon, 30 days before the day of trial, to send each witness a letter to his last address with a request that he supply the company with his present address.

Question 5.—Should the legal department have a corps of investigators to complete the investigation after suit has been brought and prepare the case for trial, or should this be done under supervision of the claim agent?

Fifty-four replies were sent to this question. The tendency seems to be to retain the investigation in the hands of the claim department. One claim agent who follows the opposite course, justifies his policy as follows:

In my opinion the legal department should have a separate corps of investigators to assist in preparing for trial and while at trial. These should be men who can spend days, and weeks, if necessary, on one case exclusively. It is only in this way that all the possible details can be covered. A claim agent with the numberless claims and accidents on his mind cannot hope to do it in this thorough manner. The connection between the claim agent and the investigators of the legal department should, however, be very close, and the claim agent should watch every claim that has passed through his hands until its final disposition, assisting the legal department wherever possible. He, of course, is the one who first knows the circumstances of the accident and by conversation with the legal department can often bring out points that do not appear in the papers.

Question 6.—Should the claim agent control the final disposition of a claim after suit has been brought and conduct all negotiations looking to a settlement, or should the legal department assume full control with power of disposition without consulting the claim agent?

There were 52 replies to this question. A few companies only transfer the full control of negotiations to the legal department, but under these conditions the claim agent is nearly always kept informed of the progress of the case so that he can settle the claim on a reasonable basis if he has an opportunity to do so. Two opinions expressing arguments in favor of this course follow:

I regard it as bad practice for the legal department to have anything to do with the settlement of claims outside of acting in an advisory capacity as to questions of liability. It is extremely hard for one attorney to deal with another without making concessions of some sort. The claim agent is not bound by any duty, real or fancied, toward an attorney and can, therefore, do many things which a brother attorney cannot.

A dollar does not look as large to a member of the legal department as it does to the claim agent, the latter handling 100 claims to the former's one, and the former is too prone to accept an offer from the plaintiff's attorney to "split the difference" when they are a few hundred dollars apart on a prospective settlement, and thereby "get rid of another lawsuit." A reason of far greater weight, however, is that when a claimant's attorney knows that by bringing suit after a settlement has been declined or his offer of settlement rejected by the claim agent, he can get his client's case into another department where a more favorable view of it may be taken, the claim agent's influence upon that attorney will be materially lessened, his efficiency as an adjuster decreased and the number of lawsuits greatly increased.

Question 7.—What is the best system to pursue for the prevention of accidents on rear platform? How can such accidents be prevented or their number reduced?

To this there were 46 replies. Some companies say the pay-as-you-enter car solves the problem. Others believe in the use of platform gates. One refers to the use of mirrors by the motormen. The majority, however, consider there is no remedy except careful instructions to the employees, especially conductors, in the performance of their duties. One company has the following notice posted at each end of its cars:

"Dangerous. Riding on car platforms or steps is dangerous. Those doing so assume all risk of injury."

This does not prohibit passengers from riding on the car platforms, but notifies them that they assume all risks. The company states that, "This question underwent careful consideration by the Supreme Court of Massachusetts in the case of *Burns vs. Boston Elevated Railway Co.*, 66 N. E. 418, in which case the rule was sustained and the liability of the company denied. This case has been subsequently followed and approved on numerous occasions by the same court, and we have not heard of any court taking an opposite view."

Question 8.—From the claim standpoint, which is the better, a one or two step car? What step covering is used by your company, and what results have you had with reference to passengers slipping?

To this there were 48 replies. All but three companies recommended the one-step car when it can be used, even if the first step has to be very high, although many companies state that on interurban cars it is necessary to use more than one step. One company advocates broad steps. Quite a difference in practise prevails in regard to the material used for steps, although most of the companies are using one of the many safety steps on the market.

Question 9.—State your opinion of the proposition that the Claim Agents' Association fix a standard rate for surgeons' and doctors' charges, as is done by casualty companies, and make such rate effective in all claim departments.

There were 53 replies to this question. Fourteen of the companies believe that such a plan would be desirable, although they think it would be difficult because the rates vary so greatly in different parts of the country. Many companies say that they have such schedules on their own lines both for fees to cover injuries treated by a physician and also per diem fees while in court. Still others do not think that any standard rate can be fixed as it would of

necessity be very much too high for the general run of service rendered or too low for the service of the most skilful surgeons who are often the ones desired. One advocate of this latter policy says that the testimony of a physician who is regularly employed by a company is not given the same weight by the jury as one who is not so regularly employed, no matter what the relative skill of the two may be. One company called attention to the evil of physicians who always appear for the plaintiffs in cases of this kind and manufacture evidence and accept a contingent fee, which, of course, no reputable physician would do. These men work hand in hand with unscrupulous attorneys, and as they are often fine looking and smart, it is difficult to combat their testimony and the juries are deceived. This would not be the case if the same juries tried many cases, but where jurymen serve for one week or two every two or three years, they do not understand the conditions.

Question 10.—What success have you had with the witness blank, i. e., printed form mailed to witnesses setting forth list of questions to be answered by the witness and remailed to the company?

There were 53 answers to this question. A few companies depend entirely upon witness blanks and report that they have been remarkably successful with them. In most cases, however, the witness blank is used only for those who are at long distances or as a preliminary communication to be followed later, if no satisfactory reply is obtained, by a personal call. A few companies prefer to write individual letters to the witnesses. The proportionate number of replies reported by the companies who are using these blanks varied between 50 per cent and 90 per cent.

Question 11.—How shall we handle the unreported claim?

To this question there were 41 replies. The usual plan is to endeavor to obtain from the claimant or his attorney the names of the witnesses, time of accident and other circumstances, and then make as complete an investigation as possible. Employees should be held rigidly to the rule that no accidents, no matter how slight, should be unreported, although this, of course, does not cover the fake claim in which a person may jump from the car while in motion, stumble a little and later bring a claim for accident. If a company is satisfied that the accident and settlement can be secured at a nominal amount, a settlement should be made. In any case, all of the train crews who might have been in charge of the car at that time, can be brought to court.

Question 12 relates to suspicious cases diagnosed as "traumatic neurasthenia, recovery hastened by early settlement of the claim." On the other hand, a competent and skilful physician employed by the plaintiff alleges injuries of the spine, back, etc., and the plaintiff claims that his nervous system has been permanently impaired. The question is asked, "What is the best policy to pursue in the disposition of such a claim, assuming that it cannot be settled by the payment of a nominal amount?"

To this question there were 51 replies about equally divided that it is better to settle the case as quickly and cheaply as possible, and that it should be fought out on its merits and for its influence on other cases. One company recommends that it be settled if the plaintiff is a woman and take the chances of suit if a man. Another suggestion was that it is not advisable to get too many doctors in the case as they have a great influence on the patient. Two suggested methods are given:

Refuse payment. Show a determination from the start

to vigorously contest the claim. Obtain all possible information as to the character and reputation of the claimant. Through espionage, keep a close account of her and her physician. A close investigation should also be made into the previous health of the claimant. Before the case will be called to trial sufficient facts will be gathered to warrant either a settlement of the claim or the determination to contest it to the end. If, however, there is nothing in the claimant's history that reflects upon her character or reputation; if there is not marked improvement in her physical condition, but on the other hand a gradual decline, and if it can be shown by the claimant that she enjoyed good health prior to the alleged accident, then it becomes apparent that a trial by jury would result in simply an assessment of damages, and the proper course to pursue under those circumstances would be to make as favorable a settlement as possible.

This presents a type of case with which we are all familiar. It requires great judgment and discretion on the part of an adjuster to avoid a lawsuit. Above all things he wants to be fair. He has an opportunity to exercise his social talents and his knowledge of human nature, if he has any. He wants to visit such a claimant as often as it can be consistently done and to make himself generally agreeable and leave a good impression, if possible, at the end of every visit. He wants to be polite, entertaining and sympathetic and to gain the confidence of the claimant and impress him or her (generally her) with his honest and fair intentions in the case. He wants to enlarge, whenever an opportunity presents itself, on the trouble, expense, inconvenience, length and uncertainty of lawsuits. In many cases this treatment brings a fair settlement, if it does not, the adjuster has done all he can do. If it comes to a fight, fight in earnest, so the claimant and his or her attorney will have an example of fight that will last. Make good the words that a lawsuit is all it has been represented to be. The company probably will be beaten, but it will have done all that can be done in the negotiation stage.

ECONOMY TESTS OF HIGH SPEED ENGINES

A paper read by C. H. Treat at a recent meeting of the American Society of Mechanical Engineers and printed in the October Proceedings gave complete data on a test

dotted line on the curve (Fig. 1) shows steam consumption of as low as 41 lb. per hp per hour under full load. This performance, it will be noted, is as good as many new engines in best condition would show. The test showed that it is quite important from an economical point of view to keep the piston rings on small high-speed engines in shape to prevent undue leakage. The data for the full line curves in Fig. 1, showing results for engines in proper condition, were obtained from tests made at the plant of the American Blower Company, Detroit, Mich., in 1905. The test was made by condensing the exhaust in a surface condenser consisting of a steam heater section pipe immersed in a tank having an overflow and 1-lb. supply from city water. The whole apparatus was mounted overhead so that any drip or leaks could be seen and stopped. That the section itself did not leak at any time was shown by the entire absence of drip, unless steam was entering. The condensation being piped down, heater pipes and base were slanted to drain through a water seal to prevent steam blowing into the upper of two barrels having drain valves at bottom, the lower barrel being on platform scales. For each barrel of water the weight before filling was subtracted from the full weight. The scales used weighed correctly. The indicator spring was calibrated by both the makers and the American Blower Company. A long lever reducing motion was used to prevent lost motion. The drum spring was drawn tight, and at the high speeds cards were short. The engine was indicated at speeds up to 500 r.p.m., using a Prony brake at high speeds and taking the brake-horsepower. Readings were taken every five minutes after conditions had become constant and the engine was well warmed up. No corrections were made for moisture in steam, but a few determinations showed a quality of 98 per cent to 99 per cent. Data given in Fig. 1 are from tests of a number of engines of different sizes, the speed being 350 r.p.m. to 500 r.p.m.

Fig. 2 gives a section of "A B C" engines showing ar-

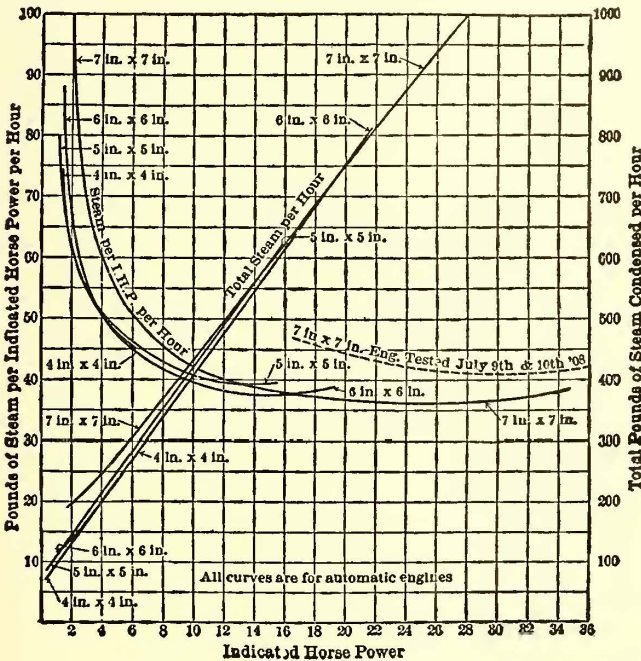


Fig. 1—Tests of High Speed Engines

made July 9 and 10 of this year on a 7-in. x 7-in. vertical self-oiling engine which had been run almost continuously night and day for 10,000 hours connected to a forced draft fan. The engine cylinder had been badly scored and the mean diameter increased to 7.082 in. The rings had been broken due to water and were replaced prior to test. The

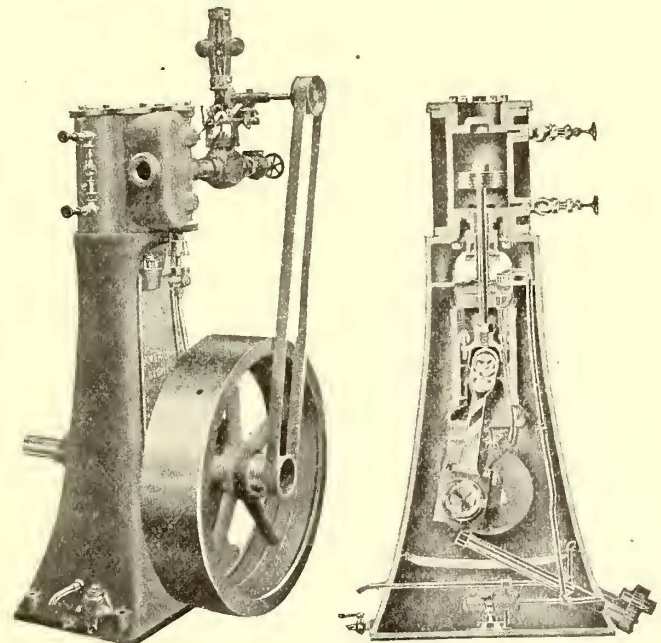
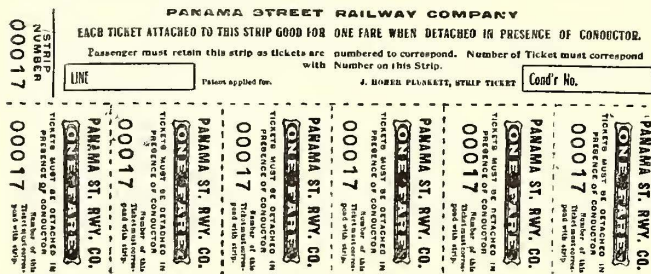


Fig. 2—"A B C" Vertical High Speed Engine

arrangement of cylinder and valve chest, also the unique patented oiling system. The test of the used engine gave the indicated friction horse-power as 1.18, this being only 4 per cent of the indicated horse-power of the engine. To the oiling system employed is due much credit for keeping the internal friction at such a low figure.

