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Our Convention Issue

This issue of the ELECTRIC RAILWAY JOURNAL, like those published prior to the annual conventions for many years, consists of two parts: the current issue or news section, and the special convention section. The latter this year is devoted to a subject which is attracting more attention now than ever before, namely, the promotion of traffic. In one sense the promotion of traffic is allied with publicity work, about which so much is being said at present. Its object is to give the public a better knowledge of the service which a company can furnish and is furnishing, and so to increase the gross receipts of the company. A canvass of the situation among the electric railways of the country showed that there are very few which are not doing something along this line. Some have greater opportunities than others, and some are utilizing to better advantage the opportunities which they have, but practically all are advertising their service in some way, such as by the issue of time tables, circular letters or folders, or by direct solicitation, or in daily newspapers. For the last two years the Transportation & Traffic Association and, prior to that time, the American Street & Interurban Railway Association have had committee reports on the promotion of passenger traffic. It was largely the interest expressed in the report of this committee last year and the exhibit accompanying that report which suggested to the publishers of this paper the devotion of their convention issue of 1910 to the subject of the promotion of traffic.

Promotion of Traffic

Promotion of traffic is a very broad subject, and in such a condensed summary of methods as is presented in the convention souvenir section of this issue it is possible only to refer briefly to the principal features of the work of a few representative companies. The 70 electric railways from which information was obtained by personal visits of the editors or by correspondence are located from Maine to the Pacific Coast and include large as well as small properties. They have been divided into five geographical groups and each group is considered in a separate chapter. Among other features of traffic promotion work about which information was obtained may be mentioned newspaper advertising, timetables and descriptive folders, car advertising, chartered and special-car service, and personal solicitation of excursion parties. The interurban railways west of the Allegheny Mountains are devoting much attention to building up freight traffic, and in the chapters devoted to the roads in the Central States, Mississippi Valley States and Pacific Coast States freight solicitation methods and industrial development work are treated at length. No doubt many companies other than those which are referred to in this issue have devised equally interesting and valuable methods of traffic promotion, and the publishers regret that limitations of time and space made it impossible to include them. On the

whole, it is believed that the contents of the souvenir section form an outline of typical practice of electric railways in this comparatively new but almost unlimited field of effort.

Another Collision of Interurban Cars

As we go to press news comes of another disastrous head-on collision between interurban cars, this time on the Illinois Traction System, near Staunton, Ill. The reports are not very definite as to the cause, but the collision appears to have been due to a fatal mistake on the part of the crew of a northbound car in not heeding the signals carried by a southbound car indicating a second south-bound section. The first section was passed safely, but the north-bound car struck the second section on a curve at the foot of a long grade and 36 persons, including four officials of the Illinois Traction System, were killed. The layman is fully justified in asking with real concern whether the train order system is adequate under the conditions existing in high-speed electric railway operation. Something must be done to make collisions of high-speed cars as remote a contingency as possible. While the human element must be depended upon for absolute safety, we believe that it should be assisted by some automatic or mechanical means. If there is no other recourse, the simple staff system, in spite of its inflexibility, at least affords a train crew evidence which any man can understand showing that it has an indisputable right to the section of track which the staff governs.

Registration at the Convention

It will be a very great convenience to the officers of all of the associations which will meet in Atlantic City next week, as well as to the delegates themselves, if those in attendance will make use of the advance registration cards sent out by the secretary the first part of this week. The plan of sending out advance cards on which delegates can register their names, the names of the companies with which they are connected and their official titles has been adopted to reduce the congestion at the registration booth during the first few days of the convention, but the cards were not utilized last year as extensively as they might have been. The time per individual at the registration booth is reduced practically one-half if those at the association booth have simply to issue a badge, instead of issuing both a badge and a registration card, and this time saved is useful both to the delegate and to the association. It is needless to add that to have a correct registration those who fill out the cards should write their names and the names of the companies with which they are connected clearly. The names in question may be very familiar to the secretary of the association, but not to the stenographer who transcribes the card or to the compositor who sets the list of those in attendance. Preferably the cards, if made out in advance, should be typewritten, so that all chance of error will be reduced to a minimum. This is one of the little ways in which the delegates in attendance can facilitate the work of the convention. In this connection, although not directly related to registration, a word might be said in regard to promptness of starting meetings. This is a duty which delegates owe to the officials of the organization as well as to each other. The time saved to the different associations if enough delegates are in the convention rooms on time so that meetings can be promptly started would amount to considerable in the aggregate. To "run on time" is as good for an association as for a railroad.

FIRE PROTECTION IN OPEN STORAGE YARDS

The description published elsewhere in this issue of a car-storage yard equipped with standpipes and nozzles for fire protection brings up the subject of the comparative merits of storage in the open and in car houses, as well as that of protective devices against fire in the open yard. In comparing the merits of these two systems of storage we must balance the saving made in insurance premiums and in the cost of car house construction when cars are stored in the open against the deterioration of the paint and varnish on the car caused when cars are exposed to the weather as in a yard. The average insurance rate on cars in the open is from 25 cents to 50 cents, as against, say, an average rate for cars in sprinkled car houses of 30 cents and a rate for cars in unsprinkled car houses of 60 cents or more. We doubt, however, whether the saving in premiums thus secured, added to the interest on the cost of a car house, is as large, in most cases, as the losses caused by deterioration of cars in open storage. Steam railroad practice is often cited as a precedent for outside storage of cars, but the comparison is not an exact one because few steam railroad companies aim to maintain as high an outside finish for their coaches as city railway companies. Moreover, the steam railroad coach is more weather-tight than the ordinary city car, and is not equipped with electrical apparatus, which undoubtedly also undergoes some deterioration when open storage is used.

The use of standpipes for fire protection for cars is not new, as standpipes with elevated nozzles were employed for car house protection in Newark a number of years ago, but their use for the protection for cars in outside storage yards is probably novel and certainly interesting. In considering this installation the first question naturally to arise is in regard to the relative advantages of these standpipes and of a corresponding number of hydrants with hose stored in covered houses. The principal arguments in favor of the standpipes are that as the nozzles are located on elevated platforms the operator is able to see every part of the yard and can thus easily locate a fire; that the equipment is always in place and ready for immediate use; that it is probably less liable to accident than hose; that each nozzle can be handled by a single man, and that a minimum amount of space is required. On the other hand, it is questionable whether the standpipe equipment, being exposed as it is to the weather, would not be more apt to deteriorate than hose and hydrants, and whether with a hose equipment a larger number of streams could not be more readily directed on a single point than with a system of standpipes. Either system can be so arranged, of course, that city fire steamers can be connected with the car yard fire service and thus supply additional pressure if necessary.

The cheapest, simplest and probably the most effective protection against fire in open storage, where it is practicable, is to have plenty of room between the tracks, with open aisles down which fire engines or other fire-fighting apparatus can be brought. To this precaution should be added ample entrance facilities and enough trackage room so that cars near those on fire can be removed from the zone of danger. It is doubtful whether expensive fire walls afford any better protection against fire than these open spaces. Certainly they often interfere greatly both with ordinary work in the yard and with the fire department where its services are needed. Of course, where the ground area is limited the fire wall offers a most

satisfactory barrier against the spread of fire, and it should be as effective in the car yard as in a car house.

MORE DETAILS OF PHILADELPHIA OPERATIONS

Fuller details of the results of operation and more open discussion and publicity concerning the affairs of the property than have been ventured heretofore are contained in the annual report of the Philadelphia Rapid Transit Company for the fiscal year ended June 30, 1910. An abstract of the report was published in the issue of the *ELECTRIC RAILWAY JOURNAL* for Sept. 24, 1910, page 480. The losses due to the irksome strike are set forth without reserve; the policy that makes no secret of the appalling sum which the walkout of employees and the subsequent riots and interruption of service cost the company is a wise one. The action of the company in giving the figures of its burdensome rentals for underlying properties and in presenting more than the usual number of details is in line with progress; such figures should be thoroughly understood.

The Philadelphia Rapid Transit Company was organized to assume control on July 1, 1902, of the various existing street railway systems in Philadelphia and to construct the Market Street Elevated Railway. During the eight years that intervened from that time to the close of the 1910 fiscal year the company has received from shareholders in cash practically the full payments due on their capital stock, a total of \$30,000,000. It has "earned only a deficit" in four years out of eight. Its annual earnings and income have increased from \$15,436,574 to \$18,501,357, or 19.9 per cent. Its charges for interest and rentals have risen from \$6,743,843 in 1903 to \$8,374,463 in 1910, or 24.2 per cent.

It is evident from this showing that the company needs the full advantage of its possible gross earnings and that a strike inflicts serious loss. President Charles O. Kruger shows that in the seven months of the fiscal year which preceded the declaration of the strike the company made, as compared with the corresponding period of the previous year, an increase of \$681,964 in gross receipts and of \$285,819 in net. The maintenance of the same rate of increase during the rest of the year would have yielded a gross increase of \$1,261,469. In the 66 days of the strike the actual loss in passenger receipts, compared with the corresponding period of the preceding year, was \$1,558,105. The normal passenger earnings of the company, based on the record of the 1909 fiscal year, averaged \$50,185 per day and the continuance of revenues at the same rate would have meant, for the entire 66 days, gross of \$3,312,210. In this estimate we disregard the expected normal rate of increase in 1910 over 1909 and also the fact that the strike did not cripple operations during the best traffic seasons. The company was fortunate to have kept so large a proportion of its regular business while the disorder prevailed as these figures appear to indicate.

Of course, these amounts do not express the full measure of the loss to the company, which was enhanced, first, by the delay that intervened between the final settlement of the strike and the restoration of normal traffic conditions; second, by a heavy increase in current expenses, and, third, by extraordinary expenses of \$836,856 incurred in protecting the property.

As the passenger earnings of the company amounted in 1910 to upward of \$18,300,000 per annum, the actual loss is an im-

pressive proportion of the revenues, both gross and net. The extraordinary expenses for protection are equal to an additional 4.5 per cent of the gross receipts and income for the year. The entire loss to the community, of course, was much greater, as the estimate just given does not touch the effect upon other industries of the sinister sympathetic strike; nor does it measure the economic loss of idle men and idle industries. These are heavy burdens which the strikers and their sympathizers laid upon the Philadelphia Rapid Transit Company and upon the citizens of Philadelphia.

Under the depressing influence of the strike gross receipts of the company from all sources showed the first decrease since the organization of the system on the present basis in 1902. As stated, the gross receipts from all sources did not meet all the requirements, and with operating expenses of 53.4 per cent of gross earnings and miscellaneous income, with a charge for taxes and licenses of 8.5 per cent and with fixed charges of 45.3 per cent, the deficit is thus shown to be equal to 7.2 per cent on all the receipts of the company during the period. This is less than the apparent loss in gross suffered by reason of the strike.

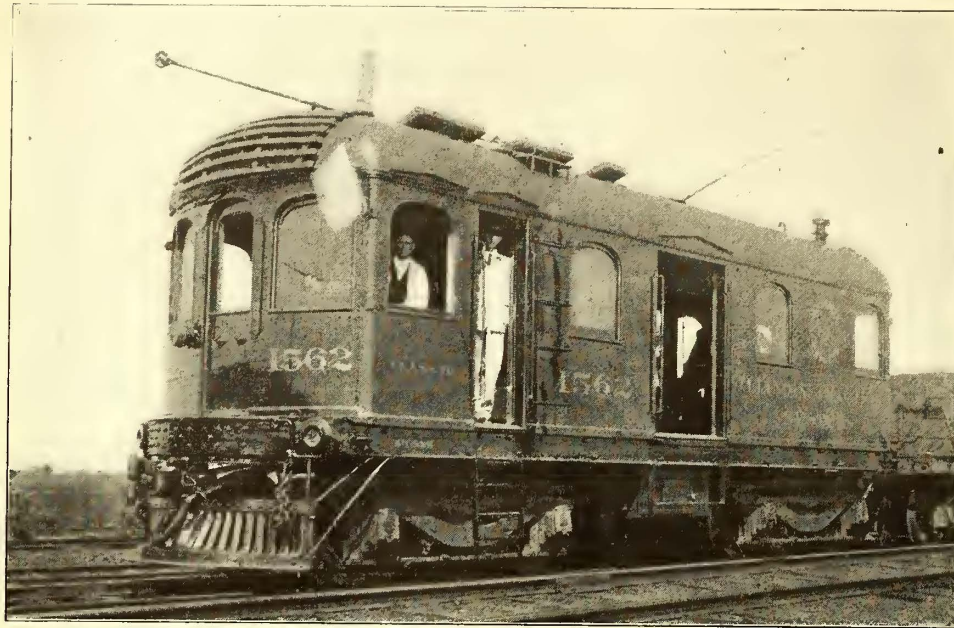
To what extent, if any, the system received any actual betterment from the heavier operating expenses is a matter that is not ascertainable. The operating expenses equaled 3.6 per cent more of combined passenger receipts and miscellaneous income in 1910 than the corresponding ratio in the previous year. If the operating expenses be considered in relation to the sums representing the totals of passenger and miscellaneous receipts in 1910 and 1909, which, of course, include an amount of income from other sources than operation, it is found that the proportion of the totals expended for maintenance was 11 per cent in 1910 and 9.7 per cent in 1909. The corresponding statistics for the other items of expense were as follows: Transportation, 24.5 per cent in 1910 and 23.5 per cent in 1909; power, 7.9 per cent in 1910 and 7.7 per cent in 1909; general expense, 10 per cent in 1910 and 8.9 per cent in 1909. A trivial part of these increases is attributable to an increase of about 1 per cent in trackage during the year, which made the total track 628 miles.

No feature of the report is deserving of more earnest consideration than that which pertains to the heavy fixed charges with which the revenues have to cope. The total fixed charges, taxes and licenses amounted to \$9,944,321, which is equal to 53.7 per cent of the total revenue and income from all sources. Of this total \$1,569,858, or 8.5 per cent of the aggregate earnings and income, represents taxes and licenses, leaving \$8,374,463, or 45.2 per cent, as the portion of total gross from all sources which had to be applied to fixed charges. The distribution of this large amount in the detailed statement of fixed charges for the year shows that \$6,989,326 net was paid as rentals on stocks of underlying companies. While the actual total thus paid was \$7,249,116, this was reduced by \$259,790 dividends on stocks owned. The other items which are part of the total cover in the main bond and mortgage interest and ground rents. For maintenance of the organization of underlying companies \$36,300 was expended and for registration of stocks and trusteeships \$10,120. Two unusual items are accident annuities, \$1,250.

A company owes a duty to its stockholders which publicity in respect to these matters, whether of favorable or unfavorable facts, helps to fulfil.

NEW 60-TON LOCOMOTIVES OF ILLINOIS TRACTION COMPANY

The Illinois Traction System is just putting into service six 60-ton electric locomotives that exhibit several novel features of design. With the exception of the trucks and electrical equipment, these units were designed and built by the railway.



New Illinois Traction Locomotives—Side View of Locomotive in Service

They will be used in handling trains of freight to and from the new St. Louis freight terminal. Accompanying illustrations show the general features of design of these locomotives and the special details of construction. The following statement presents the general data regarding each of the six units:

Length of underframe over all.....	34 ft. 0	in.
Length of body over all.....	31 ft. 4	in.
Truck center distance.....	19 ft. 0	in.
Truck wheel base.....	7 ft. 2	in.
Height, track to sill.....	3 ft. 5	in.
Height, bottom of sill to top of roof.....	9 ft. 4 13/16	in.
Width over all.....	9 ft. 3	in.
Width inside.....	8 ft. 5 1/2	in.
Drawbar pull.....	30,000 lb.	
Weight.....	120,000 lb.	
Body construction.....	Steel box	
Underframe.....	Six 10-in., 40-lb. I-beams	
Body bolsters.....	Steel plate	
Trucks.....	American Locomotive Company	
Wheels.....	36-in. Midvale rolled steel	
Truck bolsters.....	Cast steel	
Springs.....	Pittsburg Spring & Steel Co.	
Journal boxes.....	Symington, 5 1/2 x 10 in	
Motors.....	Four G.E. 69-C, 200 hp each	
Control.....	General Electric Type M with C 83-A controllers	
Gears and pinions.....	General Electric	
Airbrakes.....	Westinghouse schedule E L	
Brakeshoes.....	American Brake Shoe & Foundry Company	
Couplers.....	National Malleable Castings Company	
Pilots.....	Angle iron	
Headlights.....	Wagenhals	
Sanders.....	Illinois Traction System	
Trolley base.....	U. S. B.	
Trolley retrievers.....	Knutson No. 2	
Paint.....	Sherwin-Williams	
Varnish.....	Murphy	

UNDERFRAMING

The chief members of the underframing of these locomotives are six 10-in. I-beams which are continuous from bumper to bumper. The sills are tied together by 10 crossings, which include iron spacing blocks with their ends shaped to fit the contour of the I-beams. The spacing blocks between the center sills are malleable iron, each cast with a hole through its center to enclose and support the cable conduits. At each crossing the sills and spacing blocks are held together by two 1-in. tie rods passing through the webs of the sills and through bosses cast on the spacing blocks. Yellow-pine nailing pieces 4 1/2 in. square, are bolted to the longitudinal sills to carry the cross flooring, which is 1 3/4 in. thick.

CAST-STEEL BUFFER

At each end of the underframe the six I-beam sills butt

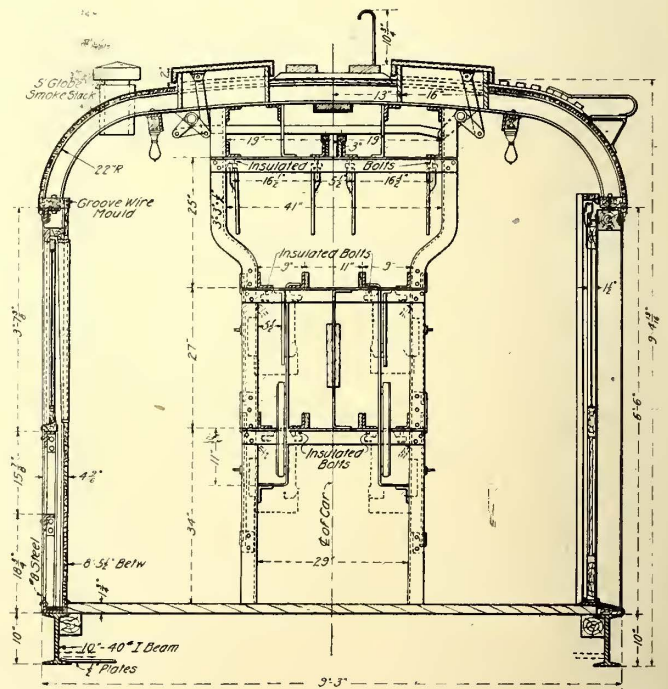
against a combined end sill and buffer, which is a single casting of steel weighing about 1000 lb. and having a vertical face of 11 3/4 in. The general form of this combination buffer and end-sill casting is illustrated and the method of attaching the sills thereto by the use of 1-in. x 8-in. pocket irons and 1-in. rivets is shown.

The front face of the buffer piece has a radius of 3 ft. 9 in. at the center. The back edge of the top part of the buffer casting has a radius of 9 ft. 3 in. This gives the casting an extreme depth of 16 in. along the center line of the locomotive and 8 in. at the ends where the side sills are attached. The large cast-steel end sills are designed to furnish support for coupler radius bars and the locomotive pilots.

The body bolsters are made up of 1 1/4-in. x 12-in. steel plates, the top pieces passing over the center and intermediate sills and under the side sills. The ends of the top pieces are upset to form shoulders against which butt the lower bolster plates. The nuts on all bolts passing through the bolsters are protected with National lock washers.

BODY FRAMING

The body framing of each of the locomotives is made up of structural steel shapes and supports a turtle-back roof. The side posts of the body framing are 3-in. x 3 1/2-in. x 3/8-in. angle irons connected at the bottom by angles of similar section and riveted to the tops of the side sills. The tops of the posts are riveted to continuous angles 3 1/2 in. x 3 1/2



New Illinois Traction Locomotives, Cross Section Through Body Showing Frame for Supporting Contactors

in. x 3/8 in. in section. Continuous roof carlins made of angles having the same section as the side posts are spaced on centers of about 16 in. The total rise of the arched roof is 24 in. and the carlins at the sides of the body are bent to a radius of 22 in. Five-eighths inch rivets join the angle-iron carlins, the side posts and the top plates. The carlins are also tied together

by 10 1/2-in. bolts extending lengthwise of the car, and the roof also is stiffened by four angle-iron purlins riveted under the carlins. The roof is covered with matched poplar protected from the weather by No. 6 cotton duck.

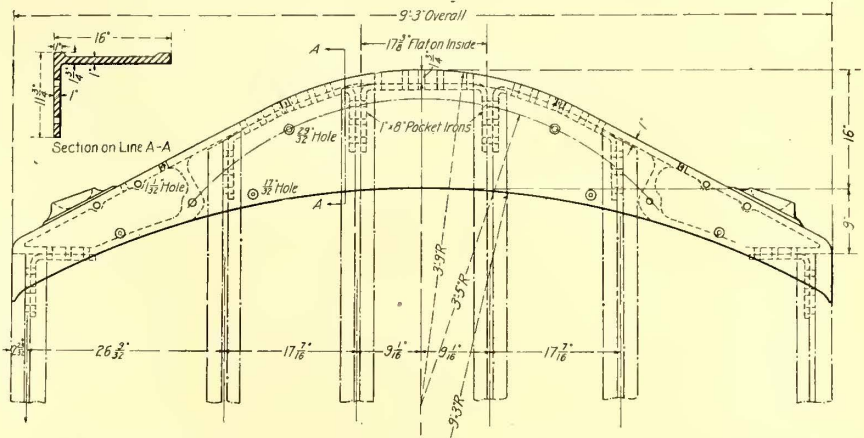
The ends of the locomotive bodies are built to a radius of 9 ft. 3 in. and each contains two windows and a door. Angle-iron framing equal in weight to that of the sides supports the end sheathing. The top pieces are reinforced at the corner posts with 3/8-in. gussets.

Each side of the locomotive body has two sliding doors and four arched windows; one door, at the motorman's corner, is 2 ft. wide and the other, at the center, is 4 ft. wide. The doors are built to slide. The windows, all of which may be dropped into pockets, have glass 26 1/2 in. x 30 1/8 in. in size. The exterior of the framework of each locomotive is sheathed with No. 8 sheet steel having butted joints riveted to the angles of the body framing. Matched yellow-pine sheathing, 13/16 in. thick, is used on the inside. The end doors are sheathed with No. 14 steel and carry brackets to support the arc headlights and trolley retrievers. Roof mounts, steps and footholds are provided according to the specifications of the Master Car Builders' Association.