THE PLUNKETT STRIP TICKET

The accompanying illustration is a reproduction of the Plunkett strip ticket, for which the patentee claims a number of advantages over the ordinary system of tickets sold six for 25 cents. The tickets and identification strip are printed on a card 2 3/8 in. x 6 in., which is perforated so that the six tickets may be detached readily from the identification strip when presented for fare. Tickets are not good for passage if presented without the strip with which they were originally printed. Consecutive numbers are printed on the strips, and each of the six attached



The Plunkett Strip Ticket

tickets bears the same number as the strip. This form of ticket is designed to overcome in a great measure two of the greatest evils existing in connection with the issuing of tickets at a lower price than the cash fare. It prevents selling single tickets by conductors or others who occasionally deal in them, and makes it more difficult for the conductors to substitute tickets for cash fares in making out their trip sheets, and thereby pocketing the difference in the value of the two. The tickets are made by the Plunkett Strip Ticket Company, 506 North Calvert Street, Baltimore, Md.

REVERSING MOTORS IN EMERGENCIES

BY AN EX-MOTORMAN

Although some motormen recognize the value of reversing the motors in emergencies, few electric railway companies encourage their men in the utilization of this valuable adjunct to the power of the brakes in making quick stops. In the rule books emphasis is laid on the rule not to reverse the motors "except in emergencies," but motormen are not instructed how to reverse motors properly and obtain the maximum braking force so that they can make use of this practice when the emergency arises. Without previous practice it is difficult to reverse the motors at exactly the right instant when the time is measured in fractions of a second. New motormen frequently start out on a car without knowing any other function of the reverse handle except that it will lock the controller. A car can be stopped without applying the brakes, simply by reversing the motors, even when power is off of the line. The writer, during his extended experience as a motorman, has frequently reversed single cars and trains simply for the purpose of finding out for himself the retarding effect, and on a few occasions when danger was imminent the knowledge thus gained has more than repaid any slight damage which may have been done to the equipment by the experimental stops which he made.

The motors of a car can be reversed without serious damage if the following instructions are carefully followed: Apply the brakes, move the reversing handle clear over and move the controller handle one notch. If the power goes off, throw the controller handle to the last

point and allow it to stay there. At any speed above 15 miles an hour on normal rail the current should be thrown alternately on and off; otherwise the wheels will probably skid or spin, and when once locked or spinning much of the retarding force is lost. Instructions are sometimes given to throw the brakes off after reversing, on the ground that if retained the gear may be stripped. Stripping gears, however, is seldom the result of reversing motors. In descending steep grades reversing the motors will do little good. The writer's experience has been that at any speed above 15 miles an hour on a grade the wheels invariably and instantly lock and skid. Cars equipped with air brakes can be stopped in two car-lengths from a speed of 25 miles an hour if the brakes and the reverse are properly applied. The best method is to apply the air and immediately release, reversing the motors as the brakes come off. Ordinarily, however, at speeds over 20 miles an hour it is best to first reduce the speed with the brakes down to about 15 miles an hour, and then apply the reverse. In multiple-unit train operation the value of reversing the motors is especially marked. It requires courage and confidence on the part of the motorman to remain in the cab and wait until the last moment before releasing the brakes and reversing the motors, but this is the only effective method, and if followed would prevent the disastrous results of many collisions which take place when the speed has been reduced to 15 miles an hour or less just at the instant of impact.

Under certain conditions the reverse had better be left alone. On a very slippery rail it is worse than useless. Furthermore, the effect of reversing the motors differs widely with different types of electrical equipment and weights of cars. It is impossible to use the reverse when the power goes off on a two-motor equipment with one motor cut out. Maximum traction trucks are affected only slightly by reversing the motors. On very old equipment it is sometimes found impossible to make the motors generate when reversed, and on new equipment at low speeds generation may not take place for any appreciable time after the controller handle has been moved.

The best way to teach motormen to use the reverse would be to put them through a course of instruction and practice, using modern cars which could be expected to act in the same manner as the cars actually in service. It may be argued that it would lead to reckless running if the men are given too much insight into methods of making sudden emergency stops. This same argument has been advanced in connection with the use of automatic train stops with block signals, but it has little weight. In the early days of air brakes the engineer's brake valve was sometimes fitted with a seal, which had to be broken in making an emergency application, so that there was always evidence of such an application having been made, and explanations were required whenever the emergency was used. This practice has long since been abandoned, without, however, materially increasing the number of unnecessary emergency stops.

A consular report on the trade of French Indo-China, issued recently, states that there are 9 miles of overhead trolley railways in and around Hanoi, and a line 2 1/2 miles long is under construction from Hanoi to Sontay.

The Board of Trade has confirmed the order which enables the York (England) Corporation to construct and operate electric railways in that city.

News of Electric Railways

Cleveland Traction Situation

The injection of the question of the validity of the referendum vote into the receivership suit against the Municipal Traction Company and the decision of the court that the election was perfectly valid formed one of the principal features in the hearing in the United States Circuit Court at Cleveland last week. Rumors had been current that attorneys for the company would question the validity of the vote. When the court intimated that a receivership for the benefit of all the companies, the bondholders and the individual stockholders could hardly be evaded, in consideration of the evidence adduced, the attorneys at once requested the court to take up the consideration of this point. They stated that the question was not put to the voters in accordance with the election laws in the precincts where voting machines were used, arguing that "Yes" and "No" were inserted in the spaces on the machines instead of "For the franchise" and "Against the franchise," as used on ballots.

Arguments were prepared during a recess and a voting machine was taken to the court room. When the attorneys had finished the presentation of evidence and arguments, Judge Tayler stated that he could not conceive of a voter framing the question in his mind in such a manner that he would vote against the franchise when he thought he was voting for it. A man who would make such a mistake, he said, would appear to be a hopeless case. Judge Tayler also said he could see no grounds for holding the vote invalid, and he believed it to be a legal expression of the people's wishes. This decision was a disappointment to the attorneys, who had hoped to form the basis, at least, of a final test of the vote in the courts.

City Solicitor Newton D. Baker had also made application to file an intervening petition making the city a party to the suit. If the request had been granted, he hoped to present arguments that would show that the vote on the machines had not been taken legally, because of the statement of the question on them. In case of a decision against the ballot, he then expected to ask the Council to arrange for another vote. The court, however, refused permission to bring the city into the matter. Although the jurisdiction of the court in this matter was questioned somewhat, Judge Tayler said that the court had jurisdiction in so far as the validity of the vote affected the case in hand and that it was proper to pass upon the point at that time.

Attorney D. C. Westenhaver has asked that the Forest City Railway Company be allowed to file an intervening petition in the case, in order to protect its claims for the return of the property if the system is finally disintegrated. The company grants that the referendum vote is valid and asks with the other petitioners for a receiver for the Municipal Traction Company, and the Cleveland Railway Company in order that all rights may be determined by the court. As Mr. Westenhaver is the attorney for the Municipal Traction Company also, the propriety of his acting as attorney for one company asking for a receiver and of the defendant which is putting forth every effort to prevent a receivership, was questioned by attorneys representing other interests. As a result, Attorneys Westenhaver, Rudolph, Boyd and Brooks have retired from representation of the Forest City Railway in the intervening petition and E. D. Morgan and Bronson Winthrop were substituted.

W. B. Sanders raised the point as to whether Mayor Johnson represented the Forest City Railway or the Municipal Traction Company in the collateral agreements under which the former is claiming a restoration of property. This might have a bearing on the final outcome of the case, and forms another point in the complication which must be straightened out by the court. In discussing the so-called "gentlemen's agreement" between F. H. Goff and Mr. Johnson, attorneys found an interlineation in the Johnson copy that was not in the one retained by Mr. Goff. It is in Section 15 and is said to be in the handwriting of City Solicitor Baker. The section reads as follows, the part in parenthesis being the interlineation in pencil:

"After the delivery of deeds, contracts and other papers they are to be handed to Mr. Goff and Mr. Johnson to be by them held or deposited in a box under their joint control at the Cleveland Trust Company so as to insure the complete performance, according to the plan herein outlined, of all the things to be done by any of the parties to this agreement (and until possible referendum passed.)"

Mr. Baker says he has a faint recollection of the referendum being discussed by Mr. Johnson and Mr. Goff, and that he was asked to write in a clause recognizing the possi-

bility of the vote. As Mr. Johnson's copy was at hand, he said he supposed that he had penciled the clause on that and that it was not put on Mr. Goff's. As it does not appear on both, he said he supposed Mr. Goff's copy would be the one to use as evidence in this hearing. Mr. Goff, in an unofficial way, said he had no recollection of the interlineation being made, although the referendum law was possibly discussed at the meetings between himself and Mr. Johnson.

Attorney James H. Hoyt said he did not know whether he had any objections to make to the introduction of the Mayor's copy as evidence or not. He said the copy had been handed to him by Attorney Westenhaver for examination, but the latter had requested him to return it as Mr. Johnson said it irritated him to see Mr. Hoyt reading it. Mr. Hoyt stated that he certainly would not agree to its being admitted until he had examined it thoroughly.

Attorney S. B. Clark stated that the Municipal Traction Company offers to prove that it is not insolvent and in no danger of becoming so. On the assumption that the ordinance is defeated and no renewal is given, if a third party would pay 150 per cent on the face value of the bonds, the bondholders would be protected. The fare received now, he said, is sufficient to take care of the conditions made in the lease. The attorney further said that the lines on which pay-as-you-enter cars are in use are showing an increase of 15 per cent, and this increase will be sufficient to place such cars on all the lines within a year. In view of these facts and because the physical property is sufficient to take care of the bonds for 1909, Mr. Clark said he would agree to the request for a receiver if the property was all taken into court and the Municipal Traction Company allowed to operate as it had been doing. Attorneys for the Central Trust Company of New York, trustee under the bond issues of the Cleveland Railway, said that this did not satisfy the conditions in the application for a receiver and that they would not agree to it. The court also held that this would not be proper under the proceedings. This is the second time a proposition has been made to place the matter in the hands of the court on condition that the Municipal company be allowed to continue operation of the system.

The claims of Attorney Cannon for the creditors are that some of the funds are short of what they should be, that money was paid out without the approval of the Cleveland Railway Company when the lease specifically provided for this, and that many items credited to assets are really liabilities. Among other things, he said that the accident fund is \$60,000 short of what it should be. He said that \$2,000 a month had been paid out for certain expenses without voucher of the Cleveland Railway, which the latter claims was expended without legal right. Mr. Cannon said he could show that \$257,000 of the \$500,000 charged for betterments did not represent assets, and that \$151,000 charged against the Neutral Railway Company and \$57,000 against the Public Square improvements cannot stand as assets.

Most of the session on last Saturday was devoted to the hearing before Master Commissioner Brelford regarding the solvency of the Municipal Traction Company. A. C. Ernst, of Ernst & Ernst, said that \$172,723 which the Municipal company took over for the purpose of paying claims of the Cleveland Railway, and which is now on hand, is a liability rather than an asset. This is a portion of \$203,000 taken over, the remainder having been paid out. Mr. Ernst had vouchers for \$20,000 which had not been approved by the Cleveland Railway, as provided by the terms of the lease, and it is said they were paid from this fund. Mr. Ernst also stated that \$180,000 of the \$308,000 Cleveland Railway notes indorsed and issued certainly represented a contingent liability against the Municipal company. If the Municipal company indorsed them and then failed to pay rent to the Cleveland Railway, the latter could not pay the notes and the Municipal company would be liable for them. He said that the Municipal company had sold through its free stock exchange \$248,000 Cleveland Railway stock and \$1,594,700 Forest City Railway stock since May 5.

Mr. Ernst testified that a list shown him was that of accident liability claims for the nine months ended Sept. 30, 1908. It showed \$135,434 for that period, and Mr. Ernst said that at least \$180,500 would be necessary for the year at that ratio. Mr. Ernst also testified that securities of the Cleveland Salt Company, the Electric Package Company and the Traction Insurance Company are not properly assets of the Municipal company, as they were turned over to it by lease only.

The work of analyzing the accounts of the Municipal

Traction Company was continued on Monday of this week. Many differences of opinion were shown as to the proper classification of various charges made since the leasing company took hold of the properties. The Municipal Traction Company insists that many expenditures should be classed as betterments, while the attorneys for the creditors and bondholders say they should have been met from maintenance accounts.

Fred C. Alber, assistant to the president, testified as to the payments made to the Pay-Enter Fare Box Company. He said he had approved several payments, but that no bills were rendered. The reason for this, he said, was that the cost of the boxes could not be ascertained in the experimental stage. He said further, that he felt safe in doing this because he knew the Municipal Traction Company would get value received and because Mr. Johnson had an interest in the fare box company. Mr. Alber stated that he did not know who the stockholders of the fare box company are and did not know whether he was one or not. He did not know whether Mr. Johnson is a stockholder.

Mr. Alber said that some of the stock of the Forest City Railway had been sold to motormen and conductors and that payment had been made for only a part of it. Attorneys for the bondholders and creditors endeavored to prove that disposition had been made of over 1600 shares in this way. In the course of the testimony, Mr. Alber said that the Municipal Traction Company had paid him \$43,000 due him from the Forest City Railway. This was money that he had received from Ben T. Cable to be loaned to the Forest City company, he said.