COUPLER AND DRAFT GEAR

The locomotives are fitted with the Bosenbury type of M.C.B. contour coupler, made by the National Malleable Castings Company. These couplers have spring carriers supported by radius

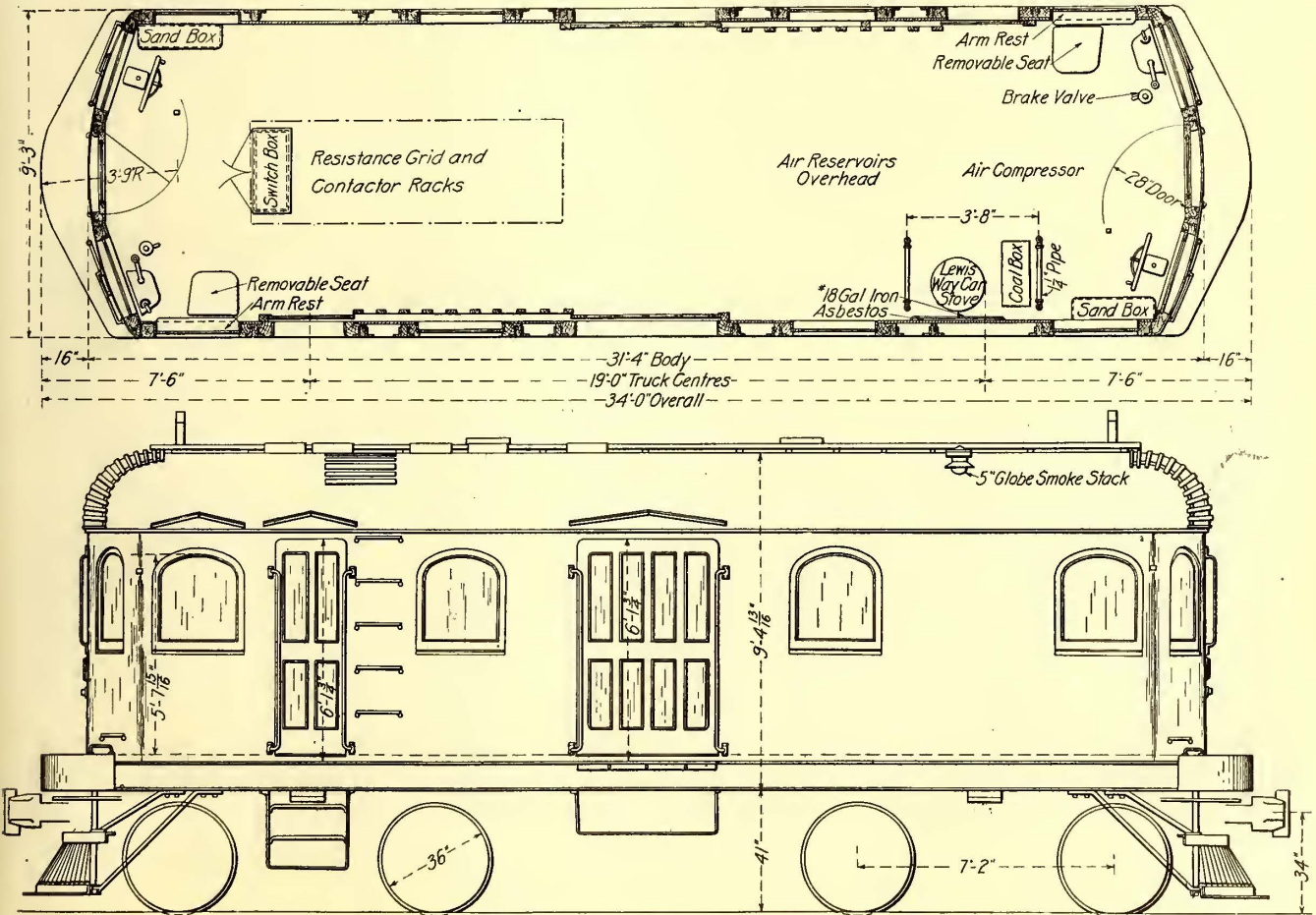
swivel pin is 2 in. in diameter. The length of the coupler from the center of the pulling face to the center of the swivel pin is 4 ft. 9 in. and the center of the swivel pin is 4 ft. 3 in. ahead of the truck center. The unique feature of the coupler is the extreme depth of the knuckle, 16 in., which prevents the parting of a train at severe breaks in grade. This type of coupler and attachment has been developed by J. M. Bosenbury, super-



New Illinois Traction Locomotives—Cast-Steel End Sill and Buffer

intendent motive power and equipment of the Illinois Traction System, and is standard for all equipment of that road.

The pilots of the locomotives are formed of 3-in. x 4-in. x 1/2-in. angles riveted together and supported directly under the buffer pieces, being braced against the side sills by struts 1/2 in. in diameter.



New Illinois Traction Locomotives—Plan and Elevation

plates bolted to the cast-steel buffer pieces. The coupler anchorage is riveted to the center sills and includes a spring pocket carrying one 7/8-in. steel spring with a 5 1/2-in. outside diameter and one 3/4-in. steel spring with a 3 1/4-in. outside diameter. The

ELECTRICAL EQUIPMENT

The electrical equipment of these six new electric locomotives of the Illinois Traction System is designed to provide a high drawbar pull during the complete range of acceleration.

mobiles, but experience has shown that the trackless trolley buses are able to turn out for any passing vehicle or any obstruction and still have a safe clearance. For two weeks during the early part of September it was found necessary to operate over a portion of road which was being plowed up for a change in grade. This work made it necessary to drive the cars across deep furrows over a stretch of soft plowed ground, all of which was accomplished successfully.

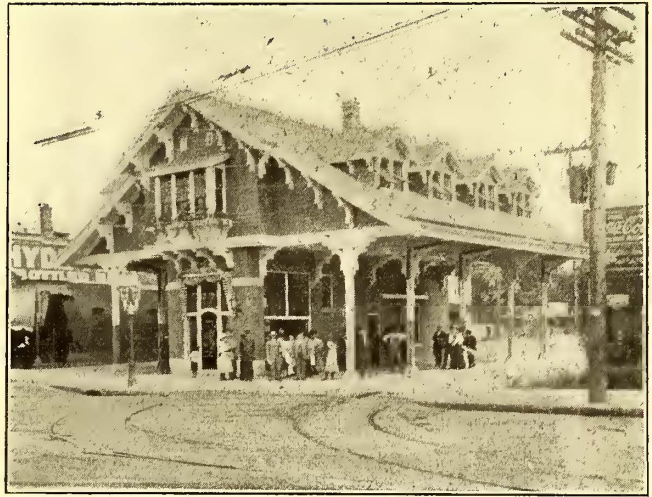
No turn-out is used on the road. The grades are continuous and the car going down hill is enabled to coast about half the distance on gravity so that the car going up has the power right of way. The car going down attaches its collectors to the wire only where the grade is not sufficient to permit coasting. There has been no trouble from the collectors leaving the wire, although some very sharp curves have to be passed. The one man who operates a bus collects the fares before starting and then takes his position as motorman, remaining in place until he reaches the terminal. Only in rare instances is it necessary for him to get out and attach the trolley. Such action would be due either to faulty operation or to exceptionally rough places passed over at excessive speed. The collectors are not wheels, as was stated in the earlier article on this line, but are under-running shoes of sliding type. They have given very satisfactory results so far, but the company does not wish to publish the details of construction until certain details have been perfected.

The motor equipment per bus consists of two 15-hp series motors, which drive the wheels through sprocket chains. The controller does not differ materially from the regular railroad type. The weight of the car is about 3000 lb. and its carrying capacity 16 passengers. While no tests have been made as to the amount of power required, the company has found that the equipment mentioned is ample even when the cars are loaded beyond their ordinary capacity. The maximum speed under favorable conditions is about 25 m.p.h. and on the 12 per cent grade about 8 m.p.h.

The cost of a bus completely equipped is about \$2,500. Mr.

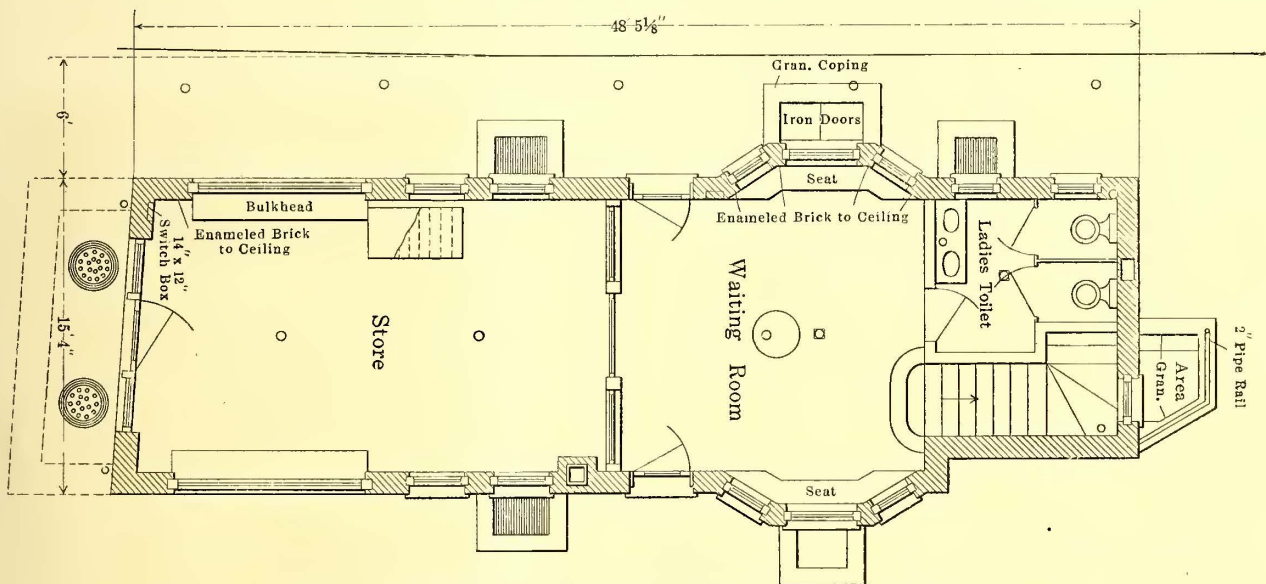
AN ARTISTIC TRANSFER STATION IN ST. LOUIS

The United Railways Company, of St. Louis, has recently completed a transfer station at the corner of Hodiamont and Easton avenues—the junction of two city lines, one cross-town line and three suburban lines. The new building is not only interesting for the compactness of its design, due to the limited area available at the junction, but also for architectural



Transfer Station, United Railways of St. Louis

treatment which marks a distinct advance in American city buildings for like purposes. As shown in the accompanying half-tone illustration, the striking artistic appearance of the building has been obtained by employing the long, sloping ornamental roof so characteristic of the Swiss chalet. This kind of roof lends itself admirably to the protection of large areas. In this case efficient protection for passengers who are trans-



Plan of Transfer Station for the United Railways of St. Louis.

Mann states that this figure is rather high owing to the novelty of the vehicle and local causes such as a strike.

The overhead construction does not differ materially from that for the ordinary electric railway, except that an additional wire is required for the return current and a few departures due to certain conditions of grades, curves and right of way for pole lines.

Arrangements are being made in Pittsburgh for a mammoth "Land Show," which is to be held Oct. 17 to 29. The exhibits will include those of the United States Government, boards of trade, companies and State exhibits.

ferring in rainy weather is furnished by having the eaves project over the two sets of tracks along each side of the building.

The building line proper is embraced in an area only 48 ft. 5 1/8 in. long by about 15 ft. 4 in. wide. The exterior of the street floor is of brick with stone trimmings and the interior is of enameled brick except for some glazed brick in the store; the upper floor is of wood treated in the Swiss fashion, as already mentioned. The lower portions of the roof are carried over the rails on 8-in. x 8-in. yellow pine posts, which are set on concrete piers between each pair of tracks. Although small, the building serves for other operating purposes besides

the transfer of passengers. The basement contains a storage room, a heating plant, bins for coke, sand and salt, and a men's toilet. The ground floor, which is shown in the plan on page 649, has a store in the front part, the remainder being divided into a waiting room and women's toilet. The upper floor is used as a division headquarters for one of the suburban lines ending at this location. Acknowledgments are due to Richard McCulloch, vice-president and assistant general manager of the company, for courtesies extended in preparing this article.

REPORT ON THE PROGRESS OF STREET RAILWAY REHABILITATION IN CHICAGO

The Board of Supervising Engineers of Chicago Traction has just published its second annual report covering the year ended Jan. 31, 1909, and an advance report presenting financial and statistical information for the year ended Jan. 31, 1910. A review of the first annual report of the board appeared in the ELECTRIC RAILWAY JOURNAL for Nov. 13, 1909, page 1021. The new report covers in detail the operations of the two boards of engineers which are supervising the rehabilitation of the Chicago City Railway, Chicago Railways and the Calumet & South Chicago Railway properties.

Board No. 1 embraces the work of the Chicago City Railway and the Chicago Railways. Its members are: Bion J. Arnold, chairman; George Weston, representing the city of Chicago; Harvey B. Fleming, representing the Chicago City Railway Company; John Z. Murphy, representing the Chicago Railways Company; F. J. Parke, secretary and auditor, and L. H. Davidson, assistant secretary. Board No. 2 covers the work of the Calumet & South Chicago Railway Company. It is made up of Messrs. Arnold Weston and A. L. Drum, representing the Calumet & South Chicago Railway, and Harvey B. Fleming, representing the Chicago City Railway Company under the operating agreement between the Calumet & South Chicago Railway Company and the Chicago City Railway Company.

The second annual report is a book of 522 pages, 6 in. x 9 in., illustrated with numerous double-page insets and full-page half-tone engravings. The text is subdivided into 15 chapters devoted to such subjects as organization, pay-as-you-enter cars, ventilation of street cars, chemical treatment of ties, through routes, accounting, financial and statistical exhibits, report of the chief engineer of the work, descriptions of organization and work of the engineering divisions of the board, digest of meetings, and text of ordinances.

CALUMET & SOUTH CHICAGO

The valuation of the Calumet Electric Street Railway Company and the South Chicago City Railway Company as made by Bion J. Arnold and George Weston is described. The methods employed in doing this work were similar to those used in the valuation of the Chicago City Railway and the Chicago Union Traction properties. After discussion, \$5,000,000 was agreed upon as representing the value of all tangible and intangible assets of the companies as of Feb. 1, 1908, and this figure was inserted in the ordinance as the basic price to be paid by the city if at some future date it should elect to exercise its option to purchase the properties at this price, plus the cost of such extensions and improvements as might have been added in the meantime, as prescribed by the ordinance.

A condition precedent to the acceptance of the ordinance required the consolidation of the two companies, which was effected May 9, 1908, under the name of the South Chicago City Railway Company. The rehabilitation program as stated in the ordinance requires that all work shall be carried out under the supervision of a board of engineers having substantially the same powers and duties as in the case of the Chicago City Railway and the Chicago Railways, but acting independently thereof. The ordinance provides that the rate of fare for a continuous trip in one general direction within the present or future limits of the city shall be 5 cents and that transfers shall be honored between the Calumet company and the Chicago City Railway Company and the Chicago Railways Company within

the limits of definite zones. Through routes are provided between the systems mentioned. The ordinance of the Calumet company approved an operating agreement with the Hammond, Whiting & East Chicago Electric Railway Company, and obligated the Calumet company to enter into an equitable operating arrangement with the Chicago City Railway, subject to the approval of the Board of Supervising Engineers. The full text of the ordinance and operating agreement is published in the second annual report of the board.

WORK SUPERVISED

Chapter 3 of the second annual report presents a general summary of the work performed by the traction boards during the fiscal year ended Jan. 31, 1909. The Chicago Railways Company accepted its franchise ordinance on Jan. 28, 1908, just prior to the opening of the year under review, and on Feb. 15, 1908, John Z. Murphy was appointed as the representative of that company on the board. The work of rehabilitating the Chicago Railways system proceeded promptly. In consequence the responsibilities of this board were doubled as compared with the preceding year. The magnitude of additional work devolving upon the board during this period is in a measure evidenced by the increase in the number of employees from a minimum of 66 on Feb. 1, 1908, to a maximum of 126 in September, 1908, which was reduced to 105 on Feb. 1, 1909, the average number employed by the board throughout the year being 105.

The boards held 125 meetings during the year, at which were approved certificates for construction and rehabilitation work aggregating \$13,850,551. Plans, specifications and drawings for the work covered by these certificates were designed, examined and approved, work orders were authorized, and the actual work in the field was supervised. Securing of bids was authorized and contracts were approved for the purchase of materials and performance of work for all roads. The report next includes a list of the contracts for material placed during the year. Some of these were as follows:

Air-brake equipments.....	1,025
Brick.....	1,636,200
Car signs.....	2,600
Clay conduit, duct feet.....	2,900,000
Creosoted blocks, square yards.....	6,000
Crushed stone and screenings, cubic yards.....	110,266
Concrete gravel, cubic yards.....	18,000
Concrete mixers.....	12
Cement, barrels.....	219,252
Copper cable, miles.....	385
Electric switches.....	350
Granite paving blocks, square yards.....	1,019,000
Gear cases.....	2,600
Headlights.....	1,300
Paving pitch, gallons.....	522,424
Pneumatic drills.....	18
Poles, tubular steel.....	1,100
Rail bonds.....	2,000
Registers (fare).....	350
Rail, tons.....	38,500
Rail joints.....	4,000
Rotary converters.....	11
Steam track crossings.....	30
Spikes, screw.....	1,050,000
Sprinkler tanks, 4,000 gallons.....	12
Snow plows.....	5
Snow sweepers.....	22
Trolley catchers.....	2,350
Track special work, layouts.....	85
Ties.....	242,629
Welded joints.....	10,000
Wire, galvanized span, feet.....	45,000
Wire, copper, miles.....	231

The report contains a concrete statement of the work accomplished up to Jan 31, 1909. A considerable amount of this work has been described in detail in current issues of the ELECTRIC RAILWAY JOURNAL. Arrangements for reconstruction work by the Calumet & South Chicago Railway Company were not completed until late in the season of 1908, and such time as was available was largely devoted to placing the existing property and equipment in the best practicable condition to enable it to furnish the best service possible under the circumstances.

The conclusions of the board regarding pay-as-you-enter cars in Chicago, the factors leading up to the design of the Chicago type of car and some results obtained by the operation of these cars are given. The report also presents communications to the board from B. J. Arnold, J. Z. Murphy and Octave Chanute on the subject of wood preservation. As a result of investigations

the track ties were treated with chloride of zinc and encased in concrete.

INSTALLATION OF THROUGH ROUTES

Physical obstructions to the operation of the 21 through routes described in the ordinances of Feb. 11, 1907, are being gradually eliminated. Some of the difficulties, however, are beyond the control of this board, such as bridges, steam railroad subways and elevated railroad columns, but every effort is being made to have these obstructions also removed through the proper authorities. It was not thought advisable to create new temporary through routes by diverging from the through routes as prescribed by ordinance, because in such cases the public would become accustomed to the temporary through routes and discontinuance would be embarrassing, even though the service supplied by them was largely supplanted by the permanent routes. On the other hand, there would be no objection to establishing an abbreviated through route along the same lines as laid down in the ordinances, but which, for some reason, could not be carried through to either one end or the other. The latter plan has been followed.

It was decided that it would not be advisable to install temporary special work around the elevated road columns as at present located, which temporary special work would not provide safe clearances. If this were done and the railway companies took the chances of accidents, it might naturally follow that it would indefinitely defer the necessary relocation of the interfering columns.

The report contains a detailed statement setting forth the physical obstructions to the operation of the through routes as they existed on Feb. 1, 1909, and those which had been removed between that date and July, 1910.

PUBLICITY OF ACCOUNTS

In accordance with the requirements of the traction ordinances, the customary annual auditing of the accounts of the railway companies by accountants appointed by the city comptroller was concluded in April, 1909, and the reports were duly rendered to the city comptroller. Owing to receivership proceedings and legal complications involving the underlying properties of the Chicago Railways Company, this company was delayed in accepting its ordinance. However, the accounts which naturally would pertain to the joint accounting between the city of Chicago and the Chicago Railways Company, in case the ordinance should be accepted, were kept in one set of books, later to be personally examined by the city comptroller, chairman of the board, auditor of the board and a representative of the accounting firm that previously had audited the books. Subsequently the vouchers and books of the Chicago City Railway Company were similarly examined.

In addition to these audits, still another investigation, covering the entire period of two years during which the railway companies had been operating under the ordinances, was brought about through certain allegations made during the early part of 1909, to the effect that private discounts which the Chicago City Railway Company had received from manufacturers had not been properly applied in the joint account with the city, but had been appropriated by the railway company's individual account. As the subject soon became a matter of public interest, it was deemed advisable by the city administration to institute a further examination of the accounts of both the Chicago City and the Chicago Railways companies, in order that all matters of accounting in which the city under the traction ordinances was interested might be subjected to the most critical review from both interested and disinterested sources. The railway companies as well as this board assented to the proposed investigation, which was conducted by independent auditors appointed by Mayor Fred A. Busse and resulted in proving that the matter of private discounts had been taken cognizance of by this board and that they were duly accounted for on the books of the company.

Such changes and corrections as all of these audits and examinations disclosed to be proper were made and the corrected accounts were published in the annual report for the fiscal year 1907-1908. This work caused a regrettable postponement of

the issuance of the first annual report, as well as the present report, but the desirability of publishing correct operating and financial statements justified the delay. Coincidentally the books and accounts of this board were audited by a firm of accountants selected by Mayor Busse, which reported in part as follows:

"There is every evidence that an effective control is maintained over the progress of the rehabilitation work and all expenditures in connection therewith. With regard to the matter of rebates, to which we refer at some length in our separate report on the railway, we found that the board was fully informed regarding these special arrangements, but for its knowledge whether or not all rebates are credited that should be we believe that in the main it must depend on the good faith of the officials of the company.

"As to the board's own expenditures we cannot do better by way of informing you of the amount and character of these expenditures than to submit an abstract thereof, which is enclosed with and made a part of this report. We would add that we made a careful analysis of the various expense accounts and investigated all items of any importance and found properly approved vouchers on file therefor. According to figures shown in the board's books, which figures we have verified for ourselves so far as related to the Chicago City Railway Company, the total cost of the rehabilitation amounted, up to January 31, 1909, to \$25,490,890.58. The total expenditures of the board were \$397,224.51, which is slightly over 1½ per cent of the rehabilitation expenditures. In view of the importance of the work, the magnitude of the amounts involved and the character of the services desired, the above ratio of expense would not appear to be unreasonable or excessive."

FINANCIAL REPORTS

The entire cost of the rehabilitation, in accordance with the terms of the ordinances, is added to the capital investment, and no portion during the rehabilitation period is charged to operating expenses, as would be the case under customary accounting procedure. The ordinances fix arbitrarily upon 70 per cent of the gross earnings for operating expenses and taxes. In case the actual operating expenses, including expenditures for renewals, exceed 70 per cent, the excess of renewals is charged to capital account; on the other hand, should the actual operating expenses be less than 70 per cent, the difference is applied to the cost of renewals and correspondingly reduces the charge to capital account. These provisions apply to the rehabilitation period only.

Under these peculiar conditions and in view of the many operating difficulties encountered at a time when a complete reconstruction of roadway and plant is being effected, due largely to interference with traffic affecting gross revenues and to the inability of the companies to take advantage of low operating conditions in the summer months because of the necessity of doing track work at that time, a comparison of the operating results of these companies with other traction properties could not be fairly made; neither could the results shown be used as a criterion for future operating economies. These abnormal conditions prevailed to a greater or lesser degree throughout the period of rehabilitation, which expired for the Chicago City Railway April 15, 1910, and will expire for the Chicago Railways January 28, 1911, and for the Calumet and South Chicago Railway November 29, 1911 (with certain exceptions in the last case, as stated in the ordinance).

CONTRIBUTIONS TO THE CITY

Comparison of the contributions of the companies to the city of Chicago for the past two years shows as follows: Year ended Jan. 31, 1908, \$1,564,618.47; year ended Jan. 31, 1909, \$1,386,877.96.

The companies contributed to the city's treasury \$177,740.51 less in 1909 than in 1908, notwithstanding the fact that the gross earnings of the two contributing companies have increased \$757,257. This condition is paradoxical on the face of it, but it was nevertheless anticipated in the estimates made when the ordinances were being formulated and was fully exploited before the local transportation committee of the City Council at that time. The situation arises from the fact that

the gross earnings of the properties cannot normally increase with sufficient rapidity to take care of the interest allowance of 5 per cent on the new capital invested, which in the short space of four years will amount to approximately fifty millions of dollars. This is more aptly illustrated in the succeeding exhibits relating to capital investments. These decreases will continue to a limited degree until the end of the rehabilitation period, when, normal conditions prevailing, each year thereafter should show consistent increases in the amounts contributed to the city.

The combined balance sheet of the Chicago Railways Company, Chicago City Railway Company, Calumet & South Chicago Railway Company and the Southern Street Railway Company for the year ended Jan. 31, 1910, as presented in the advance report of the board for that year, shows a value as stated by traction valuation commissions of \$55,775,000. Certificates have been issued by the Board of Supervising Engineers for a total of \$42,754,978, which with the current assets as of Jan. 31, 1910, \$3,523,177, gave total assets of \$102,053,155. The liabilities include: Capital, \$98,529,978; reserve for damages, \$1,231,889; city of Chicago, proportion of profits, less taxes and licenses paid in advance, \$1,274,917, and the companies' proportions of profits, \$1,016,371, making the total liabilities, \$102,053,155.

The accompanying table shows the operating statistics of the

The personnel of the chief engineer's organization, at the conclusion of the year reported, included the following:

Chief engineer of the work, Bion J. Arnold; assistant chief engineer of the work, Geo. Weston.

Division D, track and roadway: Division engineer, R. F. Kelker, Jr.; assistant division engineer, C. E. Thomas; field engineer, F. E. Morrow; engineers, C. E. Raff and P. J. Kealy.

Division E, electrical transmission and distribution: Division engineer, Edward N. Lake; assistant division engineer, R. H. Rice; field engineers, W. F. Sims, E. J. Ward.

Divisions G and I, buildings and fixtures (Div. G), power plant equipment (Div. I): Division engineer, R. A. Sanborn; assistant division engineer, C. C. Wright; consulting architect, E. E. Roberts.

Division K, cars and car operation: Division engineer, Wray Thorn; engineer inspectors, F. C. Thomas, E. J. Sigwalt; traffic inspector, O. H. Tousey; assistant traffic inspector, J. A. Doane; car inspectors, C. H. Cross, J. W. McDonald.

Division P, tunnels: Division engineer, Wm. Artingstall; structural designers, S. T. Smetters, T. R. Williamson.

Drafting room: Chief draftsman, F. W. Steeg; assistant chief draftsman, J. C. Neely, Jr..

Division of accounts: Auditor, F. K. Parke; chief clerk, C. G. Snyder.

TABLE OF OPERATING STATISTICS

GENERAL:	Chicago City Ry. Co.		Chicago Rys. Co.		Calumet & So. Chicago	
	1910	1909	1910	1909	1910	1909
Miles of track owned (single).....	250.77	252.29	317.336	326.84	96.386	94.445
Miles of track operated (single).....	264.46	247.82	308.475	305.446	93.268	94.198
Gross earnings per mile of single track owned.....	\$37,918.50	\$33,862.93	\$39,210.43	\$33,769.03	\$9,142.07	\$8,886.55
Gross earnings per mile of single track operated.....	\$35,728.74	\$34,473.73	\$40,216.69	\$35,638.29	\$9,447.80	\$8,913.70
Gross earnings of system.....	\$9,508,822.85	\$8,543,280.58	\$12,442,882.32	\$11,037,071.16	\$881,177.47	\$839,296.19
Paid to employees (wages).....	\$3,479,393.16	\$3,533,354.86	\$5,058,148.34	\$4,609,515.02	\$437,282.97	\$374,273.16
Average number of employees.....	5,632	5,968	8,116	6,409	429	615
Per cent of gross earnings used in operation (including reserve for taxes and damages).....	70.00	70.00	70.00	70.00	70.00	70.00
Per cent of gross earnings reserved for damages.....	8.96	5.80	6.27	7.40	5.89	5.00
Per cent of gross earnings reserved for taxes.....	5.52	5.35	4.92	3.37	.86	1.02
TRANSPORTATION:						
Total passengers carried.....	312,864,537	282,791,209	427,138,380	373,643,388	23,804,926	20,768,593
Passengers carried for revenue.....	183,585,222	167,508,754	245,510,655	217,400,335	16,466,243	15,675,315
Passengers carried on transfers, employees and other free passengers.....	129,279,315	115,282,455	181,627,725	156,243,053	7,338,683	5,093,278
Total revenue car miles.....	35,319,683	33,646,585	46,157,999	43,857,066	4,311,115	3,953,612
Total car miles.....	35,748,460	34,202,740	.....	44,021,454	.....	3,971,415
Per cent of transfer and free passengers to fare passengers.....	70.42	58.58	72.22	70.00	44.57	32.73
Average gross earnings per passenger (cents).....	3.03	3.02	2.90	2.95	3.70	4.04
Average passenger earnings per passenger (cents).....	2.92	2.95	2.85	2.89	3.45	3.76
Average expense per passenger, including 5 per cent interest on agreed valuation of property (cents).....	2.72	2.68	2.57	2.53	3.81	4.30
Average operating expenses per passenger (cents).....	2.13	2.11	2.03	2.07	2.59	2.83
Average interest charge per passenger, based on agreed valuation of property (mills).....	5.96	5.70	5.32	4.65	1.22	1.22
Average profit per passenger (mills).....	3.01	3.35	3.41	4.20	0	0
City's proportion (55 per cent) of profit per passenger (mills).....	*1.51	1.84	1.87	2.31	0	0
Company's proportion (45 per cent) of profit per passenger (mills).....	1.50	1.51	1.54	1.89	0	0
POWER:						
Kilowatt output in hours (all plants).....	128,836,492	119,295,740	155,719,853	100,213,656	17,793,358	15,000,061
Total rated kw capacity (all plants).....	39,695	33,005	34,014	22,981	4,653	3,400
Load factor (all plants) 24 hours.....	37.19	41.11	52.26	49.80	38.67	50.23
Cost per kw-hour (all plants) (cents).....	0.87	1.04	0.96	1.023	1.09	0.97
Average kw-hour per car per day of 18 hours.....	518.65	538.00	473.00	312	585.85	..
Energy consumed per car mile (kw-hour).....	3.40	3.55	3.33	2.558	3.34	3.79

Also paid to employees on construction and rehabilitation work: ¹\$865,301; ²\$1,422,715; ³\$2,548,124; ⁴\$1,177,146; ⁵\$94,304; ⁶\$48,171.

*Chicago City Railway Company only, as Southern Street Railway Company's divisible earnings transferred to capital.

†Except primary charge.

three Chicago properties for the fiscal years ended Jan. 31, 1909 and 1910, as reported in the annual reports of the Boards of Supervising Engineers.

ORGANIZATION OF STAFF

The report of Bion J. Arnold, chief engineer of the work, to the Board of Supervising Engineers, Chicago Traction occupies 117 pages of the annual report of the board. Mr. Arnold first describes the engineering organization. The working force of the chief engineer has been organized in divisions with a division engineer who had specialized in the particular work covered by his division in charge, all of the divisions being under the general superintendence of an assistant chief engineer. The scope of each division is limited as far as practicable to the itemization made standard by the American Street & Interurban Railway Accountants' Association classification insofar as it relates to the respective divisions. In this manner the total monthly construction costs as reported by any division can be used as a check against the monthly statements of the companies for additions to capital account.

General office: Private secretary to chief engineer, A. I. Downey.

TRACK AND ROADWAY DIVISION

The minimum number of men employed in the track and roadway division has been 12, maximum 31, and the average 21. The inspectors have been located in Chicago and at various other places. The minimum number stationed outside of Chicago at any one time has been four, the maximum nine, and the average six.

Inspection of all material and labor entering into the work in connection with the rehabilitation of tracks and roadways was constantly maintained by this division. The system of inspecting paving blocks at the point of shipment has been maintained, and to that end inspectors have been stationed at the several quarries, seven men being located in Wisconsin, South Dakota, New York and North Carolina.

There was no change in the method of inspecting cross-ties and switch-tie lumber, which provides for all inspection to be made prior to delivery to the railway companies. In addition to the inspection made directly by the division force, the in-

spection of rails, tie rods, etc., was carried on through a firm of inspecting engineers which reported to the board.

PAVING

Approximately 476,300 yards of granite pavement was laid. In addition to this, creosoted wood-block pavement was placed on all the boulevard intersections on the Chicago City Railway Company's lines where tracks have been rehabilitated, and 3588 sq. yd. of this pavement placed on Dearborn Street by the Chicago Railways Company. The track report describes the layout of special work at four new car houses and in each instance through tracks are provided for so that cars can be run directly through the bays onto the streets at opposite ends of the houses. During the year the headroom under five steam railways was increased to permit the operation of large street railway cars and five steam railway grade crossings were removed on account of track elevation.

DIVISION OF ELECTRICAL TRANSMISSION AND DISTRIBUTION

The work of the division of electrical transmission and distribution was subdivided into the following classifications: Bonding, conduit, feeders, trolley and miscellaneous. In addition to the field work necessary to supervise the actual installations, consisting of surveys, inspection and reports of progress, a large amount of office work was necessary in the preparation of specifications, plans, reports and estimates.

The following subjects are described in detail in the electrical section of the report: Feeder calculations, negative returns and the use of aluminum for underground electric cables.

Calculations for positive feeders have been in progress during the year for the systems of the Chicago City Railway Company and the Chicago Railways Company. Those for the former have been made to provide for the operation of the estimated number of cars which will be in service at the close of the rehabilitation period for that system, which is the winter season of 1909-1910. The negative returns were all calculated upon the basis of the requirements of the Chicago Municipal Code.

The Chicago City Railway Company purchased two miles of 1,623,000 cir. mil paper-insulated lead-sheathed aluminum cable (1,000,000 cir. mil copper equivalent), which was installed on trial during the season of 1909. This was the first installation of this kind in Chicago.

BUILDINGS AND POWER PLANT EQUIPMENT

The divisions of buildings and fixtures and power plant equipment have been combined and the work handled under one organization, as set forth in the first annual report. The number of engineer-inspectors employed in the inspection, supervision and checking of rehabilitation expenditures during the year 1908 has varied with the amount of construction work being done. The maximum number of inspectors employed has been thirteen and the minimum seven.

An engineer inspector has been detailed at each location where the progress of active construction work required his constant attention. Where work was less active several such locations were assigned to one inspector.

All engineer inspectors were and are required to make daily labor reports, monthly material estimates, monthly progress reports and special progress reports, as work demands; to keep complete daily data of construction work in field books, and to compile unit cost data. Each must be familiar with plans and specifications and see that work is done in conformity with them. In addition to the inspection work by the chief engineer's office, cement, steel reinforcing bars, and other materials have been tested and inspected by a firm of inspecting engineers. Complete written instructions to engineer-inspectors are issued to each man and with these he is required to be thoroughly familiar.

RECORDS AND REPORTS

Estimates as received from the engineer-inspectors in the field are priced and tabulated each month, together with the records received from the auditor of the rehabilitation expenditures of the railway companies for that month. In general the same forms, with a few changes, are used as during the first fiscal year.

A preliminary estimate is sent to the auditor on the tenth day of each month of the expenditures for the past month. This is corrected and a final estimate sent to the auditor when the accounts of the companies have been checked up in detail. This final estimate must be completed within the time set in the ordinances for correcting certificates.

All work orders, requisitions, purchase orders, contracts and extras are checked and approved as the construction work progresses. Digests of the requisitions, contracts, extras, etc., without prices, are given to the engineer-inspectors so that they may intelligently inspect the work in the field.

NEW CAR HOUSES

The report describes and plentifully illustrates the various car houses built by the two companies under the supervision of the board. Illustrated descriptions of these car houses have appeared in the *ELECTRIC RAILWAY JOURNAL* as follows: Chicago City Railway, Thirty-eighth Street and Cottage Grove Avenue car house, June 20, 1908, page 113; Seventy-ninth Street and Vincennes Road car house, April 11, 1908, page 597; Sixty-ninth Street and Ashland Avenue car house, May 8, 1909, page 864; Chicago Railways Company, West Twenty-fifth and Leavitt Streets car house, April 3, 1909, page 623; Madison Street and Fortieth Avenue car house and shops, Aug. 29, 1908, page 537. Two other new structures are described in the report. These are the Archer Avenue and Rockwell Street car house of the Chicago City Railway and the Lincoln and Wrightwood Avenues car house of the Chicago Railways.

SHOP ADDITIONS

The construction of a new fireproof carpenter shop, paint shop and additions, located at West End and Park Avenues, was commenced by the Chicago Railways Company during the year 1908. This enlarged building covers an area of 340 ft. by 225 ft. and will have a capacity of 125 cars. A pressed-brick wall fronts on each street, with a transfer table traversing all tracks at both ends of the shop.

A reinforced concrete saw-tooth roof has been built over the entire building, with the exception of the paint storeroom and glass storage-room. This roof is supported on concrete girders spanning about 60 ft., with two rows of concrete columns in both the paint shop and carpenter shop. Exceptionally efficient lighting and ventilation are obtained by the use of saw-tooth skylights.

The entire building will be heated by the blast system. Large overhead galvanized iron ducts extend from the fan room throughout the building. The outlets are placed about 6 ft. 6 in. above the floor line. In the paint shop these outlets are provided with dust collectors.

SUBSTATIONS

Five substations have been estimated as being required to supply the necessary electric current to the system of the Chicago City Railway Company when rehabilitated. The total ultimate capacity of these five stations is 50,400 kw, exclusive of the Plymouth Court substation battery, and 52,640 kw including this battery. Four of these substations were built prior to Feb. 1, 1908, and construction work on the fifth has been started. All new substation buildings of this company are to be of substantial fireproof construction with pressed-brick walls, both inside and out, book tile roofs, carried on structural steel trusses with composition roof covering, and concrete floors with a red tile wearing surface; in fact these substation buildings have been designed to be thoroughly fireproof and also to present a very attractive appearance.

An illustrated description of the Forty-second Street and Wabash Avenue substation of this company was presented in this paper for Aug. 15, 1908, page 462.

Work has been performed during the year 1908 on four substations for the Chicago Railways Company. The table on page 654 shows the location, size and capacity of these substations.

The Lill Avenue substation of the Chicago Railways Company was illustrated and described in this paper for Jan. 2, 1909, page 6.

ROTARY CONVERTER SUBSTATIONS, CHICAGO RAILWAYS COMPANY.

Location and machinery installed Feb. 1, 1909.	Ultimate capacity.	Total floor area, sq. ft.	Sq. ft. per kw ult. cap.
Van Buren and Jefferson streets. 3x2,000 = 10,000 kw	6x2,000 = 12,000 kw	8,060	.673
Milwaukee Avenue. 2x2,000 = 4,000 kw	3x2,000 = 6,000 kw	4,742	.790
Lill Avenue. Under construction	3x2,000 = 6,000 kw	4,294	.716
West Twenty-fifth and Leavitt Sts. Under construction	3x2,000 = 6,000 kw	4,294	.716
Total,	14,000 kw	30,000 kw	Av. .724

DESCRIPTION OF ROTARY CONVERTER SUBSTATION MACHINERY

The 25-cycle, 9000-volt, three-phase alternating current generated by the Commonwealth Edison Company at the Fisk Street and Quarry Street power houses is transmitted underground to the various substations of the companies, where it is stepped down and transformed from alternating current to 600-volt direct current and delivered to the direct-current feeder systems of the street railways.

Rotary converters of standard manufacture of 2000-kw capacity have been installed as a standard unit for all substations of both companies. The size of 2000 kw was adopted for the reason that it was sufficiently small for economy of operation and large enough to secure a low first charge per kilowatt. With a machine of 2000-kw capacity no sub-base is used. The pillow blocks and field frames of the unit are carried on sole plates, which are supported on two concrete foundation walls. Cross girders running lengthwise of the building are placed under the field frames.

Air-blast reactances have been installed between the low tension windings of the transformers and the rotary converters. Each transformer and reactance is bottom-connected and takes air through its base, which is supplied with a damper for cutting off the air supply when out of service.

By the electric operation of all oil switches in the station it is possible to place the alternating-current line and converter panels in line with the alternating-current switchboard. All substations have been provided with electric 3-motor traveling cranes of sufficient capacity to lift the largest piece of apparatus in the station.

It has been found practically unnecessary to supply any independent method of heating the substations, as the stations are in service practically 24 hours per day and sufficient heat is generated in the operation of the electrical apparatus to give a comfortable working temperature. Special facilities for ventilation are provided in all of the substations. Large windows have been placed in the side walls of the stations both above and below the crane rail. All of these windows have pivoted sash with wire glass and are mechanically operated from the floor.

TUNNELS

This division was organized in April, 1908, shortly after the Chicago Railways Company accepted its ordinance, for the purpose of supervising the lowering of the roofs of the old tunnels, and to prepare plans and specifications for and to supervise the rebuilding of the Washington Street and La Salle Street tunnels as provided in the ordinance.

Upon the acceptance of its ordinance by the Chicago Railways Company on Jan. 28, 1908, the responsibility for reconstructing the tunnels was assumed by the board, and in addition to supervising the work of lowering the Van Buren Street tunnel, previously referred to, this division, during the year 1908, worked upon the plans and specifications providing for the reconstruction of the Washington Street and La Salle Street tunnels.

DIVISION OF ACCOUNTS

The division of accounts continues to keep a running check upon the expenditures of the street railway companies falling under the supervision of the Board of Supervising Engineers and in a general way is conducted in the following routine:

The two terms "work order" and "special accounts," are used synonymously. Applications for work orders or special accounts are submitted by each of the railway companies, requesting the authority of the board to proceed with the work specified therein and charge its cost to either capital account

or renewals, as the case may be. These applications, after having been approved by the division engineers interested therein, are returned to the division of accounts for approval as to form and are then submitted to the assistant chief engineer for his approval, and by him handed to the board for final action, and as the chairman of the board is also the chief engineer of the work, his approval or disapproval is obtained in board meeting, where the final classification of the account is made. After the approval of the board is obtained one copy of the application is retained by the secretary for the board's files and the remaining copies are returned to the respective railway companies.

Upon receipt of properly approved applications, the auditors of the respective railway companies prepare work orders or special accounts in regular form covering the work so approved, and send five copies to the board.

These copies are first submitted by the division of accounts to the assistant secretary for comparison with the applications previously approved, and when approved by him are returned to the division of accounts, whence they are distributed as follows: One copy, bearing the assistant secretary's O. K., for filing in division of accounts; one copy to assistant chief engineer; one copy to chief clerk of engineering department; one copy to each division engineer interested.

REPORTS FROM RAILWAY COMPANIES

Daily reports are received from the railway companies covering all data relating to rehabilitation accounts, consisting of:

Material manifests, being record of materials sent from storerooms.

Material returned, being record of materials returned to storerooms.

Material transferred, being record of materials transferred, which is so ruled as to show the charges from storerooms, vouchers journal entries, accounts receivable, material transferred, horses and pay-rolls for each division of each special account or work order. A general summary sheet is then written which shows the total charge to each division of each account and the total charge to each account. The recapitulation of expenditures and summary sheets is written in duplicate, the copy being sent to the division engineer interested and the original retained in the auditing department's files.

A statement showing the total charges to each of the several engineering divisions is prepared by the auditor and checked against the companies' reports, and a letter is addressed to each division engineer showing the charges to be checked by his division and specifying date upon which the final report must be returned.

Before a final monthly certificate is issued, all vouchers affecting rehabilitation or storeroom accounts are checked against the accounts in the offices of each railway company, and also against the cash records, in order to verify the fact that payments therefor have actually been made.

DIVISION OF DRAFTING

In the fiscal year ended Jan. 31, 1909, the division of drafting made 641 original drawings and tracings; filed 1246 foreign prints, which were indexed numerically and topically; fulfilled 1658 blueprint orders; printed, bound and distributed 2382 sets of specifications, and from 53 new forms, 8½ in. x 11 in., printed 23,825 sheets.

The second annual report of the board contains a digest of the minutes of board's meetings Nos. 96 to 199 inclusive and a condensed record of the proceedings of board No. 2 for the fiscal year. The ordinances authorizing the Calumet & South Chicago Railway Company to construct and operate a street railway in Chicago and the ordinance granting the consent of the City Council to an operating agreement between that company and the Chicago City Railways are printed in full.

A further extension of electric traction on the Lancashire & Yorkshire Railway (England) to Ormskirk is about to be entered upon. The company intends to develop an electric scheme for a line between Liverpool, Ormskirk and Southport by way of Burscough Bridge.

A STUDY OF TRACK DEFLECTION AND MATERIALS

The track work of the surface railways in Chicago, which has largely been rebuilt during the past three years, has been carefully studied by the Board of Supervising Engineers of Chicago Traction. In its annual report the board describes its studies of track deflection and track materials. The following information on these subjects appears in the report just issued by the board:

TRACK DEFLECTION

In order to determine the amount of deflection of the rails in concrete construction, a special deflectometer was designed by the track and roadway division for the purpose of obtaining accurate data by a mechanical means to ascertain whether or not the movement was of sufficient magnitude to tend toward a disintegration of the foundation—which would shorten the life of the track. Investigations were made, therefore, to determine the rigidity and action of the different types of construction under traffic. These observations were extended over several streets in various parts of the city. The deflectometer consists of a simple lever mounted on a suitable frame and having at its outer end a pointer which moves over a scale. Clamps are provided for attaching the shorter end of the pointer to the rail head, tie or concrete sub-base.

When the tests were first begun it was expected that deflections of the rails amounting to as much as $\frac{1}{4}$ in. or $\frac{1}{2}$ in. would be obtained. The results obtained were an agreeable surprise, for the maximum vertical deflection recorded was $\frac{5}{64}$ in. In a large percentage of the track no vertical deflection whatever was noted. The tests showed that a slightly greater vertical deflection occurred at the rail joints and usually decreased away from the joint. Where deflection did occur, the average seemed to be about $\frac{1}{32}$ in. The same general results were obtained on all the three types of track on which tests were made. No deflection whatever was noted in the concrete. Only in a very few cases was any deflection of the ties recorded, and where this was indicated it was found that the ties had not been properly tamped. In other words, it was determined that practically all movement took place between the base of the rail and the tie plate. The horizontal movement of the rail was recorded in practically every case where tests were made, and averaged about $\frac{1}{64}$ in. This horizontal movement seemed to be a constant factor and varied but little in any case.