L. W. Blyth, of Ernst & Ernst, was on the stand for some time in the forenoon. He referred to the \$20,000 paid to the fare box company without bills, but from his testimony it seems that the money was paid through J. B. Tanner, auditor of the Municipal Traction Company. He said further, that Mr. Tanner told him that any outside company purchasing the fare boxes would pay a good round sum for them, but that if the Municipal Traction Company held the properties, it would get them at cost.

Secretary Henry J. Davies, of the Cleveland Railway Company, testified that there is no provision in the lease for the purchase of fare boxes. Mr. Davies said that the company had no grant for the additional loops and tracks placed in the Public Square, and that there had been no authorization to charge the cost to the city.

Mr. Davies stated that some of the Cleveland Railway notes that had been indorsed and issued by the Municipal Traction Company had gone to protest, and that the whole issue of \$160,000 will be due within a short time. Unless the Municipal pays its rent, he said that the Cleveland Railway has no way to meet these obligations and that the indorser is liable.

On Tuesday morning Mr. Johnson testified that the Pay-Enter Fare Box Company is incorporated with a capital stock of \$10,000. He had paid \$2,000 on the capital stock. He also gave the names of the stockholders, but neither his nor Mr. duPont's name appeared among them. Mr. Johnson refused to produce anything but papers of original entry until he had examined the other books. He said that the vouchers and other papers would show the receipts and all the information that the court would require.

The attorneys for the creditors and the parties applying for a receiver contend that the Municipal Traction Company has furnished the money for the experiment and invention expenses in connection with the box and wish to have it considered as a betterment of the property. In addition to vouchers for \$17,000, it is said that there is another of \$3,000, making \$20,000 in all paid to the company and that so far 53 or 54 fare boxes have been delivered. About 70 more are in course of construction and plans have been made for the manufacture of 700 additional. Mr. Johnson said that none had been sold to other companies and that no money had been received from other railroad companies.

Exclusive Bridge Rights Denied in New York

The Public Service Commission of the First District of New York has denied the application of the Brooklyn Rapid Transit Company for a franchise for an elevated structure on the Flatbush Avenue extension and the exclusive rights to certain of the tracks on the new Manhattan Bridge between Brooklyn and New York. The application of the Brooklyn Rapid Transit Company was made several months ago and contemplated the erection of a four-track elevated railway by which the new bridge would be connected with the present elevated system in Brooklyn. The action of the commission in denying the application was based on a report given by Commissioner McCarroll which was adopted. In the report Commissioner McCarroll says in part:

"Perhaps first among the objections raised to the granting of this application is urged that the opening of the Flat-

bush Avenue extension creates an opportunity that should be improved for a fine avenue, and which the construction of the railroad would frustrate."

The Commissioner then discusses the style of structure that would be erected, and raises the question of whether the erection of any elevated structure would not be a mistake, especially a four-track structure, which would occupy the greater part of the width of the street. He goes on to say:

"There is, however, a still more serious obstacle to the granting of this application in the fact that it contemplates the operation of the elevated line on the extension and across the Manhattan Bridge only to its terminal in Manhattan Borough. This is but to create there another condition similar to that which has existed at the Manhattan terminal of the Brooklyn Bridge, with the accentuated difficulty that it would not be a focal point of distribution of passengers as is the City Hall. The underground loop line and other means of transportation would, it is true, be near, but no connections beyond it are proposed in the application. This perpetuates the misconception and the treatment of bridges simply as means of crossing the river instead of as portions of thoroughfares. It contemplates the river as the bounds of Manhattan and of Brooklyn. It accentuates the idea of division and separation as against the idea and fact of the unity of the city, which, on the other hand, the treatment of the bridges as thoroughfares emphasizes and promotes."

Massachusetts Employees Decide to Arbitrate Wage Question.—By a vote of 1241 to 479 the employees of the Boston & Northern Street Railway and the Old Colony Street Railway systems have voted for arbitration in the matter of a revision of the wage scale. The employees will select a member of the board of arbitration, the company will select a member, and the two thus selected will decide who shall be the third member.

Pennsylvania Railroad Denies New York-Philadelphia Electrification Rumor.—The Pennsylvania Railroad has officially denied the report in daily newspapers that it contemplates electrifying the line between New York and Philadelphia at this time. The statement regarding this plan is supposed to have originated from the announcement made last week of the awarding by the company of a contract for the electrification of its terminal lines to operate into the new station in New York.

Sixth Annual Convention of Sons of Jove.—The sixth annual convention of the Rejuvenated Sons of Jove was held in Buffalo, N. Y., the home-city of Wm. E. Robertson, the retiring Jupiter, on Oct. 14, 15 and 16, 1908. The headquarters were at the Iroquois Hotel, and business sessions were held in the assembly hall of the Buffalo Consistory, Ancient and Accepted Scottish Rite. Nearly 200 Jovians were in attendance from all parts of the country. The convention in every way was the most important and successful gathering in the history of the order. The following members were elected to the Seventh Jovian Congress for the ensuing year: J. Robert Crouse, Cleveland, Ohio, Jupiter; Jas. R. Strong, New York, N. Y., Neptune; John W. Brooks, Solvay, N. Y., Pluto; Homer E. Niesz, Chicago, Ill., Vulcan; C. B. Roulet, Dallas, Tex., Mercury; J. F. Dostal, Denver, Col., Hercules; W. A. Wayman, St. Louis, Mo., Mars; E. D. McCarthy, Buffalo, N. Y., Apollo; T. E. Bibbins, San Francisco, Cal., Avrenim. Edward D. Strickland, Buffalo, N. Y., was appointed national organizer and secretary to Jupiter, with headquarters at Cleveland, Ohio. The membership of the order numbers 1815.

Hearing on Malden Extension of Boston Elevated Railway.—The Massachusetts Railroad Commission held a hearing on Nov. 4 on the petitions of the Boston Elevated Railway for approval of the proposed route of the elevated structure from Sullivan Square, Charlestown, to a point near Malden Square. F. E. Snow, counsel for the company, explained that the hearing was essential to the approval of the plans which the company has presented unsuccessfully to the municipal authorities of Boston, Everett and Malden, and then asked George A. Kimball, chief engineer of the company, to explain the plans. Mr. Kimball pointed out that the route has the advantage of very few curves and that it connects with the principal surface car lines in Everett and Malden. The proposed line runs from Sullivan Square across the Mystic River to a point near the Everett station, and thence practically in a straight line to Malden. The company proposes to build a station and surface line connections near the Everett station, which is on the Boston & Maine Railroad. The Malden station would be about 150 ft. from Malden Square, the plan being to keep the elevated structure out of the square. A number of city officials of Everett and Malden opposed the plan, and the hearing was extended to Nov. 18 and 19, to give those who object more time to examine the plans of the company.

Financial and Corporate

New York Stock and Money Markets

Nov. 10, 1908.

Wall Street has been an active center ever since the election. Evidence is accumulating daily that the public has at last decided to enter the market, and the volume of sales shows that the outside buying is liberal. For the last week the trend of prices has been steadily upward, although yesterday and to-day there was evidence of widespread profit-taking. The many reports of renewed activities in industrials serve to make the securities of companies of this character and of railroads attractive. When it is remembered that the majority of high-grade stocks have earned dividends, even during the times of depression, that were in advance of the current rates for money, the assurance of good returns, now that prosperity is again assured, seems reasonable. The only danger at the present time, according to many conservative judges, is that the advance may be too rapid to be healthy. The large interests back of the market are apparently disposed to go more moderately than some of the outsiders and small speculators are inclined to do.

During the week several things have occurred which have had a distinct effect upon the stock market. The cutting of the Northern Pacific melon involves the distribution of more than \$17,000,000 that had apparently been locked up in the treasury of a subsidiary company. This of itself was a very encouraging object lesson to small investors. The decision that the American Tobacco Company was an "unlawful trust in restraint of trade" had a momentary depressing effect upon the stock market yesterday. This, however, did not last, and the decision of the United States Court of Appeals to-day, denying a re-hearing in the Standard Oil case, made a favorable impression.

Rates for money are still cheap, and the large surplus carried by the banks does not appear to have been diminished. Call money to-day was quoted at 1½@2 per cent and 90-day paper was quoted at 3½@3¾ per cent.

Other Markets

Rapid Transit and Union Traction continued to be the leading traction features in the Philadelphia market during the past week and the prices for each showed reaction from the high points as a result of liberal profit-taking. Rapid Transit declined to 20, but at the close was stronger. Union Traction at the close sold for 49.

In the Boston market there has not been much business in traction securities. Boston Elevated was the most active security on the list, the majority of the sales having been made at about 130. Odd lots of West End appeared in the market, the preferred selling for 106¼ and the common for 89. Massachusetts Electric preferred sold for 54¾.

In the Chicago market Kansas City Railway & Light sold for 84 and the common for 44. Chicago Railways certificates in all four series were traded in, Series 1 being the most active and selling around 110. Series 2 sold for 46½@47.

United Railways issues in Baltimore continued to be the leading traction security of interest to the trades. The bonds were especially active, the 4s selling for 86¾, the "incomes" for 82¾ and the funding 5s for 82¾. United Railways stock was traded in at 11.

Quotations for various traction securities as compared with last week follow:

	Nov. 2.	Nov. 10.
American Railways Company, Philadelphia.....	44½	45½
Boston Elevated Railways.....	130	130
Brooklyn Rapid Transit Company.....	49½	53½
Chicago City Railway.....	—	a179
Cleveland Railway.....	—	—
Consolidated Traction Company of New Jersey.....	a69	a70
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	a104	a104
Detroit United Railway.....	43½	50
Interborough-Metropolitan Company.....	10	10½
Interborough-Metropolitan Company (preferred).....	*29	31½
Manhattan Railway.....	137	140
Massachusetts Electric Companies (common).....	10	10¾
Massachusetts Electric Companies (preferred).....	54½	54¾
Metropolitan West Side Elevated Railway, Chicago common).....	—	a13
Metropolitan West Side Elevated Railway, Chicago (preferred).....	—	a44
Metropolitan Street Railway.....	*24	*24
North American Company.....	65¼	a73
Philadelphia Company, Pittsburg (common).....	39	41½
Philadelphia Company, Pittsburg (preferred).....	40½	42
Philadelphia Rapid Transit Company.....	22¾	20½
Philadelphia Traction Company.....	80	80
Public Service Corporation, 5 per cent collateral notes.....	a97	a98
Public Service Corporation certificates.....	a67½	a69
Twin City Rapid Transit Company, Minneapolis (common).....	90	93½
Union Traction Company, Philadelphia.....	51½	49

* Asked.
 † Last sale.

Independent Receiver for Second Avenue Railroad

Judge Lacombe of the United States Circuit Court signed an order on Nov. 6 directing Messrs. Joline and Robinson, receivers of the Metropolitan Street Railway of New York, to turn over the Second Avenue Railroad, covered by the lease of Jan. 28, 1898, to George W. Linch, State receiver, at midnight of Nov. 22 next. The order includes all property of the Second Avenue Railroad not in dispute. The following specific questions have been submitted to William L. Turner, the special master appointed by the court, for testimony to be taken:

1. Whether the receivers of the Metropolitan Street Railway are under obligation to deliver to the receiver of the Second Avenue Railroad other motors and connections than those attached to the said 275 cars at the time of their delivery, and, if so, on what terms said motors and connections should be delivered or the value thereof should be accounted for by said receivers of the Metropolitan Street Railway?

2. Whether the receivers of the Metropolitan Street Railway are under obligation to pay over . . . any sums which they have received from insurance companies or are to receive from insurance companies on account of the property that was destroyed by fire in the car barn of the Second Avenue Railroad at Ninety-sixth Street and Second Avenue on Feb. 29, 1908, and, if so, what amounts and upon what terms?

3. Whether the receivers of the Metropolitan Street Railway are under obligation to deliver . . . in addition to the property to be delivered and turned over . . . as hereinbefore directed, any horses, harness, tools, etc., . . . as property used in the maintenance and operation of the lines of the Second Avenue Railroad and delivered by it to the Metropolitan Street Railway when possession was taken under the said lease, and, if so, what of the aforesaid property and upon what terms. Also, whether any cars not turned over under this order are in fact the property of the Second Avenue Railroad, which should be delivered to said receiver of the Second Avenue Railroad in lieu of any of the 275 cars turned over as above provided. Also, whether more than 275 cars were bought with the proceeds of bonds of the Second Avenue Railroad, and whether such cars are in possession of the receivers of the Metropolitan Street Railway?

4. Whether the receivers of the Metropolitan Street Railway are under obligation to deliver . . . any property representing substitutes, increments and additions to the property mentioned in Question 3 made or provided by the Metropolitan Street Railway, and, if so, what property and upon what terms?

5. Whether the receivers of the Metropolitan Street Railway are under obligation specifically to perform a certain contract, dated March 8, 1900, executed by the Metropolitan Street Railway, party of the first part, and the Second Avenue Railroad, party of the second part, whereby the Metropolitan Street Railway agreed to furnish power at cost and, if so, upon what terms?

6. What amounts, if any, the receivers of the New York City Railway and the receivers of the Metropolitan Street Railway should pay to the Second Avenue Railroad on account of net income from the operation of the property of the Second Avenue Railroad, after deducting all proper charges against such net income?

7. What are the rights, if any, of the receiver of the New York City Railway and of the receivers of the Metropolitan Street Railway by reason of monies expended subsequent to their appointment in putting the First Avenue line of the Second Avenue Railroad between Fifty-ninth Street and 125th Street in fit condition to run?

8. What ducts and feeder cables located on franchises owned by the Second Avenue Railroad belong to the Metropolitan Street Railway?

Judge Lacombe denies that prayer of the petition asking that the receivers of the Metropolitan Street Railway be directed to pay over to the Second Avenue Railroad a sum of money equal to the amount delivered by that company to the Metropolitan Street Railway at the time possession was taken by the latter under the lease of Jan. 28, 1898. The prayer of the petition asking the Metropolitan Street Railway to indemnify the Second Avenue Railroad and its receiver against any claim of the city on account of taxes on special franchises of the Second Avenue Railroad for the years 1900-1907 inclusive is also denied. All questions of accounting between the two roads are reserved for the future determination of the court.

Albany & Hudson Railroad, Hudson, N. Y.—The holders of 80 per cent of the Albany & Hudson Railroad's outstanding bonds have, it is announced, accepted the plan of Feb-

ruary last for funding the coupons of 1908 and 1909 into treasury bonds, in order that the earnings of the property may be used for improvements and additions. There are \$2,000,000 bonds, of which \$250,000 are in the treasury. The coupons are funded at par into bonds at 87½, at The Trust Company of America, New York City.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Suit to oust the Western Trust & Savings Bank, Chicago, as trustee of the \$10,000,000 bond issue of the Chicago & Milwaukee Electric Railroad was begun on Nov. 6 by Alexander Beaubien, a bondholder. Mr. Beaubien is unable to state the amount of the issue, which he alleges is illegal, but intimates that one-half of the entire \$10,000,000 worth of bonds was issued to cover property valued at less than the required 75 per cent of the par value of the bonds. On petition of the plaintiff, Court Commissioner Hugh Ryan has issued a temporary injunction restraining the bank from acting as trustee of the railroad or attempting to do so pending the hearing before Judge Turner on Nov. 21 on an order to show cause why the injunction should not be made permanent. A. C. Frost, president of the company, says the report of Arthur Young & Company regarding the finances of the company is false and misleading. Mr. Frost says: "Last summer I made a request upon Judge Grosscup for an independent audit, which was granted, and such a report was made by Marwick, Mitchell & Company, chartered accountants of the highest standing. This report was made to Judge Grosscup on Sept. 29 and gives an honest presentation of the affairs of the company and my relations with that company. During the last 10 years I have given my time and best efforts to the building up of this property, and have secured for the company rights and franchises that cannot be duplicated, for which I have asked or received no compensation, and the statement that \$10,000,000, \$2,000,000 or \$1 is unaccounted for is absolutely false and unjustified. Equally false is the statement that the Wisconsin corporation's floating debts are over \$2,000,000. The indebtedness of all three corporations is less than \$1,000,000."

Conneaut & Erie Traction Company, Conneaut, Ohio.—Robert W. Watson, receiver of the Conneaut & Erie Traction Company, appointed by the United States Circuit Court of the Western District of Pennsylvania on Sept. 14, 1907, has filed a petition with the Circuit Court of the Western District of Pennsylvania for permission to issue \$20,000 receiver's certificates for betterments and improvements. Of this sum, it is reported, \$6,000 will be applied to meeting the cost of regrading the roadbed of the company on the Ridge Road in Ashtabula County, Ohio; \$9,000 will be used to make the necessary repairs and improvements to the roadbed and tracks of both the Conneaut & Erie Traction Company of Pennsylvania and the Conneaut & Erie Traction Company of Ohio, and \$5,000 will be paid to the receiver as compensation for his services from Sept. 4, 1907, to Sept. 4, 1908. The receiver's certificates are to be a first lien on all the property and franchises of the company.

Hartford & Springfield Street Railway, Hartford, Conn.—The Hartford & Springfield Street Railway, on account of the unsatisfactory earnings for the past six months, has passed the November semi-annual dividend on the preferred stock. The May dividend was also passed.

Mattoon (Ill.) City Railway.—According to a letter sent to stockholders of the Mattoon City Railway, the company faces foreclosure proceedings unless the creditors agree to settle for 50 cents on the dollar. The liabilities of the company total \$571,260, and consist of \$330,000 5 per cent first mortgage bonds, \$100,000 5 per cent second mortgage bonds, \$49,000 5 per cent receivers' certificates, interest on the second mortgage bonds, legal expenses of the receivership and other expenses contracted by court orders and made prior liens. The unsecured claims of the company total to \$18,213, and include \$12,601 for merchandise, material and supplies; \$3,000 for damage claims, which have been liquidated, and salaries and other expenses. The letter says that one year of operation under the receivership has demonstrated that it is impossible to maintain the property in its present efficiency, pay current interest charges and liquidate the funding indebtedness.

Philadelphia & Chester Railway, Philadelphia, Pa.—Judge Holland, in the United States Circuit Court at Philadelphia, has appointed Isaac Silverman receiver of this company, on application made by the United Power & Transportation Company, a creditor with a claim of \$6,000. The railway, it is alleged, has a floating debt of about \$100,000 and is unable to earn its fixed charges, the interest due Nov. 1, 1908, on its \$350,000 bonds being in default. Of the \$350,000 stock of the company the United Power & Transportation Company owns \$349,600.

Traffic and Transportation

Joint Fares and Through Routes in New York

The receivers of the Metropolitan Street Railway and the Central Park, North & East River Railroad, of New York, made application to the Public Service Commission of the First District for a rehearing of the case involving joint fares and through routes between the two systems. The application was granted and the Central Park company has introduced new testimony. The figures presented indicated that the Fifty-ninth Street line could not handle a passenger for 1.25 cents without loss, and that the gross revenue must be 1.77 cents to meet expenses alone.

The commission held several hearings regarding the order requiring the receiver of the Third Avenue Railroad and the Central Park road to establish joint fares and through routes. William N. Dykman, who appeared for the Central Park company, announced that it had made an offer to F. W. Whitridge, receiver of the Third Avenue Railroad, of an 8-cent joint rate for a trip involving one ride on the Fifty-ninth Street crosstown line of the Central Park road and two rides on the longitudinal lines of the Third Avenue system. Mr. Dykman said that a strong minority in the board of directors of the Central Park company felt doubtful whether that revenue would pay operating expenses, but a small majority thought that it would and the offer was therefore made. The company operating the line on which the trip originated was to receive, under this plan, 5 cents, and the company to which the passenger was transferred was to get 3 cents. Mr. Dykman said the rate was to be the same under this proposition if only two lines were taken by the passenger instead of three. He added that it was believed that an 8-cent rate would leave the possibility of some revenue above the operating expenses, a provision for depreciation and renewals, but that the company did not consider the question of any return on capital. Mr. Dykman said that the proposition was limited to three months as an experiment.

At a later hearing, John M. Bowers, counsel for the Central Trust Company of New York, requested that the proceedings be dismissed on various grounds. He held that the commission had no power to compel transfers between street railroads and that the act under which the commission was proceeding applied only to railroads other than street railroads. Mr. Bowers held that the lines of the two companies could not be made to form continuous lines of transportation, and that the roads are not connecting but are intersecting lines. He also stated that even if it could be held that the commission had the power to establish through routes on street railways, there would still be no power to compel the issue of transfers.

George W. Linch, general manager of the Central Park road, and D. F. Carver, receiver of the Trenton-New Brunswick Railroad, were called as witnesses.

Limited Fare Change on Schenectady Railway

Complaint having been made to the Public Service Commission of the Second District, New York, by residents of Colonie, Albany County, against the Schenectady Railway regarding the stopping point for cars within the village and the rate of fare, a public hearing was held by the commission at Albany on Oct. 20, 1908. From the evidence taken at the hearing and from a personal inspection by members of the commission, the commission has concluded that an additional local stop for the local trains is required for the proper accommodation of the public at the junction or crossings of Mereline Avenue in Colonie, and that 5 cents is a reasonable maximum fare from such stop to Broadway, Albany, and has issued the following order:

Ordered: (1) That said Schenectady Railway be and it is hereby ordered and required to establish and maintain a new stopping place for all of its local trains or cars at the junction of Mereline Avenue in Colonie, with suitable and convenient walks or approaches from the sidewalk on the southerly side of Albany and Schenectady turnpike at which all local trains and cars shall stop on signal to receive or discharge passengers. That the just and reasonable maximum rate of fare from said stop to Broadway in Albany and all intermediate points, either direction, is the sum of 5 cents, and that the maximum fares to and from said stopping place from and to said Broadway and intermediate points be and they are hereby fixed accordingly. That the said Schenectady Railway be and it is hereby directed to file and publish a proper schedule of fares pursuant to Section 33 of the Public Service Commission Law, forthwith, the same to take effect on one day's notice.

Ordered: (2) That this order shall take effect on Oct.

30, 1908, and shall continue in force until modified or abrogated by this commission.

Ordered: (3) That said Schenectady Railway shall notify this commission within three days from the service upon it of a certified copy of this order whether the terms of the order are accepted and will be obeyed.

Patrons Vote in Chicago to Decide Operating Question

As announced in the ELECTRIC RAILWAY JOURNAL for Aug. 22, 1908, page 511, the Northwestern Elevated Railroad, Chicago, Ill., has under construction a stub-end terminal, which will permit it to operate additional trains to the business district without running them on the now overcrowded Union Loop. In connection with the opening of this terminal the transportation department of the railroad is distributing to the patrons on its trains, postal cards asking for information and worded as follows:

TO ELEVATED R. R. PATRONS

On or before December 1, 1908, the Northwestern Elevated R. R. will open a new station at Clark and North Water Streets (entrance thereto being from Clark Street Viaduct.)

Trains running to this station will stop thereat and start therefrom, and will not cross the river.

In order to know how best to arrange its train service, please answer the following questions and hand this card to the Agent at any Northwestern "L" Station.

Will you use this new station?.....At what station do you board train in A. M.?.....
Name
Address

With the results of this straw vote at hand it will be possible in a way to tell beforehand the volume of traffic and to decide how it can be handled from the new terminal to the best advantage.

Dishonest Conductor Sentenced in Brooklyn

The legal department of the Brooklyn Rapid Transit Company has succeeded in having one Frederick Lehrfeld, who goes under eight aliases, and who has pilfered fares from the street railways of the Metropolitan district, sentenced to the penitentiary by the Brooklyn Court of Special Sessions on the technical charge of violating Section 570 of the Penal Code, which makes the using of fictitious names to secure employment a misdemeanor. Warrants are out charging Lehrfeld with forgery, and these will be served on him at the end of his penitentiary sentence. The actual complainant against Lehrfeld was the Coney Island & Brooklyn Railroad, the most recent company to employ him. Before that Lehrfeld had worked for the Brooklyn Rapid Transit Company, Public Service Corporation, Metropolitan Street Railway, Union Railway and Third Avenue Railroad under his different aliases. From each of these companies he was discharged not long after entering the employ because of "shorts." While he worked on the upper Broadway line of the Third Avenue Railroad, under the name of Phillips, Lehrfeld kept a diary of his operations which, after he was arrested, came into the possession of the police. One page from Lehrfeld's ledger shows that in 11 days, in January and February of this year, he failed to ring up fares amounting to \$63.70, while employed by the Third Avenue Railroad. The various items on that page are:

	Wages.	Profits.
Jan. 30	\$2.33	\$2.80
Jan. 31	2.65	5.00
Feb. 1	1.65	2.00
Feb. 2	2.26	5.25
Feb. 3	2.35	4.00
Feb. 6	2.26	4.00
Feb. 7	2.21	6.00
Feb. 9	2.28	10.35
Feb. 10	2.37	11.05
Feb. 12	2.37	10.45

In addition to his income from the fares, Lehrfeld also did a thriving business, it is alleged, in obtaining jobs for men with the street railways in and about New York. From each man who came to him Lehrfeld got \$25. By means of letters he often succeeded in placing the applicants with one of the companies. One man, who declared he gave \$25 on Lehrfeld's promise to get him a job as conductor with the Brooklyn Heights Railroad, furnished the company with information on which a warrant was secured for Lehrfeld charging him with forging letters of recommendation from the officers of the company and selling them to applicants for work.

When not on the rear end of a street car Lehrfeld, who is 33 years old, dressed as "a man about town." Many of the men to whom he promised positions believed he was a politician who had influence with street railway companies.

Under various names he was employed at eight different times by the Metropolitan Street Railway. On each occasion he was discharged for alleged failure to turn in fares. He was on the payroll of the Third Avenue Railroad half a dozen times. Three times he was a conductor on the Brooklyn Heights Railroad, twice on the Coney Island & Brooklyn Railroad, once on the Richmond Rapid Transit Company, four times on the Union Railway of the Bronx, and at various times he was employed by the Public Service Corporation of New Jersey. In September, Lehrfeld, who was then with the Public Service Corporation, learned that detectives were looking up his record with the various corporations and disappeared. Two weeks ago officers of the Coney Island & Brooklyn Railroad and the Brooklyn Rapid Transit Company learned that he was under indictment in Manhattan for attempting to defraud a fire insurance company out of \$16,000, and they had District Attorney Jerome call upon Lehrfeld's bondsman to surrender him.

Elevated Railway Traffic in Chicago

The Northwestern Elevated Railroad, the Metropolitan West Side Elevated Railway and the South Side Elevated Railroad report daily average passenger traffic as follows since January, 1908:

NORTHWESTERN ELEVATED RAILROAD		
	1908.	1907.
January	100,302	88,682
February	102,182	88,435
March	103,130	89,347
April	103,569	90,134
May	105,001	94,204
June	109,107	99,051
July	99,463	91,542
August	100,307	93,174
September	105,700	97,447
October	118,010	108,806

METROPOLITAN WEST SIDE ELEVATED RAILWAY		
	1908.	1907.
January	141,564	150,165
February	145,427	154,443
March	145,339	154,000
April	146,638	156,275
May	145,117	151,423
June	144,361	148,518
July	131,152	135,779
August	128,678	136,517
September	131,354	140,979
October	143,226	157,080

SOUTH SIDE ELEVATED RAILROAD		
	1908.	1907.
January	112,702	92,411
February	111,927	96,094
March	114,801	100,226
April	117,885	103,152
May	119,313	109,880
June	125,876	115,686
July	114,362	111,966
August	112,665	113,847
September	116,490	118,256
October	121,590	126,670

New Fare Tickets in Philadelphia Misused

Many of the residents of Philadelphia have recently taken advantage of the new form of ticket issued by the Philadelphia Rapid Transit Company to cause the company and its employees embarrassment. As stated on page 1354 of the ELECTRIC RAILWAY JOURNAL for Nov. 7, 1908, the tickets were adopted to prevent the abuse of the unlimited six-for-a-quarter tickets heretofore in use. They are non-transferable and the coupons are void if detached. On several occasions, especially during the rush hours, the operation of cars has been seriously delayed by individual citizens who have refused to recognize the new regulations, and have offered detached tickets in payment for fares. When the conductor refused to accept them, they retaliated by refusing to pay a cash fare. Thereupon, the conductor being under orders not to eject any passengers forcibly was compelled to halt his car until he could get a policeman to put off the disturber. Not infrequently a passenger has even gone so far as to offer a strip ticket in payment for himself and wife, and when told that the tickets were not transferable has paid his own fare from the strip ticket and told the conductor to eject the woman.