It was conclusively demonstrated that the eye greatly exaggerated the apparent movement of track under load. It was discovered that track which seemed, to the trained observer, to have a deflection of about $\frac{1}{4}$ in. in reality did not move more than $\frac{1}{64}$ in.

As a result of this investigation particular attention is called to the conclusion, based on extended tests, that the concrete foundation, as laid, was practically rigid. The problem was to fasten the rail to the tie so that the rail and foundation would act as a unit. In all of these types a tie plate is used. In type No. 1 the rail is fastened to the steel ties by means of special wedge and clip devices. In types Nos. 2 and 2-A the screw spike is used to fasten the rail to the wooden tie. It was concluded that no criticism could be applied to these forms of fastening. In some cases where the deflection was noted it was discovered that the rail fastenings were not tight. It is probable that in types Nos. 2 and 2-A the tie plate sinks into the tie slightly with the compression of the wood fibers under the applied loads, and this may account for part of the vertical deflection noted. The deflection at the joint is probably explained in the following manner:

There is always an opening left in the concrete for the welding, a process which is done after the concreting. Before the weld is made the rail fastenings on the ties adjacent to the joint are loosened and the rail apparently is buckled by the welding process; consequently, it does not resume its original position on the tie, except while the weight of a car is upon it.

The importance of using tie plates in concrete track construction was also demonstrated. Tests were made in various cities

on concrete track work where no tie plates had been used and serious deflections of the rail were discovered, due to the base of the rail cutting into the tie. Further injury as a result of this deflection was evident from the condition of the concrete, which had crumbled away from the rail.

An interesting feature of the test was that the speed of the cars passing over the track was not a factor in the deflection. Tests were made with the speed of the cars constant accelerated and retarded, but no appreciable difference was recorded. In other words, only the actual weight of the cars seemed to affect the deflection and no wave motion in the rail existed, for no deflection could be discovered except when the car was actually over the point of reading. In order to determine whether there was any movement of the pavement in sympathy with the movement of the rail, steel pins 18 in. long were driven through the pavement into the earth and the instrument was mounted upon them. It was discovered that there was no appreciable movement of the pavement.

CHARACTERISTICS OF TRACK AND ROADWAY

In the report for the first fiscal year were stated the general theories upon which the track construction was based and certain characteristics which were deemed worthy of mention were pointed out.

As a result of investigations carried out during the past season, an additional standard of construction was developed, termed "Type No. 2-A." In this type of track construction the small truncated pyramid of earth which was left between the ties in type No. 2 is omitted, the excavation being made level and rolled, and ties are spaced 3 ft. center to center instead of 4 ft., as in type No. 2.

The elimination of the pyramid above mentioned permits the rolling of the subgrade with a steam roller prior to placing the concrete in the trenches and thereby insures a more solid foundation than could be expected of type No. 2 construction, as well as a better distribution of the load over the subgrade.

The examination of track made by means of the deflectometer showed that whenever a movement of the rail occurred the movement was taken up between the rail and the tie plate; in no instance did a tie move under load except when the concrete had been improperly tamped. Having thus determined the location of the movement in the track, it was noted that the concrete lying about the rail base, instead of adhering to the metal, shrank away from it in setting. This left an extremely small void between the bottom of the rail base and the top of the set concrete. Therefore, it was evident that the concrete directly under the rail could carry no load except when the rail was deflected and forced down upon its surface. In other words, the entire load was supported and distributed over the foundation by the cross-ties until the rail came in contact with the concrete immediately under the rail base. Therefore, it was thought desirable to diminish the spacing of the ties from 4 ft. center to center to 3 ft. center to center in order that the load coming upon the track might be more evenly transmitted to and distributed over the concrete foundation by increasing the number of ties.

TIE SPACING

Before arriving at a definite conclusion as to the proper tie spacing, two stretches of track were laid in order to obtain comparative results. The ties laid 2 ft. center to center largely increased the cost of construction and made the proper tamping of the ties quite difficult. It was, therefore, concluded that the desired result could be obtained by the spacing of the ties 3 ft. center to center, thereby reducing the cost resulting from closer spacing, permitting an effectual tamping of the concrete about the ties, and at the same time introducing the factor of safety not secured with ties spaced 4 ft. center to center.

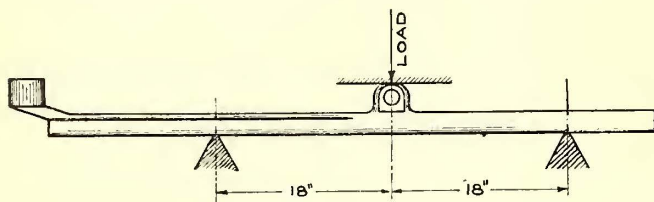
TIE RODS

Tests were made of the tensile strength of tie rods of three different methods of manufacture. The first of these methods was the welding of the round terminal to a flat bar; the second was the reducing of the flat portion and upsetting to make the round terminals, and the third was turning over edgewise

the ends of the flat bars and upsetting to make the round terminals. The rods made by the first and second methods in every case broke at the junction of the round and flat portions, each showing practically the same tensile strength. Those made by the third method in a majority of the tests failed in the threaded terminal, but developed a considerably higher tensile strength before failing than those made by the first and second methods. A fourth method of manufacture is now being tried, which consists of rolling the flat section of the rod from 1-in. round bars.

MATERIAL STUDIES—MANGANESE STEEL

As it was thought desirable to obtain information as to the character of the manganese steel placed in the track as special



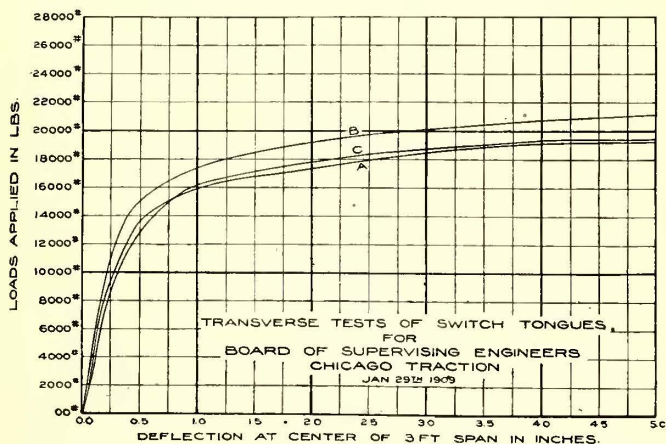
Track Material Studies—Application of Load to Manganese Steel Switch Point

work, a number of switch tongues were purchased from the manufacturers supplying the special work. These tongues were tested for physical characteristics by a firm of inspecting engineers. The results obtained were as follows:

A 1/2-in. Morse standard twist drill was used in these tests. The drill was used for a period of two minutes, resharpened, and this operation repeated four times. All of the samples were practically undrillable. The depth of the hole after completion of each test was measured to the nearest 0.001 in., and these measurements are tabulated below.

Sample Tagged	Depth of Hole After Test.
"A"	.030 inch
"B"	.029 inch
"C"	.039 inch

A 7/16-in. diameter steel ball was set on the face of the sample and subjected to a load of 35,000 lb. Upon removal the



Track Material Studies—Results of Tests on Manganese Steel Switch Points

diameter of the impression on the surface of the specimen was measured. In each case this was found to be 0.32 in., indicating that, so far as the surface hardening was concerned, the three samples were practically the same.

The switch tongues were successively subjected to the transverse tests. The loads were applied in an identical manner and every precaution was taken to make the test conditions the same. The application of the load was as indicated in an accompanying engraving and the results of these tests are also shown by curves.

In addition to the physical tests, chemical analyses were made by two representative analytical chemists as follows:

ANALYSIS NUMBER 1.

	"A" Per Cent	"B" Per Cent	"C" Per Cent
Carbon (combustion).....	not made	not made	not made
Carbon (color).....	1.020	0.620	0.850
Silicon.....	0.286	0.480	0.331
Manganese.....	12.270	11.820	13.240
Manganese (check).....	not made	not made	not made
Phosphorus.....	0.060	0.068	0.084
Sulphur.....	0.035	0.023	0.032
Copper.....	not made	not made	not made

ANALYSIS NUMBER 2.

	"A" Per Cent	"B" Per Cent	"C" Per Cent
Carbon (combustion).....	1.100	1.260	1.240
Carbon (color).....	1.010	1.150	1.190
Silicon.....	0.470	0.260	0.350
Manganese.....	11.440	10.880	12.480
Manganese (check).....	11.280	10.900	12.560
Phosphorus.....	0.067	0.056	0.084
Sulphur.....	0.021	0.036	0.033
Copper.....	None	0.340	0.090

HOLDING POWER OF TRACK AND SCREW SPIKES

Tests were made of the relative holding power of screw and track spikes in the various kinds of ties used. The accompanying table shows the comparative holding power. The table also shows the per cent of holding power of the track and screw spike in the various kinds of ties referred to, the holding power in oak ties assumed at 100 per cent. These tests show a high percentage of efficiency of the screw spike in soft woods over the track spike.

HOLDING POWER OF TRACK AND SCREW SPIKES IN VARIOUS TIES.

(Treatment, Zinc Chloride.)

Kind of Tie.	Screw Spike Pounds.	Track Spike Pounds.	Efficiency of Screw Spike Per Cent.*
Oak, untreated.....	9007	5893	153
90 per cent heart yellow pine, untreated.....	7018	3535	177
Short leaf pine, treated.....	6233	3520	177
Loblolly-pine, treated.....	5490	2869	191

*Referred to track spike as 100 per cent.

COMPARATIVE HOLDING POWER OF SPIKES.

	Track Spike Pounds	Per Cent	Screw Spike Pounds	Per Cent
Oak, untreated.....	5893	100	9007	100
90 per cent heart yellow pine, untreated.....	3535	60	7018	78
Short leaf pine, treated.....	3520	60	6233	69
Loblolly-pine, treated.....	2860	49	5490	61

*Referred to untreated oak as 100 per cent.

NEW YORK ELECTRICAL SHOW

The fourth annual electrical exposition will be held at Madison Square Garden, New York, Oct. 10-20 inclusive, under the general direction of George F. Parker, who has been in charge of previous expositions of this kind in New York. Some 70 leading manufacturers, laboratories and private inventors in the general electrical field will be represented and about 50,000 ft. of space will be available to exhibitors. Among those who have already arranged for space are: Watson Stillman Company, Spencer Turbine Cleaning Company, the New York Edison Company, Edison Electric Illuminating Company of Brooklyn, United Electric Light & Power Company, Electrical Testing Laboratories, Crane Company, Duntley Manufacturing Company, General Vehicle Company, Edison Storage Battery Company, Keller Manufacturing Company, Richmond Sales Company, Cutler-Hammer Company, Safety Insulated Wire & Cable Company, General Electric Company, United States Light & Heating Company, Jos. Dixon Crucible Company.

There will be a specially fine display of electric vehicles, lamps, batteries and material of interest to the users of electric current. The Edison, Brooklyn and United companies will also have elaborate exhibitions. There will also be a demonstration of the long-distance telephone. Incidental to the exposition the convention of the Electric Vehicle Association of America will be held during the term of the exposition.

Subject to confirmation by the Railway Board the Indian Government has granted a concession in perpetuity to construct 17 miles of tramways between Maungdaw and Buthingdaung, in the Akyab district, to the Arracan Flotilla Company, Limited, of London and Burma. The government guarantees to supplement the net earnings by an annual subsidy, and under certain conditions will purchase the line eventually.

OPERATIONS OF EXPRESS COMPANIES ON ELECTRIC RAILWAYS

The number of electric railways which have made contracts with old-line express companies for handling their package business has increased rapidly during the past two years. In some cases the business of the express companies is confined solely to through interurban traffic, the railway company reserving all local business. On many roads, however, the low rates on commodity freight offered by the railway are ample protection against any encroachment on its legitimate freight traffic and the old-line express company under the terms of its contract is free to solicit local as well as through business. The extent of the operations of the old-line express companies will be noted from the following list of electric railways in all parts of the country. The names of the railway companies have been furnished by the express companies with one exception. The American Express Company declined to furnish any information. Except for the possible omission of a few roads over which this company operates, the list is complete:

ADAMS EXPRESS COMPANY

Conway (Mass.) Electric Street Railway.
Frederick (Md.) Railroad.
Lackawanna & Wyoming Valley Railroad, Scranton, Pa.
Meadville & Conneaut Lake Traction Company, Meadville, Pa.
New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y.
Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va.
Rhode Island Suburban Railway, Providence, R. I.
Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.
Wheeling (W. Va.) Traction Company.

AMERICAN EXPRESS COMPANY.

Albany Southern Railroad, Albany, N. Y.
Cedar Rapids & Iowa City Railway, Cedar Rapids, Ia.
Grand Rapids, Holland & Chicago Railway, Holland, Mich.
Iowa & Illinois Railway, Clinton, Ia.
Metropolitan Street Railway, New York City.

CANADIAN EXPRESS COMPANY.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.
Windsor, Essex & Lake Shore Rapid Railway, Windsor, Ont.

DOMINION EXPRESS COMPANY.

Brantford & Hamilton Electric Railway, Hamilton, Ont.
Galt, Preston & Hespeler Street Railway, Galt, Ont.
Hamilton & Dundas Street Railway, Hamilton, Ont.
Hamilton, Grimsby & Beamsville Electric Railway, Hamilton, Ont.
Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.
Preston & Berlin Railway, Galt, Ont.

GREAT NORTHERN EXPRESS COMPANY.

Spokane & Inland Empire Railroad, Spokane, Wash.

NATIONAL EXPRESS COMPANY.

Connecticut Valley Street Railway, Greenfield, Mass.
Hudson Valley Railway, Glens Falls, N. Y.
Orange County Traction Company, Newburgh, N. Y.

NORTHERN EXPRESS COMPANY.

Everett Railway, Light & Water Company, Everett, Wash.

PACIFIC EXPRESS COMPANY.

Dayton & Troy Electric Railway, Dayton, Ohio.
Western Ohio Railway, Lima, Ohio.

UNITED STATES EXPRESS COMPANY.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.
Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.
Chicago & Milwaukee Electric Railroad, Chicago, Ill.
Chicago & Southern Traction Company, Chicago, Ill.
Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.
Detroit (Mich.) United Railway.
Elgin & Belvidere Electric Company, Chicago, Ill.
Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.
Frederick (Md.) Railroad.
Galesburg & Kewanee Electric Railway, Kewanee, Ill.
Grand Rapids, Holland & Chicago Railway, Holland, Mich.
Hagerstown (Md.) Railway.
Illinois Traction System, Peoria, Ill.
Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind.
Indiana Union Traction Company, Anderson, Ind.
Kokomo, Marion & Western Traction Company, Kokomo, Ind.
Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.
Marion, Bluffton & Eastern Traction Company, Bluffton, Ind.
Maryland Electric Railways, Baltimore, Md.
Michigan United Railways, Lansing, Mich.
Ohio Electric Railway, Cincinnati, Ohio.
Otsego & Herkimer Railroad, Hartwick, N. Y.
Rockford & Interurban Railway, Rockford, Ill.
Southern Michigan Railway, South Bend, Ind.
Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.
Toledo & Chicago Interurban Railway, Kendallville, Ind.
Toledo & Indiana Traction Company, Toledo, Ohio.
Toledo & Western Railroad, Toledo, Ohio.
Trenton & New Brunswick Railroad, Trenton, N. J.
West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa.
Winona Interurban Railway, Winona Lake, Ind.

WELLS FARGO & COMPANY.

Central California Traction Company, San Francisco, Cal.
Chicago, Lake Shore & South Bend Railway Michigan City, Ind.
City & Suburban Railway, Brunswick, Ga.
Columbus, Delaware & Marion Railway, Columbus, Ohio.
Columbus, Marion & Bucyrus Railway, Delaware, Ohio.

Detroit, Monroe & Toledo Short Line Railway, Monroe, Mich.
Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis.
Electric Package Agency, Cleveland, Ohio:
Cleveland, Southwestern & Columbus Railway.
Lake Shore Electric Railway.
Mansfield Railway, Light & Power Company.
Northern Ohio Traction & Light Company.
Elmira & Seneca Lake Traction Company, Elmira, N. Y.
Erie Railroad, Rochester, N. Y.
Fort Wayne & Springfield Railway, Decatur, Ind.
International Railway, Buffalo, N. Y.
Inter-Urban Railway, Des Moines, Ia.
Joliet & Southern Traction Company, Joliet, Ill.
Los Angeles Inter-Urban Railway, Los Angeles, Cal.
Los Angeles Pacific Railway, Los Angeles, Cal.
Los Angeles & Redondo Electric Railway, Los Angeles, Cal.
Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.
Northern Electric Railway, Chico, Cal.
Oregon Electric Railway, Portland, Ore.
Ohio Electric Railway, Cincinnati, Ohio.
Pacific Electric Railway, Los Angeles, Cal.
Peninsular Railway, San Jose, Cal.
People's Traction Company, Galesburg, Ill.
Pittsburgh, Harmony, Butler & Newcastlle Railway, Pittsburgh, Pa.
Riverside & Arlington Railway, Riverside, Cal.
Rock Island-Southern Railroad, Menmouth, Ill.
Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio.
San Francisco, Vallejo & Napa Valley Railway, Napa, Cal.
Sheboygan Light, Power & Railway Company, Sheboygan, Wis.
Stark Electric Railroad, Alliance, Ohio.
Tama & Toledo Electric Railway & Light Company, Toledo, Ia.
Warren & Jamestown Street Railway, Warren, Pa.
Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.
Youngstown & Ohio River Railroad, Youngstown, Ohio.
Youngstown & Southern Railway, Youngstown, Ohio.

CONVENTION OF THE COLORADO ELECTRIC LIGHT, POWER & RAILWAY ASSOCIATION

The eighth annual convention of the Colorado Electric Light, Power & Railway Association was held at Glenwood Springs on Sept. 21, 22 and 23. A program had been arranged which provided for the presentation of the following papers: "Mazda Street Series Lighting," by H. L. Allen, Denver; "Some Observations in Cultivating Friendly Relations with the Public," by J. M. Connelly, Denver; "Notes on Distribution Pole Lines," by J. C. Lawler, Colorado Springs; "Creosote Treatment of Our Native Lodge-Pole Pine Poles," by George R. Ogier, Denver; "The Place of Rotary Condensers and Induction Generators in Transmission Systems," by A. L. Jones, Denver; "Steam Turbines," by E. M. Gilbert, Denver.

The first session was called on the afternoon of Sept. 21, 1910, and the roll call showed 60 members present. The reading of the minutes being dispensed with, President William T. Wallace gave a short address, especially emphasizing the growth of membership and influence of the organization, its duties and opportunities. In view of the probability of passage of a public service commission law in Colorado, Mr. Wallace stated that the association should openly interest itself to bring about the enactment of a measure which would be fair to the public and the service company alike, and a special committee was recommended to represent the association in conferences with other bodies which would be affected by such a measure.

During the evening an executive session was held, and reports of the treasurer, the auditor, etc., were received.

J. M. Connelly, Denver, in his paper discussing the advantages to a public-service company of cultivating friendly relations with the public, showed in what way wrong impressions are frequently conveyed, especially to representatives of newspapers, by reason of indifference or rudeness. He entered a special plea for publicity concerning the affairs of a company in order to keep the public informed as to its needs and intentions.

In the paper "Creosote Treatment of Our Native Lodge-Pole Pine Poles" George R. Ogier, Denver, claimed that by creosoting the useful life of pine poles would be increased from 5 years to 20 years. The author stated that creosoting not only prolongs the life of the durable species of wood in use, but it prolongs the life of the inferior and cheaper woods, and enables the utilization of inferior woods, which without the preservative treatment would have little or no value. The discussion on Mr. Ogier's paper indicated that in the dryer climates the part of the pole above ground receives very little benefit from treatment. Carbolineum and creosote painting have been tried by some members and seem to be a palliative only, usually leaving a hard shell, but allowing decay to proceed under the shell. Concreting was advocated by W. G.

Matthews, superintendent of line for the Denver City Tramways, who is using a great deal of concrete setting, and to some extent concrete collars for poles partially destroyed at the ground line.

The committee on the grounding of secondaries, of which J. A. Clay was chairman, submitted a report based on the replies received from 17 companies to 13 questions relative to the grounding of secondary circuits. Attention was called to the rule of the National Electrical Code that motors operating at a potential of 550 volts or less be thoroughly insulated from the ground where feasible. The committee recommended that the question of grounding be brought more forcibly before the member companies in order that more definite information and a closer study and results may be obtained. Finally, following a résumé of the situation by W. D. Wallace, a resolution was introduced and carried endorsing grounding secondary circuits carrying up to 150 volts, leaving the question of motor circuits open, though practice is strongly for grounding up to 440 volts and many companies have definite rules to such effect. A further resolution endorsed the grounding of motors, switch and transformer cases on secondaries operating at 220 volts and above.

Following the presentation of the report of the nominating committee the following officers were elected: M. L. Corbett, manager of the United Hydroelectric Power Company, president; J. A. Clay, San Juan Water & Power Company, vice-president. An amendment to the constitution of the association makes the secretary an appointee of the president.

PROGRAM OF THE AMERICAN ASSOCIATION

The following program has been drawn up for the meetings of the American Street & Interurban Railway Association at Atlantic City, Oct. 11 to 13. All sessions will be held at the Greek Temple near the end of the convention pier:

Tuesday, Oct. 11—9:30 a. m. to 12:30 p. m.

Registration and Badges. (Convention Pier.)

Tuesday, Oct. 11—2 p. m. to 5 p. m. (Open Session.)

Convention Called to Order.

Annual Address of the President.

Annual Report of the Executive Committee.

Annual Report of the Secretary-Treasurer.

Announcements.

New Business.

Reports of Committees.

(a) Subjects.

(b) Active Membership.

(c) Associate Membership.

(d) Compensation for Carrying United States Mail.

(e) Brill Prize.

Address—"The Coney Island Fare Question," by Frank R. Ford, Ford, Bacon & Davis, New York, N. Y.

Address—"Electric Railway Securities," speaker to be announced.

Wednesday, Oct. 12—2 p. m. to 5 p. m. (Executive Session.)

Appointment of Nominating Committee.

Reports of Committees.

(a) Welfare of Employees.

(b) Interstate Commerce Commission Affairs.

(c) Insurance.

(d) Public Relations.

(e) McGraw Dictionary.

Address—"The Public Side of Street Railroading," by Patrick Calhoun, president United Railroads of San Francisco, San Francisco, Cal.

Address—"The Philadelphia Question," by Charles O. Kruger, president Philadelphia Rapid Transit Company, Philadelphia, Pa.

Thursday, Oct. 13—2 p. m. to 5 p. m. (Executive Session.)