In consequence of the annoyance caused conductors by passengers who seemed determined not to comply with the

conditions under which the tickets were sold, and so as not to inconvenience and subject other passengers to delays, the company on Nov. 7 issued an order providing that the tickets be accepted unconditionally by the conductors in payment of fare.

The letter announcing to the public that the company had decided pending a final settlement of the fare question to accept the tickets unconditionally was addressed by J. B. Parsons, president of the company, to Edward Bucholz, chairman, and the members of the special committees of the Councils appointed to confer with the company in relation to the new form of package tickets. The letter is as follows:

"We desire at the outset to express our gratification that the city, which is practically a partner in this enterprise, and will ultimately be sole owner, has thus, through its proper representatives, consulted us about a matter of importance, both to the city and to the company. We especially appreciate the courtesy and fairness with which you have presented your suggestions. We desire to meet you in the same spirit, and as the whole subject is one regarding merely the exercise of business good sense, we have decided to accept your judgment, and orders will be issued immediately that the new form of package tickets will be received exactly as was the old form.

"Permit us to say further in this connection that the real interest of every citizen as well as of the municipality will be best served if an adjustment of the whole fare question can be reached promptly, which will enable the company to render good service and get a fair return for it; and we will welcome any suggestions that will secure such an impartial consideration of this whole question as will commend itself to the good sense of the community."

Platform Riding Curtailed and Smoking Prohibited in Portland.—Passengers are now permitted by the Portland Railway, Light & Power Company, Portland, Ore., to ride on the front platform of long vestibule, tier compartment and pay-as-you-enter cars only. Smoking is prohibited on all cars of the company.

More Pay-As-You-Enter Cars in New York.—The Third Avenue Railroad (New York) has announced that it will place the first of its pay-as-you-enter cars in service early in December. The company has ordered 150 of the cars from the J. G. Brill Company, which is building them under license from the Pay-As-You-Enter Car Company.

Proposed Hearing on Philadelphia Service.—The State Railroad Commission of Pennsylvania has announced that it would hold a hearing on a complaint of Harry E. Bartow, Darby, Pa., that the Philadelphia Rapid Transit Company is not running enough cars on the line to Darby. The company replied that it was giving ample service, except in rush hours.

Far Side Stops in Portland.—The Portland Railway, Light & Power Company, Portland, Ore., in accordance with the recommendation of the City Council, is now stopping cars on the far side of street crossings. The company has been stopping cars on the near side of the street since May 1. At the intersection of lines, however, cars stop at the near side of the street.

Limited Service Between Chicago and Milwaukee.—Beginning Nov. 15 five limited trains will be run in each direction daily between Chicago and Milwaukee over the Chicago & Milwaukee Electric Railroad, leaving both terminals at 8 a. m. and 11 o'clock a. m. and 2 p. m., 5 p. m. and 8 p. m. The length and equipment of the trains will be adjusted to the service. It is planned at first to run three cars, including baggage, day and combination parlor and buffet coaches.

Passenger Records Broken in Atlanta.—The Georgia Railway & Electric Company, Atlanta, Ga., broke all passenger records on Oct. 23. On that day the company carried 211,820 passengers, 169,820 of whom paid cash fares. W. H. Glenn, manager of railways of the company, says: "The number of passengers carried on Oct. 23 was practically double the population of Atlanta. A gratifying feature was the absence of accidents, notwithstanding the fact that the schedules had been deranged by two parades at different times of the day. The occasion of this record-breaking haul was the State Reunion of the Confederate Veterans, which was held at Atlanta during the session of the State Fair. In addition, a large circus showed in Atlanta on the date mentioned. One of the previous big days, namely Oct. 20, 1905, was the occasion of the visit of President Roosevelt to one of the State fairs at Atlanta. The President spoke at the fair and held a reception. Another large day, Sept. 2, 1907, was Labor Day, but there were no attractions other than the usual amusements, such as baseball, etc."

Personal Mention

Mr. Hugh McKaig, Pittsburg, Pa., has been elected secretary-treasurer of the Boise & Interurban Railway, Boise, Idaho.

Mr. R. E. Hunt, superintendent of railways of the Utah Light & Railroad Company, Salt Lake City, Utah, has been appointed assistant general manager of the company. The office of superintendent of railways has been abolished.

Mr. E. B. Katte, chief engineer of electric traction, New York Central & Hudson River Railroad, is to present an address on the subject of electric traction next month at Harvard University before the Graduate School of Business Administration.

Mr. Harvey F. Pearce has resigned as superintendent of public works of Negaunee, Mich., to become general manager of the Twin City General Electric Company, Ironwood, Mich., which operates the railway and lighting facilities in Ironwood and Hurley.

Mr. W. L. Weston, who has been purchasing agent of the Northern Texas Traction Company, Fort Worth, Tex., for the last two years, has been appointed assistant to the general superintendent of the company, and in addition to his duties as purchasing agent, will devote part of his time to collecting data for the operating department.

Mr. Richard L. Belding, who has been traffic manager of the Interurban Railway, Des Moines, Ia., since Jan. 1, 1908, has resigned from that company to become general Eastern agent of the Chicago Great Western Railroad, with headquarters at Pittsburg, Pa. Mr. Belding was formerly freight agent of the Chicago Great Western Railroad at Des Moines.

Mr. E. G. Connette, general manager of the Worcester (Mass.) Consolidated Street Railway, has been elected a director of the company. Mr. Connette is also a director and general manager of the Worcester & Southbridge Street Railway, Worcester & Blackstone Valley Street Railway, Worcester & Webster Street Railway, Worcester & Holden Street Railway, Marlboro & Westboro Street Railway and the Hartford & Worcester Street Railway.

Mr. W. O. Wood, general manager New York & Queens County Railway, was the principal guest at a dinner held on Nov. 9 at Healy's Restaurant in honor of Mr. Wood's recent appointment to the New York & Queens County Railway and his return to active railway operation since his resignation from the Brooklyn Rapid Transit Company. There were about 32 present, all of whom enjoyed the beef-steak dinner for which this restaurant is famous. Mr. Wood was the recipient of many congratulatory remarks.

Mr. W. F. Simmons has resigned as superintendent of the Peekskill Lighting & Railroad Company, Peekskill, N. Y., to become Canadian representative of R. W. Marshall & Company, New York, N. Y. Mr. Simmons will make his headquarters in Toronto, Ont., and will follow particularly the needs of street railways in the provinces. Mr. Simmons was connected with the Peekskill Lighting & Railroad Company for 4½ years, and before that was for 17½ years general superintendent of the Kingston Light & Power Company, Kingston, Ont.

Mr. T. H. Ceperley has been appointed chief engineer of the Stuyvesant Falls power plant of the Albany & Hudson Railroad, Hudson, N. Y., to succeed Mr. W. G. Andrews. Mr. Ceperley was formerly chief engineer of the Newburg Light, Heat & Power Company, Newburg, N. Y., and had charge of the power plants of that company at both Poughkeepsie and Newburg. Before becoming connected with the Newburg Light, Heat & Power Company, Mr. Ceperley was chief engineer of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.

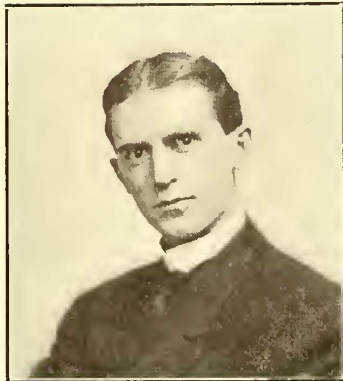
Mr. A. C. Tully, who has just resigned as purchasing agent of the Metropolitan Street Railway Company, New York, was tendered a farewell banquet by his friends and late associates Nov. 7. The dinner was held at Shanley's and between 200 and 250 were present. James L. Quackenbush, general attorney of the Metropolitan Street Railway Company, acted as toastmaster, and the speakers, all of whom voiced the esteem in which Mr. Tully was held, included Messrs. Douglas Robinson, H. H. Vreeland, Frank S. Gannon, W. Boardman Reed, Thomas Miller and James H. McGraw. At the conclusion of the evening Mr. Tully was presented a handsome silver tea set. Mr. Tully will engage in the real estate business in Sussex County, N. J.

Mr. Oren Root, general manager for the receivers of the New York City Railway, was married on Nov. 5 to Miss Ada de Acosta at the home of the bride's mother in New York. Immediately after the reception Mr. and Mrs. Root left for a short wedding trip. On their return they will reside in New York. Among those invited to the recep-

tion were Mr. and Mrs. Herbert H. Vreeland, Mr. and Mrs. Frank S. Cannon, Mr. and Mrs. Frederick Whitridge, Mr. and Mrs. Theodore P. Shonts, Mr. and Mrs. Thomas F. Ryan, Mr. and Mrs. Paul D. Cravath, the Hon. E. Henry Lacombe, Mr. and Mrs. Adrian H. Joline, and Mr. and Mrs. Douglas Robinson. Among the wedding guests was Mr. Elihu Root, Secretary of State, who is an uncle of Mr. Oren Root.

Mr. C. E. Patten has been appointed general agent of the Metropolitan West Side Elevated Railway, Chicago, in charge of ticket agents, porters, concessions, rentals, advertising and special rates. Mr. Patten has been secretary to the president of the Metropolitan West Side Elevated Railway, and began his railway career as a telegraph and relief agent with the Illinois Central Railroad in 1887. In 1888 he entered the service of the Chicago, Burlington & Quincy Railroad as telegraph operator in the general office of the company, and shortly thereafter was transferred to the Chicago terminals of the company as dispatcher. Later he was assigned to special duties in the office of the division superintendent of the company at Chicago, and subsequently was promoted to the position of chief clerk to the superintendent. Mr. Patten remained in the last position until 1905, when he resigned to become connected with the Metropolitan West Side Elevated Railway as secretary to the president.

Mr. George R. Folds has resigned as general manager of the West Penn Railways, West Penn Electric Company and the Pittsburg, McKeesport & Greensburg Railway with offices in Connellsville, Pa., to become general sales manager of the H. W. Johns-Manville Company, New York. Mr. Folds' resignation will take effect Nov. 15. Mr. Folds has been connected with the West Penn Railways since August, 1907, when he resigned as general manager of the South Chicago City Railway and the Hammond, Whiting & East Chicago Electric Railway, which operate jointly in Illinois and Indiana. Mr. Folds was born in Oshkosh, Wis., on Aug. 23, 1870. After a short mercantile experience with his



George R. Folds

father in Minneapolis he became connected with the Minneapolis Street Railway in 1893, and held successively positions as assistant in the cashier's department, transfer clerk, mileage clerk and assistant paymaster. He subsequently followed special work connected with statements in the claim department of the company, and as a result of his study of the question of side running boards upon open cars of the Twin City Rapid Transit Company, all such running boards were abolished and end entrance cars with gates for closing the platform entrances were adopted. Mr. Folds studied law at the University of Minneapolis meanwhile, and was graduated from that institution in 1897. In 1899, he was placed in charge of the claim department of the St. Paul division of the Twin City Rapid Transit Company, and in 1902 was appointed assistant attorney of the Brooklyn Rapid Transit Company. The following year he was appointed assistant to Mr. J. F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company. Mr. Folds resigned from the Brooklyn Rapid Transit Company to become general manager of the South Chicago City Railway and the Hammond, Whiting & East Chicago Electric Railway.

OBITUARY

F. W. Frahl, roadmaster of the Oregon Electric Railway, Portland, Ore., is dead.

An elaborate book of about 150 pages on the construction and equipment of the Market Street subway and elevated system of the Philadelphia Rapid Transit Company has recently been published by the Millard Construction Company. It describes the engineering features of the power station, distribution system, track construction, rolling stock, as well as of the subway, and is illustrated by half-tone engravings of parts of the work, portraits of the officers of the railway company and of the contractors. The book is handsomely bound in leather and constitutes a very attractive as well as elaborate record of the work in Philadelphia of the Millard Construction Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Berkeley, Cal.—The Southern Pacific Company is reported to have applied to the City Council for franchises for three new routes through Berkeley.

San Francisco, Cal.—The ordinance granting to John J. Egan the right to run a street railway over 240 miles of San Francisco streets was voted upon by the people of San Francisco on Nov. 3 and defeated.

***Seabreeze, Fla.**—S. H. Gove has applied to the City Councils of Seabreeze and Daytona Beach for franchises for an electric trackless trolley system. The franchise has passed second reading before the Seabreeze Council and first reading before the Daytona Beach Council.