Report of the Committee on Education.

Address—"Franchises," by Charles V. Weston, president, South Side Elevated Railroad Company, Chicago, Ill.

Address—"What Interurban Railway Companies Do for the Public," by Joseph A. McGowan, secretary and treasurer, Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.

Address—"Taxes and Licenses," by Guy E. Tripp, Stone & Webster, Boston, Mass.

Report of Committee on Nominations.

Election of Officers.

Installation of Officers.

Resolutions.

Unfinished Business.

Adjournment.

MEETING OF KANSAS ASSOCIATION

The thirteenth general meeting of the Kansas Gas, Water, Electric Light & Street Railway Association was held in the Mercantile Club Rooms, Kansas City, Kan., on Sept. 27 and 28, 1910. The papers which were presented at the meeting were only of passing interest to those identified with the management of electric railways. It was voted to hold the next meeting of the association at Independence, Kan., in September, 1911. Officers of the association were elected as follows: W. R. Murrow, secretary and manager of the Independence Electric Company, president; J. H. Rathert, superintendent of the Junction City Water-Works Company, first vice-president; B. F. Eyer, vice-president of the Manhattan Ice, Light & Power Company, second vice-president; H. A. Walker, secretary and treasurer of the Liberal Light, Ice & Power Company, third vice-president; James D. Nicholson, secretary, treasurer and manager of the Newton Electric Light & Power Company, secretary-treasurer; A. M. Patten, general superintendent and purchasing agent of the Topeka Railway; L. O. Ripley, and E. S. Springer, manager and contracting agent of the Leavenworth Light, Heat & Power Company, Leavenworth, executive board.

MEETING OF PUBLIC RELATIONS COMMITTEE AND STATE ASSOCIATION EXECUTIVES

It will be remembered that at a mid-winter meeting of the American Street & Interurban Railway Association, last January, the committee on public relations was enlarged by the appointment to that committee *ex officio* of the presidents of the different State street railway associations and the president of the Canadian Street Railway Association.

C. Loomis Allen, chairman of the committee, has issued a call for a meeting of the enlarged committee, which now consists of thirty-two members, on Tuesday, Oct. 11, at Atlantic City. The meeting will be held at 11 a. m. at the West Solarium, at the Marlborough-Blenheim Hotel, and its object will be to discuss the program to be followed by the committee in its future work. It has been thought that nearly every president of the State associations will be in attendance at the Atlantic City convention, or if he is not able to be present, that he will appoint some other official of the State association to attend the meeting of the committee on public relations. The time and place have been selected with the object of making them as convenient as possible for all members who attend.

A hearing was held before Commissioner Bassett, of the Public Service Commission of the First District of New York, on Sept. 28, 1910, to inquire into the service furnished by the New York & Queens County Railway with particular reference to the line of the company to College Point. W. O. Wood, president and general manager of the company, said that the company was laboring under a considerable disadvantage inasmuch as 25 cars ordered some time ago had been delayed in their arrival and could not possibly be equipped in the shops of the company before Oct. 11, 1910. Mr. Bassett instructed E. G. Connette, transportation engineer of the commission, to inquire into the situation and confer with Mr. Wood.

SHOP DEVICES IN ST. CATHARINES, ONT.

The accompanying illustrations show four different labor and cost-saving methods devised by W. H. Horton, electrical engineer of the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., and used in the shops of that com-

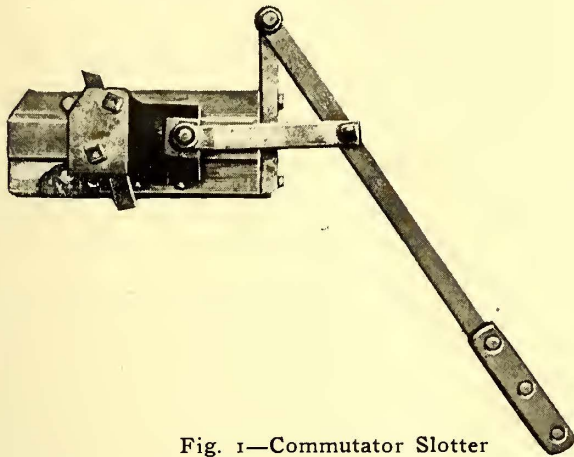


Fig. 1—Commutator Slotter

pany. Fig. 1 is a commutator slotter made on the principle of a common slide rest. It carries a cutter made of an old

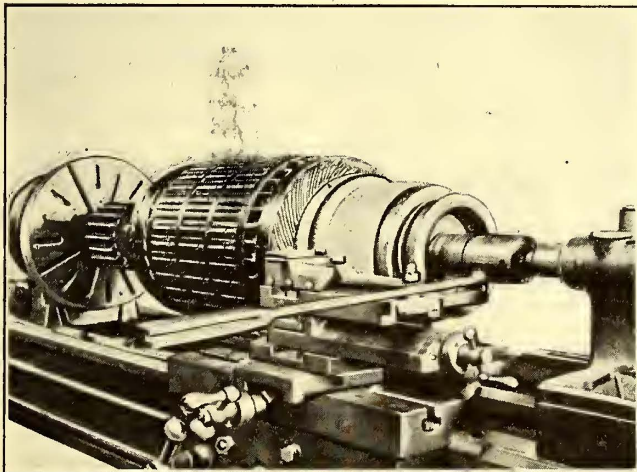


Fig. 2—Commutator on Lathe Ready for Slotting

file which is operated by a hand lever and link as shown. With this slotter 99-bar commutators of the G.E.-57 type can easily be undercut in 15 minutes. Fig. 2 shows this device installed on the slide rest of a lathe.

For boring armature and axle bearings the company uses a

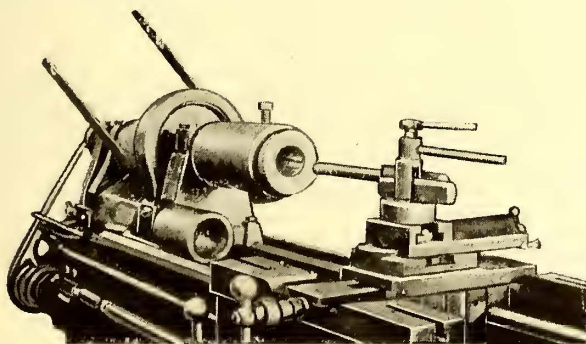


Fig. 3—Application of Cylindrical Chuck for Boring Bearings

simple cylindrical chuck which is screwed on to the lathe spindle as illustrated in Fig. 3. This has proved a very satisfactory device since the bearing requires no centering; all that is necessary is to push the bearing into the chuck and clamp it with the set screw. Bushings are used for odd-sized bear-

ings, the single set screw passing through a clear hole in the bushing to clamp both the bushing and the bearing. No armature binding has been experienced with bearings bored in this chuck because the inner side, when bored, must be parallel with the outer side of the shell. One man can bore many bearings in a day with this chuck, as no time is lost in centering. A large number of bearings can be bored, say 1/32 in. small, for stock and when armatures require bearings the latter can be fitted with this chuck without disturbing the original alignment. Fig. 4 shows an armature bander which was made of a 15-in. diameter double-flange, cast-iron pulley, 1 1/2 in. wide between the flanges. The banding wire is led from the spool seven or eight turns around the pulley after which the wire is led in the right direction by the lower right-hand trolley wheel which serves for the sheave. A piece of trolley rope over the pulley is used for a brake. This rope is fastened to a bracket at one end and is kept taut by cast-iron weights at its free end. The tension of the wire is increased simply by adding more weight on the end of this rope. This banding outfit has been found efficient and simple and does as good work as more costly devices used for the same purpose.

Fig. 5 shows a car wheel tire-heater consisting of a piece of 1 1/2-in. pipe bent into a circle with 3/8-in. holes 1 in. apart drilled all around on the inside. Natural gas for heating is supplied through the valve on the left and air is furnished through the valve on the right from a forge blower driven by a 1-hp motor. The pipe circle rests on a 3-in. thick cast-iron ring which is surfaced on the upper side and ribbed on the lower side. The brick foundation has a large center hole through which the water used for cooling the tire is drained away. A 2-ton

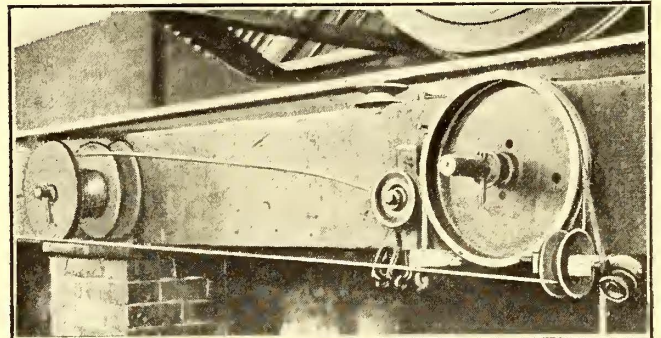


Fig. 4—Armature Bander

chain hoist suspended from a trolley running on I-beams is used to lift the wheels and axles in position over the tire. When the tire is heated sufficiently the wheel is lowered into it and the tire cooled off. This apparatus has been found to be very satisfactory. For instance, four old tires have been

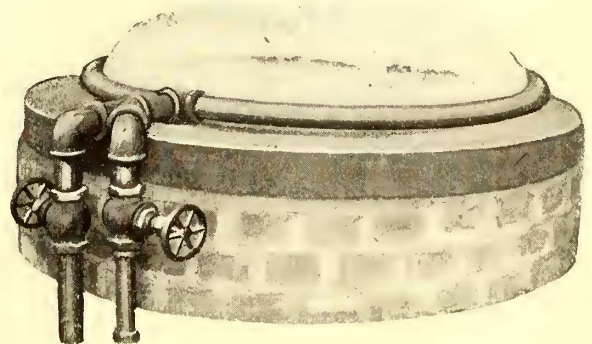


Fig. 5—Car-Wheel Tire Heater

taken off and four new tires put on for a total gas consumption of 830 cu. ft., the natural gas costing 30 cents per 1000 cu. ft. The time taken to remove an old tire varied from 6 minutes 25 seconds to 10 minutes. The time taken to apply a new tire varied from 21 minutes 30 seconds to 25 minutes.

PARLOR CARS FOR THE OREGON ELECTRIC RAILWAY

On page 636 of the souvenir section of this issue reference is made to the parlor cars operated by the Oregon Electric Railway between Portland and Salem. Through the courtesy of C. A. Coolidge, general manager of the Oregon Electric



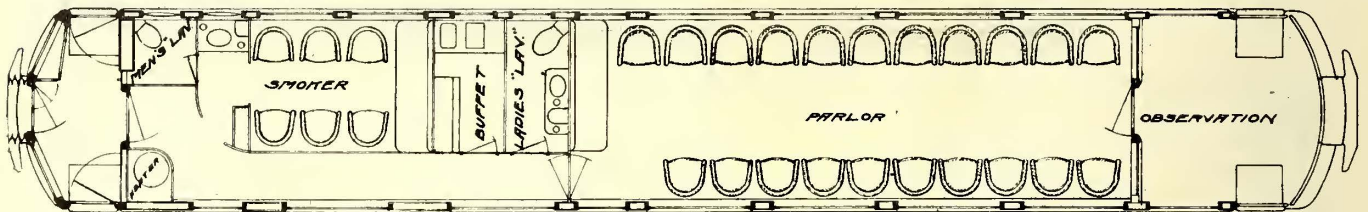
Interior of Observation Compartment

Railway, this paper is able to present herewith some additional information about these cars, which have now been in service for about four weeks. The cars are being operated at the rear end of three-car trains. The first car in the train is a

long enclosed with a bronze railing and covered with a standard steam railroad pattern observation dome with an awning. The parlor-car compartment is 25 ft. 11 in. long and contains 21 seats along the side and a sofa across the front end. In the forward end of the car is a smoking compartment containing six seats and a sofa and a buffet, together with lavatories for ladies and gentlemen. The length of the cars over buffers is 62 ft. 13/4 in. and the width over all is 9 ft. 6 in. The car bodies weigh about 37,000 lb. and the total weight, including motors and equipment, is 88,700 lb.

The side sills are made up of 4 1/2 in. x 7 3/4 in. and 1 7/8 in. x 6 in. pine timbers with a 5-in. x 7 3/4-in. sill plate bolted between. The center and intermediate sills are 6-in. I-beams. The floor is of double thickness with a layer of Keystone hair insulation 1/2 in. thick between the two layers of boards. The windows have wide double bottom sashes with art-glass semi-elliptical sashes above. All movable sashes are hung on O. M. Edwards spring balance fixtures and are fitted with rings and rollers made by the same company.

The interior of the car is finished in selected dark mahogany with inlaid borders of colored woods. The ceiling is of Empire style, decorated in green and gold. Green silk Pantasote curtains are hung over all windows. In the toilet rooms and buffet the finish is white enamel. The parlor compartment is furnished with 21 reed chairs with dark-green plush cushions. These were furnished by Heywood Brothers & Wakefield Company. The floor of the parlor compartment is covered with a thick Wilton carpet woven with a green and gold border. The smoking compartment is furnished with six mahogany colored reed chairs upholstered with dark-green leather, and the sofa across one end is upholstered in the same material. The floor of the smoking room, buffet and lavatories is covered with inlaid linoleum. The buffet is furnished with a sink with hot



Floor Plan of Observation Parlor Car for Oregon Electric Railway

combination baggage, smoking and passenger car and the second car is a passenger trailer. The parlor car is equipped with motors and General Electric type M control and the forward end is vestibuled so as to provide a covered passageway

and cold water spigots, an ice chest under the sink, a linen closet, a nickel-plate hot-water urn and a two-burner alcohol stove.

The car is heated with a Peter Smith No. 2-C hot-water



Observation Parlor Car for Oregon Electric Railway

through to the forward cars. The two parlor cars now in service are named the "Champoeg" and "Sacajawea."

An accompanying engraving shows the floor plan of the cars. At the rear end is an observation platform 8 ft. 4 in.

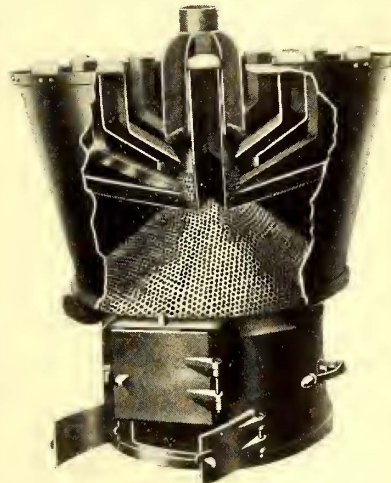
heater which also heats water for the buffet. Two 100-gal. steel water-storage tanks are hung under the car body. They are encased to prevent freezing and pressure is supplied by connecting with the air-brake system. The hot-water supply

is stored in a 20-gal. tank mounted above the car heater. Other special equipment of the car includes Edwards self-raising steel vestibule trap doors, Westinghouse air brakes, Baldwin trucks with 5-in. x 9-in. journals and 36-in. wheels designed for mounting two GE-73 motors. The cars were built by the Niles Car & Manufacturing Company, Niles, Ohio.

A SELF-CONTAINED SAND DRYER

The Thomas W. Pangborn Company, New York, is making for electric railway service the compact sand dryer shown in the accompanying illustration. A patent for this dryer is now pending. The strongest feature asserted for this dryer, aside from its fuel economy, is that it insures the absolute removal of moisture in the sand without impairing its value by burning or calcination. This is accomplished by keeping the wet sand from direct contact with the firebox and by carrying away the moisture by air currents. A perforated screen which has the shape of an inverted funnel is used for this purpose. The neck of this funnel surrounds the chimney while the conical part is separated by an air gap from the firebox. The perforated screen keeps the damp sand away from the firebox, but allows the heated air to pass freely from the firebox and under the sand. As the sand dries, it drops through the perforations of the screen and runs down the inclined surface of the firebox to the storage bin. As sand will resist the passage of air and heat, several inverted angle flues project from the firebox through the sand, extending to the top of the hopper into the open air. This arrangement allows the hot air to absorb the moisture from the sand in the interior of the hopper and to discharge through these flues.

The established principle that heat transmitted through an iron wall is obtained in greatest volume from rough surfaces is applied in this dryer. The inside of the firebox has several concentric rings projecting toward the fire and radial ribs on the outside radiate the heat under the perforated screen. As the sand comes in contact only with the heated air, it will not burn, even if the firebox is red hot. Small doors in the hopper permit the easy removal of material that will not pass through the perforated screen. The green or wet sand requires no further attention after being shoveled into the hopper. The capacity of the dryer is governed entirely by the amount of moisture and foreign matter in the sand and the degree of heat to which the stove is brought. The dryer stands 4 ft. from the floor to the top of hopper. The hopper is 4 ft. in diameter at the top and 37 in. at the bottom. The base is 30 in. in diameter; height from floor to top of firebox, 18 in. The complete dryer weighs 1,400 lb. The stove is adapted for use with hard or soft coal, coke, or wood or can be equipped with oil or gas burners.



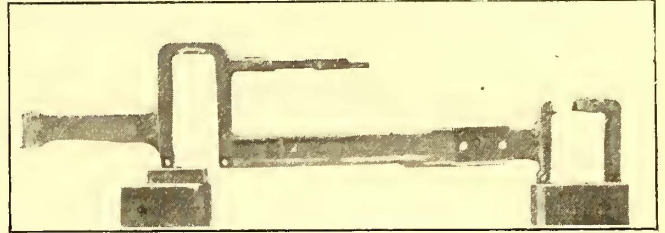
Part Interior View of Sand Dryer

The report of the Liverpool Tramways for 1909 shows that the ratio of fatalities to passengers carried was 1 in 30,382,235. At the instance of the management 285 prosecutions took place, an increase of 70 as compared with the previous year. Of this number, 60 prosecutions were for riding on steps, buffers and platforms. There were 25 cases of prosecution of persons who avoided or refused to pay fares and two of persons who refused to leave a full car. The length of track operated was 109½ miles, an increase of 2 miles as compared with 1908.

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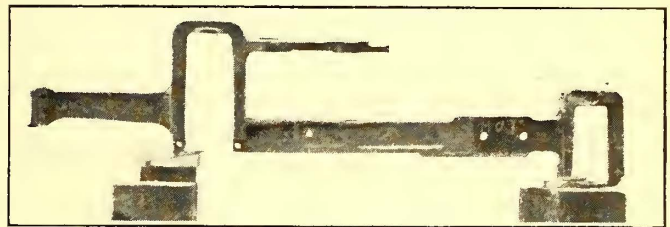
ELECTRIC WELDING WITHOUT RESISTANCE LOSSES

The Garwood Electric Company, Garwood, N. J., has recently put before electric railway companies an electric welding system in which no grid or water rheostats are necessary to secure the low voltage and high amperage required for this work. The apparatus includes a specially designed motor and a double-commutator 50-volt to 75-volt generator coupled and mounted on one cast-iron base. There is furnished with this apparatus



Broken Truck Frame

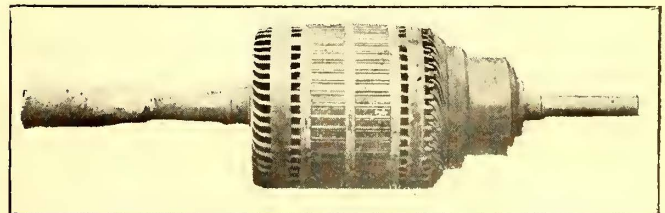
a switchboard carrying one starting rheostat for the motor, one field rheostat for the generator, one set of automatic solenoids and one special circuit breaker. The rest of the apparatus includes a head shield for the operator and a flexible cable to permit welding at a considerable distance from the motor-generator set. Either single or double arcs are furnished, so that in the latter case two operators can weld independently from one set and each can use a different voltage. In operation the motor-generator set is connected to the railway circuit, lowering the voltage to 50 volts or 75 volts and



Repaired Truck Frame

raising the amperage in practically the same proportion. The voltage regulation is entirely automatic without the waste of power incident to reducing the voltage through water rheostats or grid resistances.

This system of welding is adapted for repairing almost any iron or steel material used in electric railway work. Two of the accompanying illustrations show a truck frame before and after welding a break, while the third illustration shows a repaired armature shaft before machining. Axle caps and boxes, journals, bolsters, gear cases, worn and broken gears, brake links, etc., can also be repaired by this method. Motor



Repaired Armature Shaft Before Machining

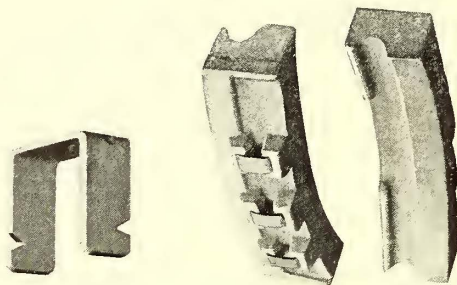
cases broken at the junction of the oil boxes and the wall of the casting can usually be repaired and reinforced in from two hours to three hours for \$1.50 to \$2. including current and labor. Broken truck frames have been welded in one and one-half hours to two hours for a cost of about \$1 each. Broken armature shafts and journals are repaired without disturbing the windings in from three to four hours at a cost of from \$2.75 to \$3.50. Broken shafts can also be butt-welded in a satisfactory manner. One of the most interesting uses

of this system is adding metal to eliminate flat spots from car wheels. A flat spot covering an area of, say, 2 in. has been covered in 10 to 15 minutes at a cost of about 25 cents, which included dressing down the welded part with a file. This operation can usually be performed without removing the car truck, only a little jacking up of the car being necessary.

While no great skill is required in manipulation care should be taken in choosing the metal for the welding bars. The heat generated during the welding burns out part of the carbon, silicon and manganese. To offset this effect the welding pieces should be of a higher grade metal than that used in the object welded so that the junction will be stronger instead of weaker than the rest of the structure.

A SAFETY BRAKE SHOE

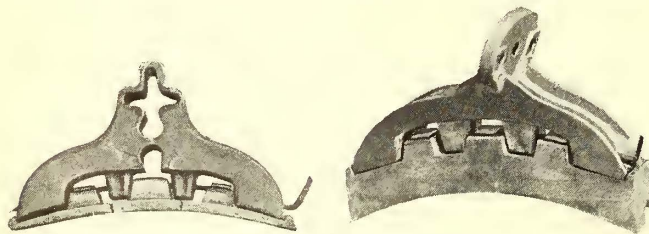
The Lancaster Iron Works, Inc., Lancaster, Pa., have recently begun to make cast-iron brake shoes on an extensive scale both for electric and steam railways. The distinctive feature of these shoes is the use of three steel keepers which prevent broken or partly worn shoe treads from falling on the track to cause disasters. By this means it is possible to take advantage of the high frictional coefficient of cast iron without



Figs. 1 and 2—View of Keeper, Keepers in Shoe and Shoe Tread

incurring the risk incident to some other designs. The keepers are cast into the lugs of the shoe and extend through them into the tread for about 1/8 in. They are 1 3/8 in. wide x 1 3/8 in. deep and about 3/16-in. thick. As shown in Fig. 1, the keepers are made with a V-notch on each side so that when the shoe is cast they are most thoroughly embedded and anchored in the molten metal.

The manufacturers of this shoe claim that the three-keeper design is superior to the single-keeper shoe in at least two important respects; first, three keepers will positively pre-

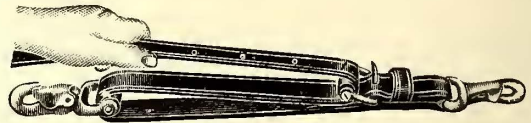


Figs. 3 and 4—Worn Shoe and New Shoe Complete

vent the shoe from being twisted or displaced, thus insuring the equalization of braking pressure over the wheel tread; second, a three-keeper shoe will wear until there is very little tread metal left, whereas a considerable portion of the single-keeper shoe is likely to drop out because it is held only at one place. Fig. 2 of the accompanying illustration shows how the keepers are cast in the lugs and also shows a shoe tread; Fig. 3 shows how a shoe broken in three parts would still be safe and serviceable; Fig. 4 shows an assembled shoe and head. The makers point out that the percentage of steel in the scrap of this shoe is much smaller than in the steel-back shoe or similar types where steel is used to hold the cast-iron tread.

COMBINED SAFETY AND SLACK STRAP

The electric railway lineman finds it advantageous to reduce to a minimum the number of tools which he has to carry. Realizing the advantages of a single device, if it will do the work of two or three devices, Mathias Klein & Sons, Chicago, have just put on the market a safety strap so provided with fittings that it serves equally well as a slack strap. The combined safety



Combined Safety and Slack Strap

and slack strap is made of heavy leather in a single piece 1 3/4 in. wide and 7 ft. long. The fittings include two safety snaps, one fixed at one end of the strap and the other provided with a roller so that it will move freely. The buckle frame also carries a substantial roller and when the free end of the trap is guided over this roller, as shown in the illustration, the strap may be used to give a double purchase in pulling up slack with a comealong. By throwing the tongue of the buckle into any of the holes along the strap, the load can be held at any desired position. As every lineman regularly equips himself with a safety belt, this strap, which will replace the safety belt and provide for pulling up slack, should be found very convenient.

A NON-CORROSIVE IRON OF HIGH MAGNETIC PERMEABILITY

The American Rolling Mills Company, Middletown, Ohio, is now producing an iron which is intended largely to meet two wants: First, for a metal in which electrolytic corrosion is reduced to a minimum through the elimination of substances which are of opposite polarities; second, for a metal of high magnetic permeability which would not become permanently magnetized. The following are two sample analyses of this metal:

	Per Cent	Per Cent
Sulphur .....	.025	.023
Phosphorus .....	.004	.004
Carbon .....	.010	.010
Manganese .....	.010	.020
Total impurities .....	.049	.057
Purity of metal	99.951	99.943

It will be observed from the foregoing that the manganese content, which is held to be the principal corrosion factor, is remarkably low; also that silicon is entirely eliminated by the time the ingot stage is reached. The metal is soft, ductile and easily worked and welded. In working, the metal acts something like steel. The general physical properties of a test specimen 8 in. long were found to be as follows:

Limit of elasticity.....	41,260 lb. to 46,700 lb.
Ultimate strength	49,770 lb. to 53,950 lb.
Elongation .....	.33 per cent
Reduction of area .....	.57.3 per cent to 68.3 per cent

It is not asserted that this ingot iron is absolutely non-corrodible but that it corrodes very much less than any other metal of which iron is the base. The electrical conductivity of a bar of this iron has been found to be 12.85 per cent of commercial copper wire, whereas the unannealed Norway iron compared with it had a conductivity of 11.8 per cent.

CHANGE IN THE GOLDSCHMIDT THERMIT COMPANY

Announcement is made of an important change in the management of the Goldschmidt Thermit Company, New York, N. Y. Commencing Oct. 1 E. Stutz, vice-president and general manager, retires from the direction of the company, which passes under the management of William C. Cuntz.

Mr. Cuntz brings to his position a thorough knowledge of the steel business and a wide acquaintance with the railway and street railway officials of the country, having been connected for 18 years with the Pennsylvania Steel Company.

HIGH PRESSURE STANDPIPE SYSTEM FOR CAR YARD PROTECTION

The Cleveland Railway Company has recently installed at its Woodhill Road yards a fire protection equipment designed by Henry N. Staats, manager of the American Railway Insurance Company. As shown in the accompanying drawings, the system consists of a series of standpipes, six in this case, arranged in a line down the center of the yard. On one side of the line are six storage tracks, either in use or proposed, and on the other eight. It is proposed to protect cars at any point in the yard from serious fires and to extinguish any blaze that may originate before it gets start enough to menace other property.

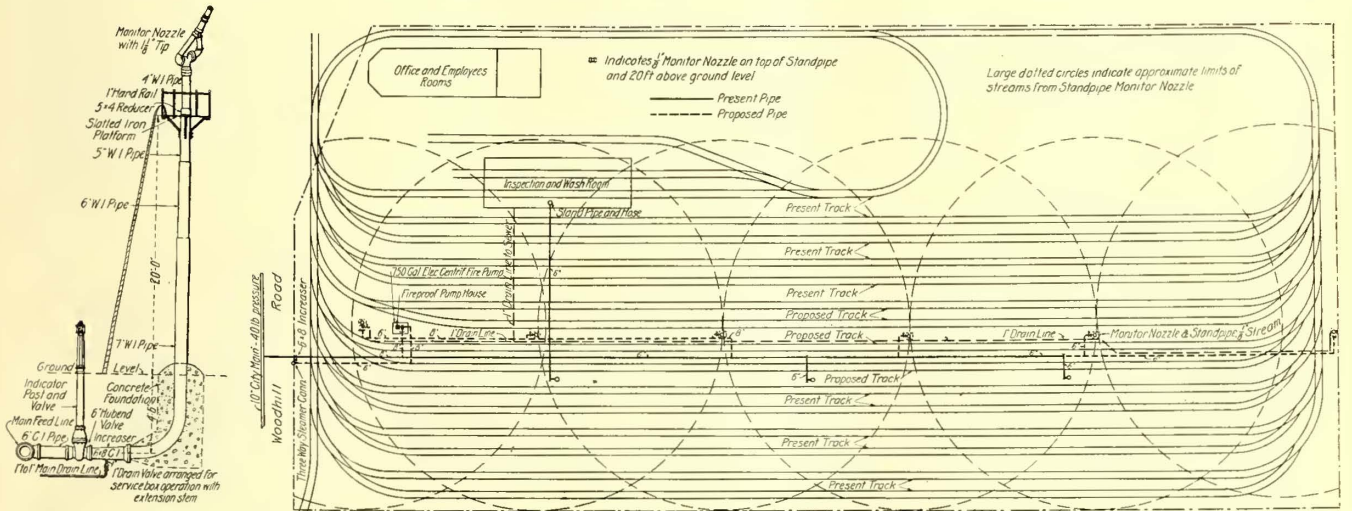
Above the ground these standpipes consist of standard trolley poles with a small metal platform near the top, which is reached by a metal ladder. Starting with a 7-in. tube, the diameter of the pipe is gradually decreased to 4 in. at the top. The joints are shrunk to insure strength and at the top one a 5 in. x 4 in. reducer is installed. A Hart monitor nozzle with 1 7/8-in. tip is turned onto the top by means of threads.

The pole is curved at the bottom to obviate the necessity of making an elbow connection in the concrete setting, which extends to a depth of 4 ft. 6 in. into the ground. Here it connects with a 6-in. Hubbard valve by means of a 6-in. x 8-in.

500 gal. water per minute on any car in the yard. While a regular city fire engine was used to furnish pressure at the test referred to in last week's issue, a 750-gal. centrifugal electrically operated pump has been ordered for this yard. The city water pressure at this point is only from 40 lb. to 50 lb. An automatic starting rheostat will be placed on the switchboard with wire connections to the top of each pipe, so that the operator may turn on the water when he reaches the indicator and start the pump as soon as he is on the platform at the top. He will thus lose no time in getting to work.

No fire pump is needed where a constant pressure of 80 lb. can be had on the city water mains, provided the mains are ample to deliver the required amount of water. However, in some cases both steam and electrically operated pumps may be used, to be sure of power at all times.

In the test that was made Saturday, Sept. 24, three of the standpipes were in operation a portion of the time, but later on the pressure was turned upon two and then upon one. None of them wavered in the least when the big volume of water was forced into them, the peculiar division of the stream at the base of the nozzle equalizing the pressure almost perfectly. Nor did the joints in the pipes show any sign of leakage or weakness of any kind. Once when only one nozzle was in operation the pressure at the engine showed 150 lb. and for quite a time it was maintained at 130 lb. The nozzles



Plan of Woodhill Road Yard of the Cleveland Railway, Showing Fire Protection Areas and Detail of a Standpipe

increaser. This size is used because the 7-in. pipe will not fit into the bell of the 6-in. valve and allow the use of lead or any other material. An indicator post rises from this valve to a distance of about 4 ft. above the ground and the other side of the valve is connected with an 8-in. city water main by means of a reducer.

The heavy solid line in the illustration of the layout indicates a 6-in. water main that was laid in the yard some years ago to take care of several hose plugs which are also shown. This would not carry a sufficient volume of water for the standpipes, so a new 8-in. main was laid to care for the first three and was tied into the old one, which for the present will supply the others. A part of the old line at the street end of the yard has been converted into a steamer connection. The hydrants and the remainder of the old main will be removed. A 1-in. hose connection will be made near the base of each standpipe, so that the work of the nozzles may be accelerated by additional streams within the car when necessary. There will also be a test valve at this point to ascertain whether the pipes are thoroughly drained after use by the drain pipe, which connects near the valve under ground.

The pipes stand 20 ft. above the ground level to the operator's platform, and in this case are spaced 115 ft. apart. In the future this distance will be reduced to 100 ft., as it is believed the efficiency will be materially increased by the change. The plans contemplate the use of two streams of

were in such good order that they could be turned horizontally with one hand or moved perpendicularly with perfect ease. The streams covered the tracks in good shape, although there was a strong wind from one side for a portion of the time. The stream was somewhat shortened by this, but the force was sufficient to make protection certain with the system. It is believed that when the new pump is installed there will be no trouble whatever to secure all the pressure that is necessary.

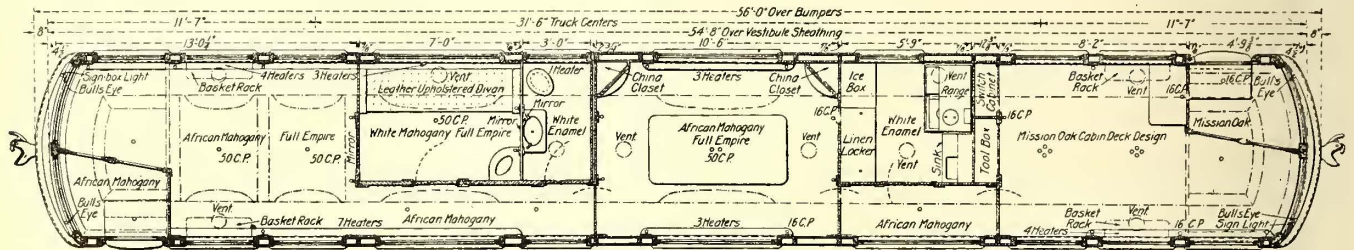
As in other forms of fire protection, the main object of this method is to form a water wall about any car that may take fire, so that the fire may not be communicated to other cars. At the same time it is expected that the fire will be extinguished easily, notwithstanding the distance that the water may be thrown. Two nozzles will play on a fire at any point and furnish a volume of water sufficient to take care of any blaze that may originate in the yards.

The Twin City Rapid Transit Company of Minneapolis has arranged to equip its main yard with this system.

A booklet recently published by the Carnegie Steel Company contains an assembly of some steel specifications of that company, the Association of American Steel Manufacturers and the American Society for Testing Materials. Electric railways will be particularly interested in the Carnegie specifications for steel wheels and axles.

TREATED CANVAS CAR ROOFING

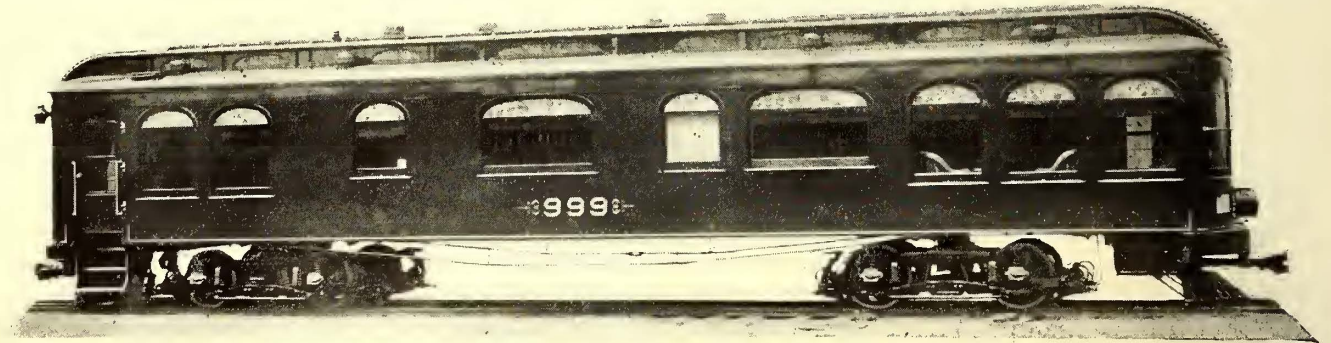
Although cotton canvas has been the standard material for passenger-car roofing for a long time, it possesses one prominent defect, namely, that the paint on the cotton roofing will crackle and sometimes blister under the effect of heat, or even from the movement of the car after the canvas has hardened. The effect of this crackling is to permit moisture to get underneath the paint to the cotton fiber. The interposition of the paint prevents the canvas from drying quickly and thus an opportunity is presented for damage by mildew germs. The actions of these organisms causes the canvas to rot so that a new carhead lining is necessary long before the actual life of the canvas, due to wear, has been reached.



Beebe Private Car—Plan Showing Division of Compartments, Furnishings, Lighting Scheme, etc.

To overcome this objection to the usual type of cotton canvas roofing the William L. Barrell Company, New York, placed on the market a few years ago a specially woven and treated canvas named "Con-ser-vit." The treatment applied to this material makes each fiber proof against the deleterious action both of mildew and water. This treatment does not include the use of linseed or other oils, or paraffine wax or similar preparations, which the manufacturers of "Con-ser-vit" claim is deleterious. It is also asserted that this roofing re-

kitchen with pipe connections for hot water to a washstand in the toilet and retiring room; a dining room, including two china closets; a combination toilet and lavatory; a retiring room, and a sitting room. The smoking room is finished in mission oak with cabin ceiling; the dining room in African mahogany with inlay lines and beamed ceiling; the parlor in African mahogany also, but with full Empire ceiling. The retiring room is finished in white mahogany and the lavatory and kitchen in imitation white enamel tiling. The floor of the



Beebe Private Car—Side View, Showing the Arrangement of the Sash and One of the End Observation Windows

mains pliable for years, as shown by its successful use under a wide range of climatic and atmospheric conditions in the United States. It has also been used extensively as car roofing and as an insulating material in the construction of steel cars for electric railway service. Of course, a special material of this kind costs more than untreated canvas, but the difference in price is more apparent than real when life is considered. The user is perfectly safe in applying one less coat of roofing paint, whereby even the first cost of the treated canvas would come within the price of ordinary roofing, irrespective of economies in maintenance. This material is supplied in all widths up to 9 ft. and three weights and grades. It has been found applicable also for covering small buildings, tool boxes, etc., on the right-of-way.

As a means of encouraging farmers to use the service of the Iowa & Illinois Railway between Clinton and Davenport, Ia., the company has erected at country highway crossings a number of well-built wooden sheds into which the farmers can put their horses while they take a trip to one of the terminal cities. No charge is made for the use of these sheds. Each farmer has a padlock to prevent the loss of his team or robes.

toilet room is covered with $\frac{1}{8}$ -in. marble and that of the kitchen and motorman's cabs with interlocking rubber. The cabs are also supplied with rubber mats. The finished floor in the rest of the car is of polished oak.

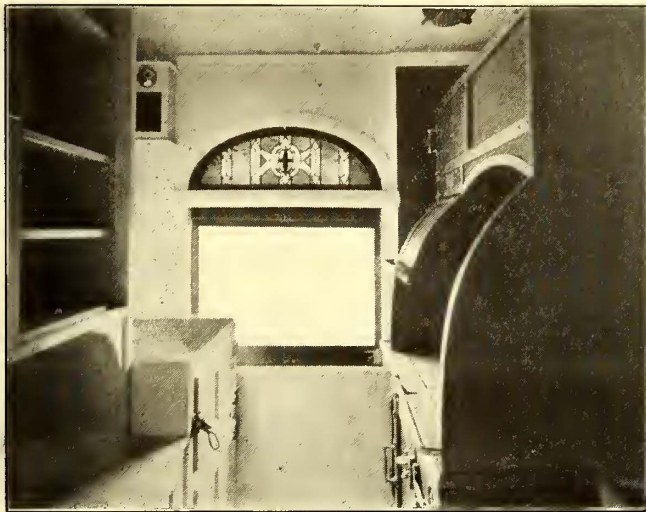
It will be observed from the side view of the coach that this car is built with very large windows and there are also observation windows at the ends. All of the trimmings both inside and outside the car are in brush brass, including the rods across the windows. A bronze foot rail is also placed across the front observation windows at a suitable height from the floor.

The kitchen equipment consists of a buffet and combination range, oven and broiler and hot-water heater. It has also an ice box large enough to take about 75 lb. of ice and still allow room for food requiring refrigeration. A copper-covered sink and shelf, which is operated by a chain rack, is connected by piping with the hot- and cold-water tanks. Beneath this sink and shelf is a copper-covered serving board under which food supplies, camp stools and other articles may be stored. This section is also provided with storage closets for cooking utensils, linen, etc. The furniture installed in the car includes a leather-upholstered divan in the retiring room; a table and leather-upholstered chairs in the smoking room; wicker chairs with

plush seats in the sitting room, and a table and leather-upholstered chairs in the dining room. The car is also supplied with a desk and four portable side tables, two of which are finished in mission oak and two in mahogany to match the finish of the smoking room and the sitting room respectively. Mirrors are placed in the toilet and retiring rooms.

All outside sash is glazed with $\frac{3}{16}$ -in. polished plate and all inside sash with $\frac{5}{32}$ -in. polished plate glass. An art glass is used over the side windows and in the monitor deck. The glass in the toilet room and the corresponding sash on the opposite side of the car are of Florentine design, molded. The curtains throughout the car are of silk Pantasote mounted on

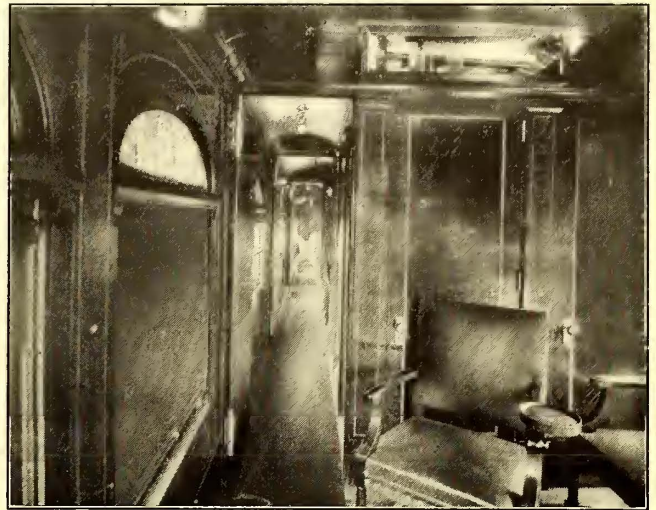
bumpers, 56 ft.; maximum width over all, 8 ft. $6\frac{1}{4}$ in.; width inside of the walls of the car below the windows, 7 ft. $5\frac{3}{4}$ in.; top of rail to top of bumper, 3 ft. $5\frac{1}{2}$ in.; top of rails to top of the roof boards at the center, 12 ft. $10\frac{3}{4}$ in. The bottom framing is made up as follows: Each side sill is built up of one $3\frac{1}{2}$ -in. x 7-in. angle, one $\frac{3}{8}$ -in. sill plate and one 7-in. channel with wood filler; the center and intermediate stringers are 6-in. I-beams with similar wood fillers. All cross sills and bracings for the entire framing are of steel and white oak. The rough floor has two thicknesses, one being on top of the sills and stringers and the other 2 in. above. The space between these floors is filled with mineral wool.



Beebe Private Car—A Portion of the Kitchen and Pantry

Haviland rollers with Curtain Supply Company's No. 88 ring fixtures. Curtains of the same material are also provided in both the cabs. Ample ventilation has been secured by the use of single 8-in. globe ventilators in each compartment. The opening below the ventilators in the interior of the car is covered with grill work and a wire mesh screen.

The car is exceptionally well lighted. As shown on the plan,



Beebe Private Car—View of the Corridor



Beebe Private Car—Sitting Room with Temporary Table

the lighting scheme embraces the use of groups of four 16-cp lamps in the smoking room, 50-cp single lamps in the sitting room and single 16-cp lamps at frequent intervals throughout the rest of the car. The layout of the electric heaters is also shown on the plan. All lighting circuits lead to an asbestos-lumber lined switch cabinet built against the rear partition inside the motorman's cab.

The general dimensions of this car are as follows: Length over the vestibule sheathing, 54 ft. 8 in.; length over the

The body framing of the car consists of white ash corner posts, $1\frac{3}{4}$ -in. x $4\frac{3}{8}$ -in. ash double posts between each pair of windows, $1\frac{3}{4}$ -in. intermediate posts in the center of the double windows, white ash side window sills and Southern poplar sheathing under the window sills and the sides of the car. The roof framing consists of 17 steel carlins with an upper roof of $\frac{1}{2}$ -in. Southern poplar covered with No. 8 cotton duck. A



Beebe Private Car—The Smoking Compartment

copper gutter is placed on the roof over each vestibule side door, and a 1-in. half-oval iron molding is placed on the edge of the rear hood to protect the hood from the trolley rope.

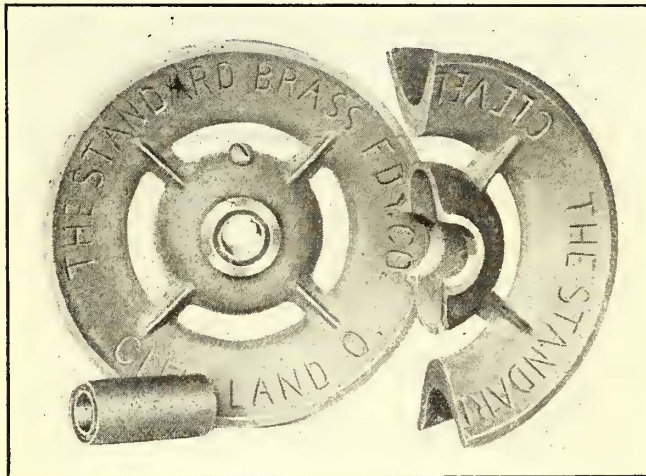
The motorman's compartments are furnished with Edwards trap doors, covering the steps, and with folding theater stools. The door closing and opening into each motorman's compartment has drop sash.