Chicago, Ill.—The Metropolitan West Side Elevated Railway has applied to the City Council for permission to build an extension through Humboldt Park and west to the city limits. The extension sought by the company is a continuation of its present Humboldt Park branch on North Avenue, west to the city limits at North Seventy-second Avenue. The ordinance provides that the company may build an incline between Forty-first Court and Forty-sixth Avenue, or between Forty-eighth and Fifty-second Avenues, as may be determined. From the incline the road will run west on the surface. Another ordinance provides for an extension of the Douglas Park branch west to the city limits at Forty-sixth Avenue. On the proposed extension an incline is provided for between Forty-first and Forty-fourth Avenues, the road to run on the surface west of the latter thoroughfare. The company also asks permission to build two more tracks on its main line at Fifty-second Avenue so as to facilitate the movement of through trains and avoid the switching made necessary now by reason of the Aurora, Elgin & Chicago Railway running trains over the tracks. Action on all the ordinances was deferred by the committee until the existing ordinances can be looked up.

Goldfield, Nev.—The Board of County Commissioners has granted a franchise to the Goldfield Traction Company for a street railway in Goldfield, Columbia and Diamond Field. One mile of the line must be complete and in operation by June 30, 1909. The maximum rate that may be charged for carrying a passenger within the limits of Goldfield is 15 cents and 30 cents to Diamond Field. Freight may be hauled over the company's lines between the hours of 10 p. m. and 6 a. m. George Wingfield and associates are behind the enterprise. [E. R. J., Sept. 26, '08.]

Auburn, N. Y.—The City Council has granted the Auburn & Syracuse Electric Railroad an extension of time till December, 1909, on its franchise right to construct a line westward to the city limits.

Oswego, N. Y.—The Village Board has extended the franchise of the Binghamton Railway permitting it to lay tracks in Oswego, the time for completion being fixed at June 8, 1911.

Wilmington, Ohio.—The Cincinnati, Wilmington & Xenia Traction Company has presented to the Council of Wilmington a franchise to operate its lines through the streets of Wilmington. The entire length of the road as proposed will be 38 miles, and it will connect Blanchester, Martinsville, Wilmington, Port William and Xenia.

London, Ont.—The Southwestern Traction Company has asked the City Council for permission to extend its tracks from Simcoe to Talbot. S. W. Mower, general manager.

Youngstown, Ohio.—The City Council has passed an ordinance granting a franchise to the Mahoning Valley Street Railway for an extension of the Wick Avenue branch from its present terminus to the city limits.

Chattanooga, Tenn.—The Chattanooga Railways has made a new proposition to the Board of Aldermen, and the new franchise applied for gives the company the right to build tracks on Seventh Street, from Georgia Avenue to Market, and on Georgia Avenue, from Ninth to Market, passing the Hotel Patten. In exchange for this grant the company proposes to surrender its franchises to maintain tracks on Eighth Street, from Broad to Georgia Avenue, thence on Georgia Avenue and Walnut to Sixth and on Sixth Street, from Walnut to Lookout, where it is intended to connect its present tracks with the spur track on Georgia Avenue. It also agrees to give up the third track on Broad Street, from Eighth to Ninth.

El Paso, Tex.—Frank R. Tobin, president of the El Paso Suburban Railway, has presented to the City Council a petition for a franchise over the streets of the city from the city limits to the Union passenger depot. The petition sets forth that already 5 miles of the road has been constructed between the town of Tobin and Fort Bliss, and says that if the franchise is granted the work will be commenced within 90 days and completed within 12 months. [S. R. J., May 18, '07.]

Marshall, Tex.—The City Council has granted M. Turney and associates a franchise to build and operate an electric street railway, and to furnish lights and power for a period of 25 years. [E. R. J., Sept. 26, '08.]

RECENT INCORPORATIONS

***East St. Louis, Caseyville & Eastern Railway, East St. Louis, Ill.**—This company has been incorporated in Illinois to construct an electric railway from East Lansdowne to Caseyville. Incorporators: F. G. Harding, Joseph Harding and E. G. Helm.

***Pan Handle Electric Company, Pittsburg, Pa.**—This company has been chartered to construct an electric interurban road that will extend from Pittsburg and Carnegie, Pa., to Chester, thence down the West Virginia side of the Ohio River to Wheeling, W. Va. Capital stock, \$80,000, of which \$25,000 has been paid in. Incorporators: Joseph Bryan, S. M. Dunbar and J. I. Merrill, Pittsburg, Pa.; H. R. Randolph, Suter Station, Pa., and Clerk of Courts Armor S. Cooper, New Cumberland, W. Va.

***Seattle & Issaquah Electric Railway, Seattle, Wash.**—This company has been chartered in Washington to build and operate electric railways between points in King and Snohomish counties. Capital stock, \$2,000,000. Incorporators: Edwin S. Gill and John McQuade.

TRACK AND ROADWAY

Birmingham & Shades Mountain Electric Railway, Birmingham, Ala.—This company is reported to have been organized to construct an electric railway which will enter the Shades valley and extend to the top of Shades Mountain. Capital stock, \$25,000, of which \$10,000 is already subscribed. R. A. Berry, Birmingham, is said to be interested in the project. The entire right of way has been secured.

Calgary, Alta.—The Montreal Engineering Company has made the following offer to the City Council, respecting the construction of a street railway: The company will construct 6 miles of railway. They pay the city as follows: First five years, nothing; second five years, taxes on regular assessment; third five years, taxes and 2½ per cent of gross receipts; fourth five years, taxes and 5 per cent of gross receipts, if the city has reached a population of 60,000; taxes, 10 per cent of gross receipts if the city has reached a population of 75,000. The Council was unanimously of the opinion that the offer was not good enough. It wants 11 miles at the outset and taxes for the first five years 3 per cent, and taxes for second five years 7 per cent and taxes, and 12 per cent on fourth five years.

Little Rock & Hot Springs Electric Railway, Little Rock, Ark.—The charter of this company has been amended so as to provide for the issuance of \$500,000 preferred stock at 6 per cent. The company contemplates building an electric railway from Little Rock to Hot Springs, a distance of 56 miles.

Pasadena Rapid Transit Company, Pasadena, Cal.—Horace M. Dobbins is said to have announced that articles of incorporation for this company will be filed shortly. It will have a capitalization of \$3,000,000. Pasadena will be the headquarters of the company. It is the intention of the promoters to build an air line between Los Angeles and Pasadena. The total length of the road between terminals will be 93/10 miles.

Rock Island-Southern Railroad, Monmouth, Ill.—This company, which is building a new electric railway from Rock Island, Ill., southeast to Galesburg, will build a steel bridge across the Edwards River, near Preemption, to cost about \$180,000. The bridge will be 3100 ft. long, with approaches 1800 ft. long, and will require about 6000 tons of steel.

Topeka (Kan.) Railway.—This company has just opened for traffic its new viaduct over Branner Street. The viaduct begins at Lake Street just south of the fence that cuts off the Santa Fe yards and proceeds west to Branner Street, where it turns due north and crosses Branner Street over the Santa Fe tracks, ending at a point only a few feet south of Seward Avenue. It is 22 ft. high in the clear and is 1400 ft. long. The total cost of the structure is said to be \$50,000. The grade at the inclines at either end is about 3½ per cent. The Blodgett Construction Company, Kansas

City, are the contractors. The Santa Fe Railway will pay for half the cost of this improvement.

Twin City General Electric Company, Ironwood, Mich.—It is reported that this company is planning to extend its railway system to Bessemer, a distance of 5 miles. The company at present operates a line from Ironwood, Mich., to Hurley, Wis., about 7½ miles.

Keene (N. H.) Electric Railway.—It is reported that this company is planning to extend its system to Washington and High Streets in Keene. Plans are also said to be under consideration for the construction of an extension to West Swanzey. Frank H. Whitcomb, secretary.

Binghamton (N. Y.) Railway.—It is said that this company is negotiating for the purchase of Hiawatha Island, in the Susquehanna River, near Owego, which has been on the market for sale by its owner, Mrs. Thomas F. Goodrich, of New York, and the price is said to be \$40,000. It is stated that if the company secures this island it will be converted into a large amusement resort and connected with Binghamton and Owego by trolley.

Buffalo, Lockport & Rochester Railway, Rochester, N. Y.—Permission has been secured by this company from Superintendent of Public Works Stevens to build a permanent bridge over the Barge Canal in Gates, near the crossing of the New York Central.

New York City Railway.—This company has recently placed an order with the Pennsylvania Steel Company for 750 tons of No. 279 standard section girder rails weighing 115 lb. per yd.

New York, N. Y.—The application of the Pelham Park Railroad and the City Island Railroad for permission to change the motive power to the monorail system was heard before the Public Service Commission of the First District on Oct. 6. A delegation of 50 members from the Board of Trade attended the hearing. Bion L. Burrows, president of the Monoroad Construction Company, which has taken over the two roads, in describing the system, said it would be little different from an overhead trolley. He also said it was the intention of the company to take the structure off the Pelham Parkway and use a private right of way, and that the company proposed to charge only five cents to carry City Islanders to or from Bartow, but to keep the present rate of 10 cents for visitors. Commissioner Eustis remarked, however, that the commission would determine whether this discrimination could be made. An adjournment was taken to give the company's engineers a chance to explain the merits of the monorail system. [E. R. J., Oct. 24, '08.]

New York, Westchester & Boston Railway, New York, N. Y.—The Public Service Commission of the First District on Nov. 9 gave a public hearing on the application of the New York, Westchester & Boston Railway for a certificate of necessity and public convenience, which would allow the renewal of the work of building the Westchester line through the Bronx. Several representatives of property owners in the Bronx urged the commission to withhold the proposal to build a branch line to Throggs Neck on the ground that it was the avowed purpose of the company to turn that land into a mill town and to build a dockage front on the Sound. It was asserted that such a branch line as was proposed was not needed, because the territory through which it would pass was inhabited by not more than a thousand persons. Counsel for the company owning the Morris Park race track also opposed the construction of the Westchester line. Incidentally it was brought out that the Port Chester route passes through the park while the Westchester line skirts it. The commission reserved its decision.

Rochester, Charlotte & Manitou Railroad, Rochester, N. Y.—This company is making a survey of the proposed change in the line around Braddocks Bay. The surveyors are also making a survey for the loop at the western terminus of the line. It is planned to extend the line about a quarter of a mile and lay a loop so that the cars may run around a circle, eliminating delays at the end of the line. The proposed line around Braddocks Bay is for the purpose of doing away with the reconstruction of the trestle across the neck of the bay.

***Ottawa, Ont.**—It is reported that a scheme is under way to connect Ottawa with Morrisburg by an electric railway. The project includes the building of a new line from Morrisburg to a point on the present Ottawa & New York Railway and the adoption of electricity as a motive power on the entire line, which will include about 20 miles of the present Ottawa & New York system. The enterprise is under consideration by J. Wesley Allison, Morrisburg. The total length of the electrified line would be about 75 miles,

30 of which are already provided by the Ottawa & New York line.

Chester, Concordville & West Chester Electric Railway, Concordville, Pa.—Joseph Shortlidge writes that this projected electric railway will connect Chester and West Chester. Mr. Shortlidge states that as yet no organization has been perfected.

Shamokin & Mt. Carmel Transit Company, Shamokin, Pa.—It is reported that this company will apply to the Governor for a charter for an extension of its lines. The preliminary surveys have been made and adopted by the company.

Rhode Island Company, Providence, R. I.—This company has just completed and placed in operation its new line to Olneyville. The new route is over Promenade and Valley Streets to Olneyville Square.

***Sherman, Tex.**—It is reported that David Light, Sherman, Tex., is planning to build an electric railway from San Antonio to Sherman.

***Husum, Wash.**—It is reported that Vaughn & Shapler, electrical engineers, are surveying a route for an electric railway, which is to be built from Husum to White Salmon and Bingen, a distance of 10 miles. The power station is to be built at White Salmon Falls, and will furnish power for the road, also for lighting the cities of White Salmon and Bingen.

Seattle-Tacoma Short Line Railway, Tacoma, Wash.—Judge Morris in the Supreme Court on Oct. 26 denied the application of James Lombard for a receiver for this road. The company was organized in October, 1907, with \$6,000,000 authorized stock. It is said that arrangements for furnishing the road were made last month. M. J. Wightman, Tacoma, secretary. [E. R. J., Sept. 19, '08.]

Tacoma Railway & Power Company, Tacoma, Wash.—This company has placed through the Stone & Webster Engineering Corporation, Boston, Mass., an order with the Pennsylvania Steel Company for 650 tons of standard 73-lb. high T-rails in 60-ft. lengths.

Vancouver (Wash.) Traction Company.—This company has extended its system 1 mile beyond the city limits to the St. John road. This mile of track is said to be the beginning of a suburban line, which is to be built through Clark County for 100 miles. The company has also started a crew of surveyors at work in the northwestern part of the city surveying for the extension of the street railway which is to be made in that section of the city. When this part of the line is finished the loop line within the city will be complete.

Fairmount & Mannington Railroad, Fairmount, W. Va.—It is stated that this company has under advisement the establishing of a new park along its line.

***Portage, Wis.**—J. N. Braun, of St. Paul, is reported to be interested in the promotion of an electric railway to be built in Portage. Mr. Braun is president of the Western Transportation Company, 317 American National Bank Building, St. Paul, Minn., which is organizing a company to build a line to be operated both by steam and by gasoline motor cars, from Portage, Wis., north, via Briggsville, Oxford and Friendship to Grand Rapids, about 70 miles. Contracts for building the line are to be let as soon as incorporation is completed. The company proposes to take over the property and all the rights of the Sparta-Melrose Electric Railway & Power Company, Sparta, Wis., which was organized with headquarters at Melrose, to build an interurban line from Sparta northwest via Angelo, Trout Fall and Cataract, to Melrose, 28 miles, on which construction work is to be started by the spring of 1909. It is stated that the Western Transportation Company will also incorporate a company to build a line from Galesville, Wis., to Etrick.

SHOPS AND BUILDINGS

Indianapolis & Martinsville Rapid Transit Company, Indianapolis, Ind.—The terminal station and freight house of this company at Mooresville were destroyed by fire on Nov. 5.