Among the car fittings are Crouse-Hinds arc headlights, McConway-Torley couplers, emergency tool box, Westinghouse air

brakes, De France pneumatic sand box, 12-in. Dedenda gongs in the motorman's compartment, a push-button system wired to an annunciator in the kitchen, Miller fire extinguisher. Van Dorn No. 18 couplers capable of operating on a 43-ft. radius curve are used when this car is coupled to another. The four-motor equipments are of Westinghouse manufacture. The car is arranged for both overhead and third-rail current collection.

TWO NEW TROLLEY WHEELS

The Standard Brass Foundry Company, Cleveland, Ohio, which operates one of the largest brass foundries in the United States, has recently added the manufacture of trolley wheels to its other work. The two designs which the company has placed on the market are the result of many preliminary service experiments with various compositions and shapes of wheels. One of the two designs is for Holland harps exclusively, while the other is generally applicable. The wheels are made in diameters of 4 in., 5 in. and 6 in. with U- or V-shaped grooves. It is stated that only new lake copper and new tin are used in



Complete Trolley Wheel; Half Wheel Showing Oil Chamber and the Bushing

all of the wheels, the alloy being proportioned to secure maximum toughness and softness. One of these wheels is shown in the accompanying illustration. The flanges of all of the wheels are heavy and can be rebent to shape in the shop. The large oil well is replenished by the removal of one screw. The bushings are of graphite. The tread of the 6-in. diameter wheels is fully 1/2 in. thick. One of the features noted on handling these wheels is their perfect balance.

STATISTICS ON USE OF ELECTRIC WELDED JOINTS IN CHICAGO

The Board of Supervising Engineers of Chicago Traction, in its second annual report, presents the following table showing the results obtained from the electric welding of rail joints which is being done for the Chicago Railways and the Chicago City Railway companies by the Lorain Steel Company:

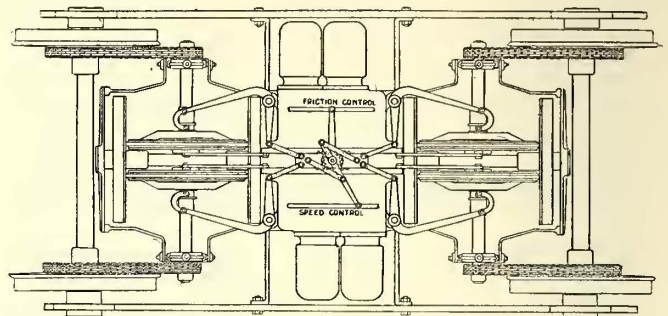
RECORD OF ELECTRIC WELDING OF RAIL JOINTS.

Year.	Railway.	First fiscal			Second fiscal			Total		
		Welds.	Breaks.	Per cent.	Welds.	Breaks.	Per cent.	Welds.	Breaks.	Per cent.
1907—C. C. Ry...	4,711	189	4.0	....	194	4.1	4,711	383	8.1
1907—C. Rys.....	4,377	241	5.5	....	46	1.0	4,377	287	6.5
1908—C. C. Ry...	....	....	..	9,272	206	2.2	9,272	206	2.2
1908—C. Rys.....	....	....	..	8,613	147	1.7	8,613	147	1.7
Total, C. C. Ry ..	4,711	189	4.0	9,272	400	..	13,983	589	4.2	
Total, C. Rys.....	4,377	241	5.5	8,613	193	..	12,990	434	3.3	
Grand total.....	9,088	430	4.7	17,871	593	..	26,973	1,023	3.8	

GASOLINE RAILROAD CARS

The Railway Motor Car Corporation, Philadelphia, Pa., is specializing in the construction of gasoline railway cars which are intended for application on roads in sparsely built-up communities on small branch lines, in city owl service and for other conditions where the seat load-factor is too low for profitable electric operation. The principal feature of these cars is the use of the Lambert noiseless friction drive. This mode of power transmission, which will be referred to in detail later, is said to give the necessary flexibility in speed control so essential in a railway vehicle.

Among the cars built by the Railway Motor Car Corporation

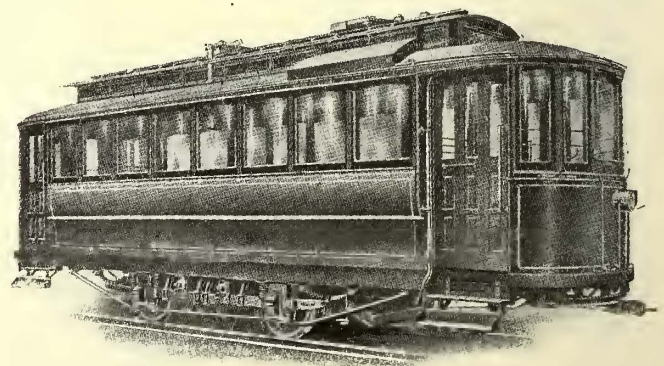


Power Transmission Connections on Truck of Gasoline Car

is one now in use on the estate of the late E. H. Harriman. Two others of the company's type "B" have been made, respectively, for the Baltimore (Md.) & Washington Transit Company and the Schuylkill & Dauphin Traction Company Williamstown, Pa. At present the company is building two distinct designs: type "B," as noted, for 30 passengers, and a higher speed suburban-interurban type "C" for 35 passengers and a baggage compartment. The principal differences in dimensions and equipment are as follows:

	Type B	Type C
Truck wheelbase	7 ft. 6 in to 8 ft.	10 ft.
Length over all.....	32 ft.	33 ft.
Length of body, inside...	21 ft.	23 ft.
Width over all.....	8 ft. 1 in.	8 ft. 6 in.
Height from rail.....	11 ft. 10 in.	11 ft. 10 in.
Vestibuled platform	4 ft. 4 in.	4 ft. 6 in.
Motor	6 in. x 6 1/2 in.	7 1/2 in. x 9 in.
Horse-power	60	100
Motor speed, r.p.m.....	500	500
Maximum m.p.h.	25	35
Weight of car, complete..	21,500 lb.	28,000 lb.
Gasoline per mile.....	1/8 gal.	1/4 gal.

Important points to be noted in connection with both types of cars are that they make use of standard car bodies and standard



Single-Truck Gasoline Car for 30 Passengers

trucks. Thus the type "B" car illustrated has a Brill body mounted on a Brill No. 21-E single truck and the same construction holds true of a type "C" car now under way, except that the wheelbase is 10 ft. instead of 8 ft. This adaptability is ascribed to the use of a drive which does not rack the car framing through jerky starts and severe vibrations and to the employment of engines which can be set on standard truck framing. Joint pounding is minimized as no weight is placed on the axles. All equipment is carried under the unbroken floor of the car, but nevertheless is readily accessible for inspection and repair. Externally the cars do not differ in appearance from the

usual electric car except that the roof carries a radiator instead of a trolley base and pole equipment. It will be observed that the weight of the non-baggage car seating 30 passengers is 23,000 lb., which gives the very reasonable weight of only 767 lb. per passenger.

In past installations the company has used engines of the Rutenber and Davis types, but it is now building a 100-hp, 7½-in. x 9-in., four-cylinder, four-cycle horizontal engine of its own design. The operations of the engine are controlled from two wheels set on the platform one over the other. One wheel carries out the forward and reverse movements and in doing so throws the friction wheels in and out of engagement with the four driving disks; the other wheel regulates the change in speed ratios, that is, it shifts the driven friction wheels in and out from the centers of the driving disks. Both controlling wheels are shaft-connected and are so pivoted as to avoid any movement of the corresponding wheels on the other platform. It will be understood from this that the car may be operated from either end. The four 30-in. diameter driving disks are of aluminum, which was chosen because of its high frictional coefficient. The driven friction wheels have insets of a fiber composed of compressed paper and straw. It is stated that this friction disk and wheel transmission has been found more efficient than gearing.

AUTOMATIC SIGNALS ON THE OHIO VALLEY SCENIC ROUTE

Among improvements in electric railway equipment in the last few years none has been so marked perhaps as in automatic signals. These have advanced from the crude and dangerous hand-light signals, which have been the undisputed cause of accidents, to high-speed automatic signals dependent only on the passage of the car and requiring nothing further on the part of the motorman than observation. Among signals of the latter type are those made by the Nachod Signal Company, Philadelphia, Pa.

In the Nachod automatic signal type "C" the signal box



Fig. 1—Car Approaching a Siding

containing the indications is located in advance of the trolley contactor so that the motorman sees by the change of this signal that he has set stop signals at the far end of the block. The control of the signals is through overhead trolley contactors and all changes in indications are caused at the instant when the car runs under them. The signals are successfully and continuously worked at car speeds of 40 m.p.h. and over in passing the contactors. If the power should leave the line while the car is in the block the signals would not have been changed when it returns, but would reappear exactly as before the interruption.

A set of these signals to protect one block of signal track consists of two signal boxes mounted on poles and four trolley contactors in the wire in the branches leading to the single track. There is required but one line wire connecting the boxes. The trolley contactors consist of contact strips mounted near the wire, but insulated therefrom and extremely flexible so that they make a certain and continuous contact throughout their length without jarring or throwing the wheel. They are

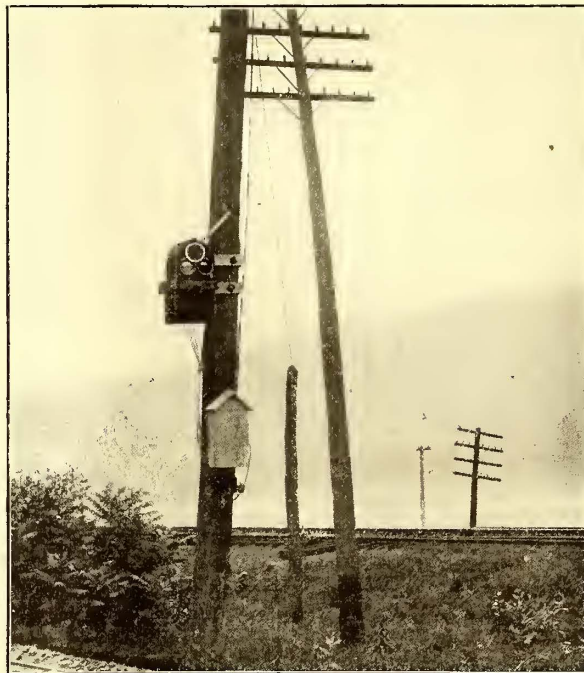


Fig. 2—Signal Box, Indicating Neutral or Empty Block

4 ft. long, weigh only about 18 lb., and accommodate the various sizes of wheels equally well.

The signal aspect is in duplicate, as there are separate night and day indications, white for "proceed" and red for "stop." The night indications are lights; the day indications are enameled aluminum disks counterweighted to fall to the indicating position. They are protected from the weather and are visible through a clear glass roundel. The moving parts of the signal forming the relay are immersed in an oil tank below the aspect. Thus both the magnets and switches receive the benefit of oil immersion. On the Chicago & Milwaukee Electric Railroad these signals are used in a service where three-car trains with three trolleys up pass through the block at 40 m.p.h.

The accompanying illustrations show signals on the line of the Steubenville & East Liverpool Railway & Light Company (Ohio Valley Scenic Route), of which W. R. W. Griffin is general manager. In Fig. 1 the car is approaching the observer to leave the block, the signal being set red. As soon as it passes the contactor at this end of the block the signals will be restored to normal or neutral. Fig. 2 shows a signal box indicating neutral or a void, which means that the block is unoccupied and may be taken from either end. A car entering from the end shown will set white signal here and red at the far end. The signals are arranged for permissive operation; that is, cars may follow into the block, but until they have all left they will not be restored to the neutral indication. The system has the desirable flexibility which enables cars having entered to leave the block by either end.

The leads from the line before entering the signal box pass through the wooden box below shown in the figure. This box is provided with enclosed fuses which act also as disconnecting switches when the signal box is to be handled. A lightning arrester is attached below this box.

Plans are being considered for the electrification of a portion of the North Western Railway near St. Petersburg, Russia.

A DURABLE GEAR LUBRICANT

The Joseph Dixon Crucible Company, Newark, N. J., is widely known for its graphite lubricants, but it is not generally borne in mind that these lubricants also have a place in the electric railway field. One of its products, known as graphite wood grease, is especially made for railway motor gearing. This is a graphite grease with which is incorporated a certain percentage of finely ground cedar fiber. The wood fiber absorbs the oily constituent of the lubricant and provides a cushion for the gears, thereby reducing gear noises to a negligible minimum. It is asserted that this lubricant also does not clog the gear or cake to the slightest degree. It is also stated that this lubricant is far more durable than a plain grease which contains neither flake graphite nor wood fiber.

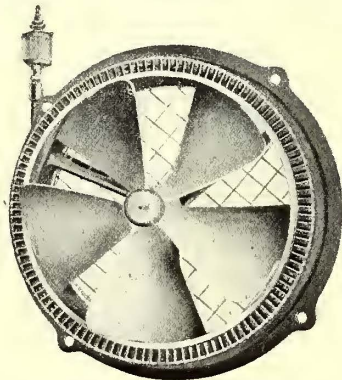
Other standard Dixon products used in connection with electric railway operations are the following: "Ticonderoga" flake lubricating graphite to increase the efficiency of any oil or grease; graphite air brake and triple valve grease, a general lubricant for the entire air brake system; graphite curve grease to reduce the wear of curved tracks, switches and the flanges of car wheels. This company will display its graphite products at the Atlantic City convention.

A STEAM TURBINE BLOWER FOR MECHANICAL DRAFT

The following paragraphs present some particulars of the "Typhoon" turbine blower made by the L. J. Wing Manufacturing Company, New York, to supply boilers with mechanical draft. These blowers have been widely installed in various classes of power plants, among these being the stations of an Eastern electric railway where 14 blowers are in service and 30 more are under order. The blower is guaranteed to consume not more than 2½ per cent of the boiler horsepower developed in high-pressure boilers.

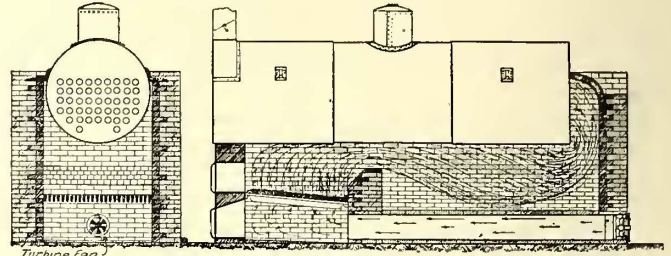
The best results are obtained by having the blowers controlled automatically so that they will stop and start with the rise and fall of the steam pressure. This is accomplished by placing a balance valve in the steam line of the blower and connecting its arm to the arm of a damper regulator. To obtain a balanced draft condition above the grates the blowers should be run at a speed sufficient to deliver enough air for the required capacity of the boiler. The damper is then set so as to cause the flames to rise vertically.

This turbine blower is a combination of a special blower and a steam turbine. The blower is of the propeller type, its blades being helicoids of revolution. The turbine consists of a series of drop forged buckets (or vanes) cast into a metal ring, mounted on the periphery of the blower. Steam is directed on the buckets by expanding nozzles mounted on the steam chest. The principal parts are shown in the cut in this column. The spider is made of gray cast iron. The steam chest which is the principal part of the spider is cored out in the casting process. There are three shoulders in the steam chest in which the nozzles are mounted. The shaft which is made of Shelby steel tubing, is driven in the hub of the spider and held fast by a round point set screw. The bearing consists of a phosphor bronze bushing which is screwed into the hub of the blower. The latter is cast of aluminum alloy, bronze or other metal as may be required by the service. At the extremity of each blade of the blower are lugs to which the bucket ring is firmly mounted. The buckets are made of drop forged steel. The nozzles are made of hard bronze



Blade and Turbine Without Casing

and are of the expanding type so designed that usage does not alter the steam consumption. After the rotating member is slipped on the shaft a steel plug tipped with a tempered thrust disk is screwed into the end of the shaft. The plug prevents the rotating member from coming off the shaft. Screwed on to the hub of the blower is a metal cap on the inside surface of which is sunk a tempered steel disk bearing on the thrust disk of the plug. The rotating member is lifted clear of the steam chest and nozzles by screwing on the cap. The cap is locked in position by a set screw. Lubrication is ac-



End and Longitudinal Elevations of Boiler, Showing the Application of a Turbine Fan

complished by means of an oil cup feeding the hollow shaft through a bent pipe. The casing on which the spider is mounted consists simply of a flanged cast-iron cylinder, containing a cast-iron muffler ring, and it entirely encloses the turbine. The muffler ring has openings which allow the exhaust steam to mix thoroughly with the air.

ASBESTOS INSULATED RECTANGULAR WIRES

For several years the D. & W. Fuse Company, of Providence, R. I., has been manufacturing an asbestos insulated wire known under the trade name of "Deltabeston." Its insulating and heat-resisting properties have brought it into extensive use for railway and hoisting motors, field, armature and controller coils, arc-lamp magnets, heating units and for many other devices subjected to severe overloads or high temperatures. This wire requires a temperature of 1000 deg. Fahr. to start the disintegration of its asbestos covering, and a temperature of 1800 deg. to decompose the asbestos completely. Thus a coil can be run at a dull red heat without causing a breakdown in its insulation.

These qualities have created a demand for "Deltabeston" wire of rectangular section as well as round. At first it seemed easy to treat a square or a flat wire like the round wire, but it was only after much experimenting that the present method was perfected. During the past year the company has sold a large amount of rectangular "Deltabeston," made with strong, uniform insulation of practically the same thickness on the corners as on the flat surfaces.

The advantages of square or flat wires for certain purposes are numerous. For instance, about 10 per cent greater copper section can be put into a given winding space by the use of rectangular wires than by employing round conductors. This is due to the perfect bedding secured by using wires with flat sides between which practically no space is wasted. The reduction of lost space in a winding is advantageous in two other ways: First, less compound is needed to fill a coil if it is to be impregnated; second, the heat radiation is greatly improved by avoiding spaces filled with a comparatively poor heat conductor.

An advantage of almost equal importance is that certain features of winding operations are facilitated by the use of flat-sided wires, especially when large conductors must be handled. Thus there is a great tendency for round wires to cut into any flat insulation between layers, due both to the tension in winding and to chafing in service. With flat wires the pressure of the conductors on the between-layer insulation is distributed over large surfaces instead of being applied in lines at the center of every wire. Greater stress, therefore, can be applied in winding a flat wire with less chance of injuring the insulation underneath it.

News of Electric Railways

Columbus Strike

Assaults upon cars at Columbus occur periodically, notwithstanding the fact that a number of men are on trial for attacking cars and that some of them have already been convicted. On the evening of Sept. 29, 1910, two cars were damaged by explosives and another was stoned. George Taylor was arrested on the charge of placing the explosives on the track in this case. Alvin C. Donovan, a grocer on St. Clair Avenue, Columbus, was arrested and held for a day or two, but was finally released on a bond of \$5,000. The police refused to divulge the charge that will be made again Donovan.

Nelin Kintz, 21 years of age, who confessed to throwing stones at cars, was sentenced to an indefinite term in the Mansfield reformatory. This was the first conviction in the riot cases. Dominic Reto, an Italian, also pleaded guilty to the same charge, but sentence had not been pronounced up to Saturday, Oct. 1, 1910.

The first trial before a jury, that of Peter Palladino, another Italian, lasted two days and was bitterly contested. Police officers and others testified that Palladino and Reto hurled something at a car on Leonard Avenue during a riot. Palladino was found guilty by the jury, and will probably be sentenced to a term in the penitentiary. Walter Guyn, 32 years of age, who pleaded guilty to throwing stones at cars, has been sentenced to serve one year in the penitentiary.

Seven more suits for damages, aggregating \$6,000, have been filed against Franklin County, in which Columbus is situated, by employees of the Columbus Railway & Light Company as the result of injuries sustained during the strike. This makes the total of suits of this kind about \$26,000.

John F. Brady, leader of the strike breakers, was placed under indictment on Sept. 27, 1910, on two charges, one of which was shooting to kill and the other shooting to wound. Brady is accused of firing the shots that wounded two women during a disturbance on the street. He was released on a bond of \$4,000.

On Oct. 1, 1910, the grand jury returned an indictment against James N. Orr, one of the organizers of the Columbus union of conductors and motormen who are on strike, on the charge of having placed dynamite on the street railway tracks in Bexley, a suburb, about three weeks ago. As a result of the explosion one man was injured and several others had narrow escapes. His bond was fixed at \$5,000, and Charles Miller, business agent of the union, is one of the men who signed the bond. Indictments were also returned against A. C. Donovan, the grocer previously mentioned, on the charge of throwing dynamite at a car.

Within the past 10 days 60 indictments have been returned by the grand jury, the majority of which are against men accused of taking part in the riots. Several indictments are for perjury growing out of evidence given at the trials which have been in progress for several days.

Hearing on Rapid Transit Proposal in New York

A hearing was held before the Public Service Commission on Oct. 1, 1910, on the plans agreed upon by the commission and the Interborough Rapid Transit Company for the third-tracking of the Second, Third and Ninth Avenue elevated lines, extensions of certain lines in the Bronx, the connection of the Queensboro Bridge with the Second Avenue line, and the opening of the Steinway Tunnel. In the offer now pending the company is willing to take a franchise on its elevated extensions running 25 years, with three extensions of 20 years each. For this it will pay 2 per cent of the gross increase in receipts at the express stations, and will submit to a readjustment of the payment at the end of each franchise period. Therefore, should the franchise for third tracks and extensions prove exceptionally profitable, the city would have a chance at the end of 25 years and at the end of each 20 years thereafter to work out a new basis of compensation. In addition to the third-

tracking of the Second, Third and Ninth Avenue elevated lines to complete third-track express routes on all from the Harlem River to the Battery, the Interborough Rapid Transit Company proposes the following extensions:

1. A two-track elevated route from the 143d Street station of the Third Avenue elevated through private property on Willis Avenue and Bergen Avenue to a connection with the Westchester Avenue line of the Interborough Rapid Transit Company.

2. A three-track elevated route from Third and Pelham Avenues through Pelham Avenue to Webster Avenue, to Gun Hill Road, to White Plains Road.

3. A two-track elevated route from Eighth Avenue and 149th Street through Macomb's Dam Lane to Central Bridge, over Central Bridge to 162d Street, to River Avenue.

4. An elevated route from Second Avenue on Fifty-ninth Street, between Fifty-ninth and Sixtieth Streets, to Queensboro Bridge.

5. An underground route from about Vanderbilt Place and Forty-second Street, Manhattan, under Forty-second Street and the East River, to a point in Long Island City near Jackson Avenue and following the line of the so-called Steinway Tunnel.

Commissioner Eustis explained that the arrangement of the improvements on the Second and Third Avenue elevated lines would involve the construction of a new four-track bridge across the Harlem River and a connection to allow express trains from the West Farms extension of the subway operated by the Interborough Rapid Transit Company to switch to the Second Avenue elevated down the east side to the City Hall.