Rome (N. Y.) Street Railway.—A fire on Oct. 28 destroyed this company's car house, with its contents, including three cars, a sweeper and some electrical appliances. The property was owned by the Utica & Mohawk Valley Railway. The loss will approximate \$40,000. It is said that it is the intention of the company to build a new structure at once.

Vancouver (Wash.) Traction Company.—It is stated that this company expects to build a new brick car house alongside the present building, located on St. John road, but with double its capacity. The old building will then be turned into a repair shop.

Manufactures & Supplies

ROLLING STOCK

Dennison & Sherman Railway, Dennison, Tex., is soon to purchase four cars.

Nebraska Traction & Power Company, Omaha, Neb., is asking prices on interurban cars.

Citizens' Railway Company, Lincoln, Neb., is reported to be in the market for four cars.

Joliet & Southern Traction Company, Joliet, Ill., has ordered a snow plow from the St. Louis Car Company.

Omaha & Council Bluffs Street Railway Company, Omaha, Neb., is reported to be in the market for 10 cars.

Detroit, Flint & Saginaw Railway, Saginaw, Mich., is said to be contemplating the purchase of four interurban cars.

Chicago, Wheaton & Western Railway, Wheaton, Ill., is in the market for four interurban cars for delivery in May, 1909.

Evansville & Mt. Carroll Electric Railway, Evansville, Ind., is asking prices on gasoline-electric cars for interurban service.

Lexington (Ky.) Railway contemplates purchasing additional car equipment. Specifications have not yet been completed.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., expects to purchase at once two or three single truck closed cars.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., is reported to have placed an order for 10 interurban cars with the Cincinnati Car Company.

Central Railway, Clinton, Ia., through Thomas Wilcox, Clinton, has asked for bids on new interurban cars for its proposed line between Clinton and Dubuque.

Des Moines, Council Bluffs & Western Railway, Des Moines, Ia., has asked for bids on 20 or more cars to be used on the line projected between Des Moines and Council Bluffs.

Northwestern Elevated Railroad, Chicago, Ill., expects soon to receive the 20 cars ordered in August from the Pullman Car Company. This is said to be the last of the equipment under construction for this company for 1908 delivery.

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, is building 75 10-bench open cars at its own shop in Rio de Janeiro. They will be equipped with National air brakes, the Curtain Supply Company's curtain fixtures and curtain material, Hunter destination signs, Peacock hand brakes and Neal headlights. All the metal work will be supplied by the St. Louis Car Company. The motors and trucks for these cars have not yet been ordered.

TRADE NOTES

S. E. Gutteridge has been elected president of the Republic Railway Appliance Company, St. Louis, Mo.

T. M. May is now representative for the Brady Brass Company, with an office at 95 Liberty Street, New York.

Wagner Electric Manufacturing Company, of St. Louis, Mo., has removed its San Francisco office to 312 Balboa Building.

Bethlehem Steel Company moved its New York offices Nov. 2 from 100 Broadway to the eleventh floor of the Trinity Building, 111 Broadway.

E. McCormack, former assistant treasurer of the Railway Steel Spring Company, New York, has been elected treasurer of the company.

R. L. McDuffie has recently entered the sales department of the Lackawanna Steel Company, for the Metropolitan district of New York.

C. H. Dodge, general Western sales agent for the Taylor Electric Truck Company, Troy, N. Y., has recently returned to Chicago after a two months' trip through the West.

Southern Railway Supply Company, St. Louis, Mo., has been reorganized with the following officers: J. F. Bartman, president; A. H. Baier, vice-president, and Ephron Catlin, Jr., secretary-treasurer.

G. C. Marsh, formerly treasurer and manager of the Contractors' Supply & Equipment Company, Chicago, Ill., has opened an office at 970 Old Colony Building, Chicago, to deal in contractors' supplies and equipment.

Dr. C. C. Garrard has resigned as manager of the instrument and transformer department of Ferranti, Ltd., in

order to become manager of the switch department of the General Electric Company, Ltd., London, Eng.

James McNaughton, manager of the Schenectady plant of the American Locomotive Company, has been appointed vice-president in charge of sales to succeed R. J. Gross, resigned. He will make his headquarters in New York.

I. A. Kinkead has resigned from the American Locomotive Company, at Schenectady, N. Y., to become manager of sales of The Parkesburg Iron Company, Parkesburg, Va. His office will be in the Singer Building, New York.

C. A. Ralston, Chicago, has been made Western representative of the Pittsburg Equipment Company, Pittsburg, Pa., which manufactures bolsters and truck side-frames for both steam and electric railways. Mr. Ralston will have his office in the Fisher Building.

Hugh A. Brown has resigned from the Crocker-Wheeler Company, Ampere, N. J., to which he has been attached for several years in the Chicago office, to become sales manager for the Rockaway Coaster Company, Cincinnati, in which he has a substantial interest.

Crane-Best Company, Chicago, Ill., has entered into a partnership arrangement with the Best Manufacturing Company, Pittsburg, and the business of the heretofore competing companies will be carried on in the future under the name of the Crane-Best Company.

L. E. Butler, formerly with the United States Metallic Packing Company, Philadelphia, Pa., and later with the J. R. Long Paint Company, has been appointed to a position in the sales department of the Hicks Locomotive & Car Works, at the Chicago office.

C. R. Robinson, heretofore sales agent for the Inland Steel Company, Chicago, Ill., has resigned to become district sales agent of the Lackawanna Steel Company, New York, with offices in the Commercial National Bank Building, Chicago.

J. B. Taylor & Company, Inc., New York, N. Y., has been organized under the laws of the State of Delaware with a capital stock of \$500,000 as engineers and contractors. They will have offices in the Hudson Terminal Building, New York, and will engage in engineering and construction work.

F. A. Barbey, New England agent of Thomas Prosser & Son, New York; the Rostand Manufacturing Company, Milford, Conn.; the Frost Railway Supply Company, Detroit, Mich., and a number of other railway supply houses, has moved his office from 185 Summer Street to Room No. 230 South Terminal Station, Boston.

International Register Company, Chicago, Ill., reports that its registers were specified for the 40 cars recently delivered to the Seattle (Wash.) Electric Company and that its registers are the only ones now in use on the lines of that company. The company is selling large quantities of its International trolley cord to railways in all parts of the country.

Underfeed Stoker Company of America, Chicago, Ill., reports that it has just received an order for three Jones stokers from the Lincoln Traction Company, Lincoln, Neb. These stokers will be installed in connection with a 447-hp Sterling unit. The station in which they are to be installed already contains 12 Jones stokers, which have been in service for several years.

J. G. Brill Company, Philadelphia, Pa., has been awarded the Grand Prix for its system of trucks at the International Exposition of the Application of Electricity at Marseilles, France. The representation in the department of electric traction at the Exposition was especially strong and the award accordingly comes as an unusually effective testimony to the superior quality of Brill trucks in both design and manufacture.

W. J. Cooke, vice-president of the McGuire-Cummings Manufacturing Company, Chicago, was recently honored by being selected as one of a party of representative men from various lines of business to make a tour of the South by the Chicago Association of Commerce. Only one representative was selected from each line, and Mr. Cooke represents the electric railway manufacturing interests. The tour will last about two weeks.

American Blower Company, Detroit, Mich., has issued a list giving the destination of apparatus and equipment of its manufacture, orders for which have been booked since Sept. 25 to date. A number of these are very important installations. They include equipment for the Westinghouse Electric & Manufacturing Company, Allis-Chalmers Company, Ault & Wiborg Company, Isthmian Canal Commission and Western Electric Company.

Ridgway Dynamo & Engine Company, Ridgway, Pa., has moved its Philadelphia office from the Girard Build-

ing to 1017 Witherspoon Building and placed the office under the management of Robert S. Beecher, who is well known in the steam engine trade. With its additional lines of side crank engines and the rapidly improving business conditions throughout the country, the prospects of the company are bright for a large increase in the volume of orders during the coming season.

Electric Service Supplies Company, Philadelphia, Pa., has recently closed an important contract with the Capital Traction Company and the Washington Railway & Electric Company, Washington, D. C., for material to be used in extending the underground conduit system of these companies. The order specifies, among other things, 10,000 conduit rail insulators completely assembled, 300,000 hook bolts and slot bolts, 30,000 tie rods and all the other forged steel fittings required. The total order represents about 15 carloads of material. Part of the material on the order is being installed.

Geo. E. Austin, president of the American General Engineering Company, New York, has recently returned from an extended trip through the Western and Pacific Coast States. He visited Chicago, Denver, Salt Lake City, Los Angeles, San Francisco, Seattle, Portland and Vancouver and the principal cities in Canada. Mr. Austin reports good business and a number of orders from the leading railroads of the Coast for his repair shop labor-saving appliances. During the trip Mr. Austin arranged with Eccles & Smith, of San Francisco, to act as Pacific Coast agents for the repair shop labor-saving appliances manufactured by the American General Engineering Company.

U. S. Metal & Manufacturing Company, New York, N. Y., has recently become agent for the Diamond Steel Pole Company, Philadelphia, in the Eastern, Middle Western and Southern States. The Diamond steel pole was described on page 762 of the Oct. 3 issue of the *ELECTRIC RAILWAY JOURNAL*, and from the numerous inquiries received lately, it is receiving the careful consideration of street railway, telegraph, telephone and electric lighting companies and railway signal interests, all of which desire a strong, substantial and cheap metal pole, capable of withstanding rigorous weather. The U. S. Metal & Manufacturing Company has arranged with Frank A. Barbey, Boston, Mass., to act as its New England agent for the Diamond pole.

H. W. Johns-Manville Company, New York, N. Y., is placing on the market under the name "Leak-No Metallic Compound," a chemical compound resembling powdered iron which, when mixed with water and applied like putty to defects in iron or steel articles, is said by the manufacturer to metallize and become a permanent part of the article to which it is applied. When hard the new compound resembles iron in color. The Johns-Manville Company offers to refund the purchase price of No-Leak compound when applied according to directions if it fails to stop any ordinary leak in anything made of iron or steel against any pressure of oil, steam, gas, air, ammonia or water, or to withstand any heat or chemicals to which iron is impervious.

Electric Railway Improvement Company, Cleveland, Ohio, has closed a contract with the Ohio Electric Railway to install 20,000 bonds by its electric brazing process between Bellefontaine and Toledo. Work will be commenced at once. The Electric Railway Improvement Company has recently leased and shipped a bonding car to the Pacific Electric Railway, Los Angeles, Cal., making the second car under lease to this railway. Among other railways which have recently leased bonding cars are the Memphis (Tenn.) Street Railway, Fresno (Cal.) Traction Company, Electric Railway, Light & Telephone Commission, Port Arthur, Ont., and Public Service Railway, Newark, N. J. The last company already had a car under lease and the recent order is for an additional car.

Allis-Chalmers Company, Milwaukee, Wis., reports among recent orders one for five 1500-hp horizontal twin turbo-generators for the Northern Hydro-Electric Company, which is developing the power of the Peshtigo River in Wisconsin. Power from these falls will be used for electric railway and lighting services in Green Bay and neighboring towns. The company recently shipped two 6500-kw turbo-generators to the Niagara Falls Hydraulic Power & Manufacturing Company, and two 2500-kw turbo-generators to the Cazadero station of the Portland Railway, Light & Power Company, Portland, Ore. Among recent purchases of steam turbines are the Cleveland, Southwestern & Columbus Railway and the Webster & Southbridge Gas & Electric Company. The Allis-Chalmers Company reports a very large increase in business in other industrial lines, and considers this as evidence of awakening industrial activity.

Mica Insulator Company, New York, N. Y., under the classification "Commutators and Parts," in the *ELECTRIC*

RAILWAY JOURNAL's *Dictionary of Electric Railway Material for 1908*, through a typographical error was represented as making its Micanite rings and segments from an exceedingly thin combination of mica and bonding cement, whereas the rings and segments are made from exceedingly thin laminations of mica. Also the definitions of Linotape and Micanite tape made by the company and appearing under the classification "Tapes and Cloths," were inadvertently separated in classifying the items alphabetically and the definition of Linotape was published without giving credit for it to the Mica Insulator Company. Linotape is a linseed oil coated tape of high ohmic resistance and dielectric strength, whereas Micanite tape is a paper tape coated with sheet mica. Both Linotape and Micanite tape are recommended for armature and field coil winding and general insulating purposes.

ADVERTISING LITERATURE

MacGovern, Archer & Company, New York, N. Y.—This company has issued its monthly list of machinery for November.

American Insulated Wire & Cable Company, Chicago, Ill.—A small pamphlet issued by this company contains valuable information on the American brand of weather-proof wire.

Rossiter, MacGovern & Company, New York, N. Y.—This company announces the November issue of its usual monthly list of electrical machinery, boilers, engines, generators and motors.

Canton Culvert Company, Canton, Ohio.—This company has reproduced for general distribution in miniature an illustrated description of its corrugated metal culverts, which appeared in the *Railroad Times*, Tokyo, Japan. The company has also reproduced the title page of a Spanish circular showing a section of its corrugated metal culverts.

W. R. Garton Company, Chicago, Ill.—A pamphlet is being prepared by this company which has for its subject the Sloan sleet cutter and the sleet wheels which are carried in stock by the company. The sleet cutter can be put into service very quickly at any point on a line, and it is found, the representatives of the company say, to become popular on railways where sleet storms are common.

R. W. Marshall & Company, New York, N. Y.—"Dollars from the Scrap Heap," Bulletin No. 12, describes the plant and methods employed by this company, and sets forth the value of its method of impregnating field coils, prefaced by a clear and well-written article on the "How, What and Why" of field coils. Every field coil impregnated by Marshall & Company is guaranteed to be entirely free from short circuits, to have the standard resistance, and to be impregnated to the center of the coil.

Western Electric Company, Chicago, Ill.—This company has issued a four-page circular entitled "Six Little Pointers for You." The pointers are that the Western Electric Company 1900 dry batteries are the strongest in action, the most perfect in construction, are regular, constant and uniform in every detail, make the voice sound clear and distinct in telephone service, recuperate rapidly, reduce operating expenses, and have established a standard of quality by which others are judged. A picture of six puppies is used to illustrate the title of the circular.

Hess-Bright Manufacturing Company, Philadelphia, Pa.—This company has issued a mailing card showing the record-breaking motor boat "Dixie II," on which Hess-Bright bearings are used. The Hess-Bright Manufacturing Company says its bearings are bringing success to motor boats, as they have to automobiles, every important automobile record, national and international, for speed, economy and endurance, having been made with machines equipped with ball bearings supplied by the Hess-Bright Manufacturing Company. A feature of the card is a flag signal code printed in colors.

Hammond Meter Co., St. Louis, Mo.—This company has issued a booklet describing the Hammond meter, a new machine for measuring water and other liquids under atmospheric pressure, which is especially adapted to measuring water from condensers and for boiler testing. The working parts are all easily accessible and the meter throughout is simple in design. All meters are thoroughly tested and calibrated before shipment from the factory, and meters now in use show errors of less than 1 per cent. The company is prepared to make meters of almost any desired capacity to measure the total quantity of water pumped by water works, etc.

Groff Drill & Machine Tool Company, Camden, N. J.—A new catalog by this company describes its Groff drill for track drilling and block signal work, ship yards, machine shops, boiler shops, bridge work and building construction in general and where mechanical power is not available.

The different types of drills are described in detail and illustrated, several of them being shown drilling steam and electric railroad track. The company makes a special drill for electric railroad work with a simple vertical sliding adjustment which allows the drill to reach any part of the web of the rail. A description of this drill, which weighs only 20 pounds, was published in the *DAILY ELECTRIC RAILWAY JOURNAL* of Oct. 16, page 1162.

Consolidated Railway Supply Company, Chicago, Ill.—This company has issued Catalog No. 15 under date of Sept. 30, in which is given a list of its general railway material, electric railway and mining supplies. The company acts as manufacturer's agent for such articles as air compressors, car replacers, derailleurs, electric drills, motor cars, pneumatic hoists and track supplies. The bulletin describes, among other things, a portable pipe bending machine operated by steam or compressed air, the Newton wrecking frogs, Smith derailer, Monarch couplers, Chicago Pneumatic Tool Company's long-stroke pneumatic riveting, calking and beading hammers, electric drills for direct or alternating current, electric grinders for direct or alternating current, multiple gear hoists, self-locking and ordinary tackle blocks, and portable electric hoists.

Crane Company, Chicago, Ill.—The *Valve World* for October, published in the interests of the Crane Company, contains as a feature a description of the equipment of the company's Bridgeport factories, which are said to be a model of advanced engineering. A feature of the new plant is the power station, which is opposite the factory building proper. The exterior of the plant, the turbine room at the west end of the building and the main pumping room are all illustrated. R. T. Crane, who continues his article entitled "Some Fallacies of Education," presents the opinions of farmers regarding the practical value of agricultural college work, and shows that their testimony is not conclusive. Mr. Crane, in his next article, will take up the short college course and other matters pertaining to this subject. He says that he has no other object in going into this subject other than the public good, and invites those whose views differ from his to express their opinions.

McDowell, Stocker & Co., Chicago, Ill.—This company has issued an illustrated circular describing its combined revolving oil stone and grinder with grinding cone and leather wheel for sharpening edge tools quickly and for general grinding. In these machines the special revolving oil stones made by this company are mounted on one arbor and are combined with a grinding wheel, grinding cone and leather wheel mounted on another arbor above and at right angles to the lower arbor. One oil stone is comparatively coarse grained and is adapted for fine grinding and quick roughing, but the other has a very fine grain and makes a smooth, keen edge. Kerosene is fed to both stones to keep them clean and sharp. It also prevents glazing and does not allow the tool to heat. The company's revolving oil stone universal edge tool grinder has an automatic knife grinding attachment for grinding long knives and is described in a special pamphlet which will be sent on request.

Railless Electric Traction Company, Ltd., London, E. C., Eng.—This company, which has acquired from Max Schiemann & Company the patent rights to their trackless trolley system in Great Britain, India and the colonies, describes the system in a 16-page illustrated pamphlet, and gives comparative estimates of the cost of overhead trolley lines and trackless lines, with the returns on the capital invested showing much in favor of the trackless trolley. In the case of the Corporation of Mulhausen, Germany, it is shown how, when the question came up of extending the railway facilities of this city of 100,000 inhabitants to the suburbs, the trackless trolley was decided upon as meeting the situation to the best advantage. Trackless trolley lines built on the Schiemann system for passenger and freight service are now installed as follows: Grevenbruck-Westphalia; Monheim-Langenfeld, near Cologne; Veischedethal-Westphalia; Wurzen-Saxony; Grossbauchlitz-Saxony; Lyons-Charbonnières, France; Neuenahr-Ahrweiler, Germany; Mulhausen, Alsace, Germany.

Elliot-Fisher Company, Harrisburg, Pa.—"Then and Now" is the title of a little folder issued by this company to bring out forcibly the value of the company's book typewriter. Snatches are given of the characters Ichabod Crane, Christopher Columbus and Benjamin Franklin to show that the one-horse shay and the old stage coach were good things before the gasoline wagon and the railway, with its Pullman vestibule cars, came into use. It is pointed out that in old accounting methods the day book, journal and ledger were used, and that occasionally the day book and journal were combined, a bookkeeper being compelled to

wait until the end of the month to know whether or not he had made any mistakes. In contrast with this method, the Elliot-Fisher standard adding-writing machine writes the original entry in half the time it was done before, posts to the ledger and makes out the monthly statement at one writing. Consequently, when the bookkeeper posts the last item on the last day of the month his statements are finished and his work for the month is done.

Carnegie Steel Company, Pittsburg, Pa.—This company, which has recently taken over the Schoen Steel Wheel Company, has issued a new catalog about Schoen solid forged and rolled steel wheels. It contains illustrations of the wheels in the successive stages of manufacture, together with half-tone illustrations and dimensioned line drawings of a number of typical designs of wheels for freight cars, locomotive trucks and tenders, steam railroad passenger cars, interurban motor trucks and city street car trucks. These wheels have been put in service by some of the largest electric railway systems in the country, including the Brooklyn Rapid Transit Company, Philadelphia Rapid Transit Company and the New York City Railway Company. More than 66,000 of these wheels are in service on the Pennsylvania Railroad. The principal advantages claimed for the solid steel wheel are freedom from defects and failures; large factor of safety against breakage; maximum mileage and uniformity of service due to homogeneity of the metal. The catalog includes some valuable pointers on the care of wheels and full directions for ordering.

H. W. Johns-Manville Company, New York, N. Y.—“What Radiation of Heat Means to You,” is the title of a 12-page pamphlet issued by this company to impress power users with the money loss due to radiation from bare or improperly covered steam pipes. To show what these losses are the company gives the results of a series of tests printed in the official publications of the American Society of Mechanical Engineers. The saving in coal consumption for 10,000 sq. ft. of surface heated 365 days per year, 24 hours per day, is given as 36 per cent for Johns-Manville high-pressure covering over ordinary covering, and 600 per cent for Johns-Manville high-pressure covering over bare pipe. The J-M asbestos-sponge fitted sectional pipe covering, J-M asbestos fire-felt pipe covering, J-M Magnesite pipe covering, J-M Vitribestos section pipe covering and the J-M Asbestocel sectional pipe covering are all briefly described. In addition, the principal coverings of the company are tabulated according to the service they are designed to perform as follows: For high pressure and superheated steam pipes, for low-pressure steam and hot-water heating systems, for hot-air pipes, for protection against freezing and for brine and ammonia pipes. The application of J-M sectional conduit for underground pipes is illustrated.

ELECTRIC RAILWAY PATENTS

UNITED STATES PATENTS ISSUED NOVEMBER 3, 1908

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

Railway Signaling Apparatus, 902,553; Edward R. Brodton, Mobile, Ala. App. filed Nov. 19, 1907. Signaling apparatus for the automatic transmission of danger signals, both in front and behind a train, or from a switch or block station, or from some portion of the railroad liable to dangerous conditions. Comprises receiving means responsive successively to characteristically different overlapping trains of waves, and a signal circuit controlled and rendered active by the receiving means energized by the last train of waves received.

Anti-Creeping Device for Rails, 902,567; Richard F. Downey, Milwaukee, Wis. App. filed Feb. 11, 1907. An anti rail-creeping device provided with a depending lug and adapted to be shrunk upon the rail base.

Detector Bar, 902,580; Casper Herringer, New York, N. Y. App. filed Feb. 28, 1908. A cam-way member for detector bars having an inclined cam face on its edge to guide a detector bar upward, and a cam face on its side to guide said detector bar inward.

Railway Frog, 902,589; George C. Lucas, Cleveland, Ohio. App. filed Feb. 20, 1908. Comprises a solid frog body having one or more outer side surfaces of the same contour as a rail, track and guard rails, and angle splices secured to the side surfaces and connecting the body to the rails.

Vehicle Sanding Apparatus, 902,626; John Taylor, Liverpool, Eng. App. filed Dec. 14, 1907. Details of construction.

Trolley Wheel, 902,628; Lewis J. Tetlow, Chicopee Falls, Mass. App. filed Jan. 2, 1908. The trolley wheel has a hollow hub with a plurality of fiber-bearing disks therein, and which is packed with lubricating compound.

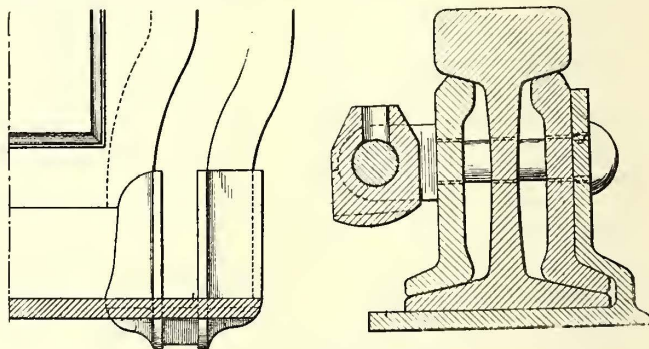
Track Fastener, 902,757; George W. Nevins, Perry, N. Y. App. filed March 21, 1908. Consists of jaws, one member of which engages the base of the rail, while the other member fits in an opening in the top of a channel-shaped metallic rail.

Ball-Bearing Trolley Wheel and Harp, 902,781; Stephen Tully, Jr., Philadelphia, Pa. App. filed Feb. 27, 1908. In place of the usual axle the trolley wheel is made rounded at its hub and fits in concave portions of the harp so as to constitute a form of swivel joint.

Railway Switch, 902,866; John M. Faller, Jacksonville, Fla. App. filed March 2, 1908. A switch spring actuated to its closed position, means for actuating the switch to its open position, and a track device including raised track rails for holding the actuating means against movement while a train is passing through the switch.

Corner Structure for Cars, 902,943; Samuel M. Curwen, Haverford, Pa. App. filed May 1, 1908. A corner post for cars made to form two members spaced a given distance apart, and a base plate uniting the two members, each member having a socket for the reception of a post and braced to stiffen the structure.

Controller for Motor Traction-Cars, 902,985; William C. Mayo, El Paso, Tex. App. filed Feb. 24, 1908. Includes a controller by means of which an engineer may use his judgment in running the car, provided the prescribed course of movement of the controller is strictly followed. The controller has means for preventing the overlapping of any of the normal operations or variations in the normal sequence of operation.



Corner Structure for Car—Pat. No. 902,943
Rail Joint—Pat. No. 903,124

Railroad Switch, 903,024; Claude C. Swan, Buffalo, N. Y. App. filed June 25, 1907. Automatically acting means for setting the air brakes of a train in the event that the latter should fail to stop before reaching an open switch.

Rail Joint, 903,027; Marshall F. Tranchard, Prattsburg, N. Y. App. filed May 19, 1908. The heads of the abutting rail ends are cut away and the webs are spliced together. A coupling sleeve straddles the spliced webs, said coupling having a head portion conforming in contour to the head of the rails.

Air Brake, 903,077; William P. Gentleman, Bratrice, Neb. App. filed April 24, 1907. An air-brake system having a compensating cylinder and piston therein for automatically controlling admission of air from the train pipe to the brake cylinder, said compensating cylinder adapted to compensate for the loss due to leakage in the system.

Track Switch, 903,110; John J. Ruddick, Newton, Mass. App. filed May 23, 1908. Has a water-tight compartment having a resilient extension, fixed movable contacts contained therein, the movable contact being carried by the resilient extension.

Car Replacer, 903,115; Charles M. Sullivan, Marion, Ind. App. filed May 25, 1908. Details of construction.

Rail Joint, 903,124; John Wolfe and Michael J. Kavanagh, Cleveland, Ohio. App. filed Nov. 14, 1907. Means for clamping the fish-plates to the rails comprising one or more clamping devices, each consisting of a pair of bolts arranged to pass through the rails and fish-plates, nuts arranged on the ends of the bolts, a shaft mounted in and extending between the nuts and a block provided with cam face rotatably mounted on the shaft.

Notice.—Harry A. Shields is no longer authorized to solicit subscriptions for the ELECTRIC RAILWAY JOURNAL or take orders for any other periodicals or books of the McGraw Publishing Company, and the company will not hold itself responsible for any payments made to him. He has been working recently in Washington (D. C.), Baltimore, Atlantic City, Philadelphia and vicinity.