E. W. Winter, president of the Brooklyn Rapid Transit Company, and J. F. Calderwood, vice-president of the company, conferred recently with Chairman Willcox of the Public Service Commission regarding the plan of the company to run its elevated trains from the Williamsburg Bridge through the Delancey-Centre Street subway to Chambers Street. The Brooklyn Rapid Transit Company has filed two written propositions for the use of the subway.

The Fourth Ward Transit Committee of the Borough of Queens has filed with the Public Service Commission the consents of the property owners along Jamaica Avenue for the construction of the Jamaica Avenue subway, known as Route No. 13. While only 51 per cent are necessary, consents aggregating 65 per cent of the value of the abutting property have been obtained from the junction of Broadway and Jamaica Avenue, Brooklyn, to Grand Street, Jamaica.

The Board of Estimate has approved the action of the Public Service Commission in granting permission for the construction of the so-called Utica Avenue route in Brooklyn. The proposed route is in Stuyvesant Avenue from Kosciusko Street to Fulton Street, to Utica Avenue, to Flatbush Avenue, about four miles, and is an extension of the Brooklyn-Manhattan-Long Island City route which will operate from the Hudson River under Fourteenth Street and the East River, following the line of the tri-borough route to the commencement of the Utica Avenue extension at Stuyvesant Avenue and Kosciusko Street.

The Public Service Commission has issued a pamphlet describing the proposed tri-borough rapid transit subway and elevated road. It gives a brief history of the system and its composite parts, made clearer by an outline of the points of difference between the route and the Interborough Rapid Transit Company's proposal. There will be four separate tunnels, with arrangements for better ventilation. The station platforms will be straight and built to accommodate 10-car express trains and 6-car locals. Bids are to be opened for construction and operation by private capital of the whole system on Oct. 20, 1910, and on Oct. 27, 1910, for construction by sections with municipal funds.

The Pelham Park & City Island Monorail Company announced that on Oct. 5, 1910, it would open its regular service between the Bartow Station of the New York, New

Haven & Hartford Railroad and the monorail station on City Island, two miles away. The company ran its first car in July, 1910, but on the initial trip the car jumped the track and injured a number of passengers. Since then the road has been virtually reconstructed, it is said.

Under an order to be issued by Justice Whitney, of the Supreme Court, George W. Linch, receiver for the Second Avenue Railroad, will abandon the franchises of that company in sections of street where tracks never have been laid. The order also will authorize the removal of unused tracks from Houston Street to Fourteenth Street in First Avenue; in Allen Street from Houston to Grand Street; in Pearl Street from the New Bowery to Peck Slip and in Peck Slip from South Street to Pearl Street.

The Public Service Commission has adopted a report from Commissioner Bassett approving the project of citizens of the section of Flatbush from Prospect Park to Sheepshead Bay to construct a new rapid transit line on the assessment basis. The new line is proposed as a branch of the Eastern Parkway subway, and would run down Nostrand Avenue about 5.7 miles almost due south to Sheepshead Bay. The northerly end of the route is 5.26 miles from the City Hall, Manhattan, and its terminus in Sheepshead Bay is 10.96 miles from the City Hall. Commissioner Bassett states that in view of the difference in cost between a subway and an elevated structure the property owners who propose to bear the assessment ought to decide which type of road they want. He also believes that construction should not be begun until the Eastern Parkway line running into Flatbush and Atlantic Avenue is under construction.

Southern Pacific Electric Lines in Berkeley

W. R. Scott, superintendent of the Southern Pacific Company, has announced that within six months the time of transportation between Berkeley and San Francisco will be shortened 10 minutes on the Southern Pacific Company's ferry system, and that the 35 minutes now made by the San Francisco, Oakland & San José Railway, the Key Route, will be reduced to 30 minutes. The Southern Pacific Company is expending \$3,000,000 in improving its lines tapping Berkeley, Oakland and Alameda. The San Francisco, Oakland & San José Railway is also constructing another line in Sacramento Street. It is announced that the Southern Pacific Company will electrify its Berkeley ferry system by March, 1911, shortly before the three years' time limit granted by the City Council for installing the system is reached. The rails of the Ninth Street line are nearly all laid, and only a short gap in the vicinity of Albany and the north city line remains to be closed to complete the Shattuck Avenue-Ninth Street loop. The Ellsworth Street line, which branches off the main Berkeley trunk line at Adeline Street, continues along Woolsey Street to Deakin Street, thence across a private right of way to Ellsworth Street, and terminates at the southern entrance of the campus of the University of California. This line is graded and the track laid for its entire distance. The switch at Berkeley station for the operation of trains both ways on the Shattuck Avenue-Ninth Street loop line has been installed and the work of ballasting the new lines is progressing. The Shattuck Avenue line will extend north from its present terminus at Berryman station along Henry Street through the new tunnel to what is known as The Circle in Northbrae, where there will be a union depot for the trains of the San Francisco, Oakland & San José Railway and the Southern Pacific Company.

Decision Regarding Low-Fare Tickets in Detroit.—The Supreme Court of Michigan has refused to grant a rehearing from its decision that the Detroit United Railway must sell workmen's tickets at the rate of 8 for 25 cents within specified hours and within the city limits as extended.

Reducing the Number of Poles in Louisville.—The Louisville (Ky.) Railway is co-operating with the telephone, telegraph and lighting companies in Louisville in removing its poles in the downtown section of the city. Wherever buildings are strong and substantial enough and the company is able to secure the consent of the property owners, it is anchoring its wires to the walls of buildings. The feed

wires of the company are now underground and ultimately the company will have only a few poles in the downtown section of the city.

Boston Elevated Railway Files Plans for New Stations.—In accordance with the recommendation of the Massachusetts Railroad Commission, dated May 25, 1910, the Boston (Mass.) Elevated Railway has filed plans with the commission for an elevated station at Green Street and Washington Street, on the Forest Hills extension of the rapid transit system. The plans provide for a station of the side platform type with north and south-bound platforms about 360 ft. long and the usual sidewalk entrances and exits. The Green and Washington Street station will accommodate eight-car trains on each side.

Recommendation for Toronto Municipal Railway System.—The City Engineer and the City Solicitor of Toronto have presented to the Board of Control of Toronto a report recommending that the city construct an electric railway on Gerrard Street, in North Rosedale, on St. Clair Avenue and in other newly annexed districts, comprising 9.7 miles, of which 1¼ miles would be single track. The total cost of the proposed railway is estimated at \$570,000, including \$250,000 for the overhead and track work and \$320,000 for permanent pavements. The question is to be referred to the electors of the municipality on Jan. 1, 1911.

Exhibit of Railway Appliances.—The Railway Appliances Association, Chicago, Ill., is preparing for its annual exhibition of railway appliances used in the construction and maintenance of railways, which is to be held at the Coliseum, Chicago, the week of March 20-25, 1911, inclusive. The twelfth annual convention of the American Railway Engineering & Maintenance of Way Association and the spring meeting of the Railway Signal Association will be held during that week. Application for space to be considered in the first allotment must be filed in the office of the secretary, John R. Reynolds, 303 Dearborn Street, Chicago, Ill., not later than Nov. 1, 1910. Those entering applications later than Nov. 1, 1910, will be allotted space in the order of the filing of their applications with the secretary of the association.

Importunate Claim Adjusters on the Ft. Wayne & Wabash Valley Traction Company.—It is reported that since the accident on the line of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., on Sept. 24, 1910, the office of that company has been overrun with persons whose object has been to secure authority from the company to adjust the claims arising from the accident. Some of the offers made to the company by these ghouls have been of an infamous character, and one recently made was that these outside claim agents secure the power of attorney from the victims or from their representatives to settle the claims and then play into the hands of the company. J. M. Barrett, who is connected with the claim department of the Ft. Wayne & Wabash Valley Traction Company, recently forcibly expelled from his office certain self-appointed claim adjusters who made a proposition of this kind, and declared that if they had been lawyers he would have had them disbarred. Full details of the interview are given in the *Ft. Wayne News* for Sept. 26, 1910.

Complaint Regarding Time of Delivery of Interchange Shipments.—The Public Service Commission of the Second District of New York has received a complaint from Frederick H. Beach, receiver of the Eastern New York Railroad, which operates an electric railway between Ballston and Middlegrove, Saratoga County, against the Delaware & Hudson Company, which intersects with this road in Ballston, stating that the Delaware & Hudson Company has refused to deliver interchange shipments at satisfactory morning hours to insure their delivery by the complainant railroad to paper mills along its route. It is alleged that up to three months ago cars were transferred at 8 o'clock a. m., but since that time the deliveries have been later. The complaint also states that the Eastern New York Railroad has been unable to arrange for the establishment of through routes and joint rates and charges for transportation of freight from its line to points on the Delaware & Hudson Company's road, and further asks that it be allowed 48 hours' free time for the loading and unloading of cars. The complaint has been served on the Delaware & Hudson Company and answer will be filed within 10 days.

Financial and Corporate

New York Stock and Money Market

October 4, 1910.

There has been more life in the stock market during the last week and prices have improved. While outside orders are still few, much better sentiment is expressed and commission houses expect to receive business as soon as quiet is restored in politics. Interborough-Metropolitan issues continue active at about the prices quoted a week ago.

The money market has been a trifle stiffer, owing to advance in foreign rates and demands from the West. Rates to-day were: Call, $2\frac{3}{8}$ to $2\frac{7}{8}$ per cent; 90 days, $4\frac{1}{4}$ to $4\frac{1}{2}$ per cent.

Other Markets

Rapid Transit stock was the feature of the Philadelphia market to-day. The total sales for the day were 20,542 shares, and the closing price was 20 $\frac{7}{8}$. This sudden movement was caused by the concerted action of the local bankers interested in traction matters to have E. T. Stotesbury become a director of the company, in virtual charge of the finances.

In the Chicago market during the week there has been some activity in Series 1 and 2 Chicago Railways certificates, and prices have advanced a few points. Other tractions are dull.

Massachusetts Electric shares have again been active in the Boston market, and the selling prices of both the preferred and the common have advanced about 2 points. Boston Elevated has sold at unchanged prices.

There has been a little buying of United Railways shares in the Baltimore market at slightly lower figures during the week, and there has been the customary steady trade in the bonds of the same company.

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

	Sept. 27.	Oct. 4.
American Railways Company.....	a43 $\frac{1}{4}$	a44
Aurora, Elgin & Chicago Railroad (common).....	*16	33
Aurora, Elgin & Chicago Railroad (preferred).....	85 $\frac{1}{4}$	a89
Boston Elevated Railway.....	129 $\frac{1}{2}$	128 $\frac{3}{4}$
Boston & Suburban Electric Companies.....	a14 $\frac{1}{4}$	14 $\frac{1}{4}$
Boston & Suburban Electric Companies (preferred).....	a72	72
Boston & Worcester Electric Companies (common).....	a10	10 $\frac{1}{2}$
Boston & Worcester Electric Companies (preferred).....	*35	36
Brooklyn Rapid Transit Company.....	76 $\frac{1}{4}$	77
Brooklyn Rap. Transit Company, 1st ref. conv. 4s.....	84	83 $\frac{3}{4}$
Capital Traction Company, Washington.....	a130	128 $\frac{3}{4}$
Chicago City Railway.....	*102 $\frac{3}{4}$	*102 $\frac{3}{4}$
Chicago & Oak Park Elevated Railroad (common).....	*34	*34
Chicago & Oak Park Elevated Railroad (preferred).....	*74	*74
Chicago Railways, pteptg., ctf. 1.....	a03	a05
Chicago Railways, pteptg., ctf. 2.....	a16 $\frac{1}{2}$	a16
Chicago Railways, pteptg., 3.....	a8	a8
Chicago Railways, pteptg., ctf. 4.....	a5	a5
Cleveland Railway.....	*91 $\frac{1}{2}$	91 $\frac{1}{2}$
Consolidated Traction of New Jersey.....	a73	a73
Consolidated Traction of N. J., 5 per cent bonds.....	a104	a104
Detroit United Railways.....	*45	*45
General Electric Company.....	a145	148 $\frac{1}{2}$
Georgia Railway & Electric Company (common).....	a116	a117
Georgia Railway & Electric Company (preferred).....	a86 $\frac{1}{2}$	87
Interborough-Metropolitan Company (common).....	20 $\frac{7}{8}$	20 $\frac{7}{8}$
Interborough-Metropolitan Company (preferred).....	55 $\frac{1}{2}$	56 $\frac{1}{2}$
Interborough-Metropolitan Company (4 $\frac{1}{2}$ s).....	81 $\frac{1}{2}$	81 $\frac{1}{2}$
Kansas City Railway & Light Company (common).....	a23	24
Kansas City Railway & Light Company (preferred).....	a79	80
Manhattan Railway.....	138	143
Massachusetts Electric Companies (common).....	a18 $\frac{3}{4}$	a20
Massachusetts Electric Companies (preferred).....	82 $\frac{1}{2}$	a84
Metropolitan West Side, Chicago (common).....	a20	a20
Metropolitan West Side, Chicago (preferred).....	a62	a62
Metropolitan Street Railway.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	67 $\frac{1}{2}$	68
Northwestern Elevated Railroad (common).....	a20	a20
Northwestern Elevated Railroad (preferred).....	a60	a60
Philadelphia Company, Pittsburg (common).....	a45	a45 $\frac{3}{8}$
Philadelphia Company, Pittsburg (preferred).....	a42	a42
Philadelphia Rapid Transit Company.....	a18 $\frac{1}{4}$	a20 $\frac{7}{8}$
Philadelphia Traction Company.....	82	a82
Public Service Corporation 5 per cent col. notes.....	a95	a95
Public Service Corporation, ctf.s.....	a101	a101
Seattle Electric Company (common).....	*109	*109
Seattle Electric Company (preferred).....	*98 $\frac{1}{2}$	*98 $\frac{1}{2}$
South Side Elevated Railroad (Chicago).....	59	a58
Third Avenue Railroad, New York.....	9 $\frac{1}{8}$	0
Toledo Railways & Light Company.....	84	84
Twin City Rapid Transit, Minneapolis (common).....	111 $\frac{1}{4}$	112 $\frac{1}{2}$
Union Traction Company, Philadelphia.....	a43 $\frac{1}{4}$	a46
United Rys. & Electric Company, Baltimore.....	14 $\frac{1}{4}$	14 $\frac{1}{2}$
United Rys. Inv. Co. (common).....	*15	*15
United Rys. Inv. Co. (preferred).....	56	57
Washington Ry. & Electric Company (common).....	a33	a32 $\frac{1}{2}$
Washington Ry. & Electric Company (preferred).....	a89	a88 $\frac{1}{2}$
West End Street Railway, Boston (common).....	a84	a84 $\frac{1}{2}$
West End Street Railway, Boston (preferred).....	a100 $\frac{3}{4}$	*100 $\frac{3}{4}$
Westinghouse Elec. & Mfg. Company.....	62 $\frac{1}{4}$	70 $\frac{1}{2}$
Westinghouse Elec. & Mfg. Company (1st pref.).....	*125	129

Report of New Haven Subsidiary Properties

Following the practice of other years, the New York, New Haven & Hartford Railroad gives the results of operations of the subsidiary Connecticut Company and the Rhode Island Company in the annual report for the year ended June 30, 1910. The operations of these two companies compare as follows:

Year ended June 30, 1910.	Connecticut Company.	Rhode Island Company.
Earnings:		
Passenger	\$6,775,445	\$4,136,285
Mail	9,469	3,908
Express	272,592	183,821
Chartered cars.....	27,430	13,656
Sale of power.....	46,926	57,538
Park earnings.....	49,148	.....
Advertising.....	22,867	16,477
Miscellaneous	174,0436	29,124
Total earnings.....	\$7,944,313	\$4,440,809
Operating expenses:		
Maintenance of way and structures.....	\$834,048	\$316,391
Maintenance of equipment.....	518,725	264,124
Operation of power plants.....	784,590	375,289
Operation of cars.....	1,735,549	1,044,953
General expenses.....	588,678	536,029
Miscellaneous expenses.....	283,435	.....
Total operating expenses.....	\$4,745,025	\$2,537,686
Net earnings.....	\$3,199,288	\$1,903,123
Income from other sources.....	.....	62,113
Total income.....	\$3,199,288	\$1,965,236
Taxes, rentals, etc.....	326,202	1,391,671
Net income.....	*\$2,873,086	\$573,565

*Net income to Feb. 28, 1910, amounting to \$2,254,278, paid over to New York, New Haven & Hartford Railroad.

†The operations of the gas, light and water departments to Feb. 28, 1910, are included in the income statement; from March 1, 1910, they are included in the income statement of the Housatonic Power Company.

Earnings of the Connecticut Company in the preceding year were \$7,988,831 and expenses were \$4,305,603. Earnings of the Rhode Island Company in the year ended June 30, 1909, were \$4,160,785 and expenses were \$2,313,954.

In his report regarding the affairs of the New York, New Haven & Hartford Railroad Charles S. Mellen the president, says in part:

"There has been completed 6,000 ft. of 4- and 6-track single phase electrification in the vicinity of Glenbrook, Conn., which construction is to be a typical form to be generally used in the electrification of the Harlem River branch and the line from Stamford to New Haven. We have received one of the two electric freight locomotives, both of which were designed to handle freight trains operating between Harlem River and New Haven, or heavy passenger trains between Grand Central Station and New Haven. The one received has proved more than adequate in the tests of both of these services. It is expected that the second locomotive ordered will be received before this report is printed. Surveys have been completed for the electrification of the main line and yards on the Harlem River branch, and general designs for electrical catenary superstructures have been completed for this electrification. Surveys have also been completed for the electrification of the main line between Stamford and New Haven.

"Plans for the rehabilitation of the Warren power station are practically complete. The rearrangement will eliminate the present direct current machinery; thus converting the station into a straight alternating current plant. Bids are now being obtained for the purchase of the necessary apparatus. Requisitions have been placed for material to cover the multiple unit equipment necessary to better the control of cars now operating between Providence, Fall River and Bristol, which arrangement will produce a more flexible and reliable system of train operation.

"The company has accepted the provisions of chapter 601 of the acts of 1910 of the General Court of the Commonwealth of Massachusetts authorizing the ownership of the capital stock of the Berkshire Street Railway Company, and to date has acquired by purchase 19,365 shares out of a total of 19,481 shares."

The operating revenue of the New York, New Haven & Hartford Railroad for the year was the largest in the history of the company, amounting to \$60,693,668, an increase of 11.66 per cent over the preceding year.

The profit and loss account shows a charge of \$290,232 for "extraordinary renewals in prior years on street railway properties in Connecticut."

Proposed Sale of Treasury Bonds of the Detroit United Railway

J. C. Hutchins, president of the Detroit (Mich.) United Railway, has addressed the following circular to stockholders of the company, in which reference is made to the improvements made to the property of the company out of the earnings and to the proposed sale of \$1,500,000 of the bonds of the company now held in the treasury:

"Since the discontinuance of the dividend on the stock of this company in 1907, conditions have been such as to seriously interfere with the financing of the property. The marketing of the bonds having been retarded by the attitude of the city of Detroit, it has been necessary to meet capital expenditures in the main out of earnings instead of by the proceeds from sales of bonds, which under the existing circumstances could not be advantageously sold.

"Since the beginning of 1907 more than \$4,000,000 has been expended on the property out of earnings and the financial position of the company materially strengthened. In addition to the necessary upkeep and development of the property and providing for the floating debt which existed in 1907, \$1,500,000 has been paid on account of the \$3,000,000 of 3-year gold notes which were then outstanding, leaving a balance of \$1,500,000 still to be met. If this amount can be provided for, it is the intention to resume dividends on the stock, and the co-operation of the shareholders is asked for this purpose.

"Of the bonds held in the treasury of the company, \$1,500,000 are now offered to the shareholders to be underwritten at 82½, the intention being to obtain a loan on the bonds and underwriting for one year from February, 1911, which will provide for the payment of the \$1,500,000 balance due on the \$3,000,000 gold notes above referred to. The price at which the bonds are being offered will yield a return of about 6 per cent on the investment.

"It is hoped that before the expiration of the year during which the loan is to be carried the differences between the city and the company will be satisfactorily adjusted, enabling the bonds to be sold and relieving the underwriters of their obligation, for which they will then receive a bonus of 2 per cent on the amount of their respective underwriting. As the question of the resumption of dividend will entirely depend upon the required amount of the underwriting being obtained, shareholders are particularly requested to assist in getting the full amount taken up."

Holding Company Proposed for Montreal Street Railway and the Montreal Light, Heat & Power Company

Patrick Dubee, secretary of the Montreal (Que.) Street Railway, in a circular addressed to the shareholders of the company, says in substance:

"Your directors, in conjunction with the directors of the Montreal Light, Heat & Power Company, have ascertained the relative value of the two companies as being \$250 per share for the Montreal Street Railway and \$190 per share for the Montreal Light, Heat & Power Company. Both boards are of opinion that the interests of their shareholders will be best served by an intimate union, which can be best effected through a holding company that would exchange its securities for the shares of the two companies on the above basis.

"Assuming that all the shares were exchanged upon the basis outlined, this would imply a capitalization for the holding company of \$57,300,000, on which the total net income would be: 1907, 4.69 per cent; 1908, 5.03 per cent; 1909, 5.48 per cent. The current fiscal years of each company will show that the rate of increase in the net income has been fully maintained, notwithstanding the liberal reductions in gas and electric rates during the past three years; and with contemplated economies after union, a further increase in the combined net income can be expected. An expression will be asked from the shareholders at the next general meeting."

The net income of the companies for 1907, 1908 and 1909 follows:

	Montreal Street Railway.	Montreal Light, Heat & Power Co.	Total.
1907.....	\$1,040,358	\$1,647,467	\$2,687,825
1908.....	1,136,411	1,745,848	2,882,259
1909.....	1,229,676	1,911,201	3,140,877

Columbus Railway & Light Company, Columbus, Ohio.—The Columbus Railway & Light Company has omitted the quarterly dividend on the \$5,000,000 of preferred stock of the company. In January, April and July, 1910, dividends of three-quarters of 1 per cent each were paid.

Denver (Col.) City Tramway.—The Denver City Tramway has notified the holders of the outstanding first mortgage 6 per cent gold bonds of the Metropolitan Railway dated July 30, 1891, maturing Jan. 1, 1911, aggregating \$953,000, that provision has been made for the payment of the principal of the bonds and the accrued interest thereon on Jan. 1, 1911, at the office of the Mercantile Trust Company, New York. Pursuant to the provisions of the first and refunding sinking fund mortgage 25-year 5 per cent gold bonds of the Denver City Tramway dated Nov. 1, 1908, \$953,000 par value of these bonds are authorized to be issued for the purpose of paying off and discharging the first mortgage 6 per cent gold bonds of the Metropolitan Railway. Clark, Dodge & Company, New York, N. Y., and the International Trust Company, Denver, Col., announce that they are prepared at any time prior to Jan. 1, 1911, to exchange for the bonds of the Metropolitan Railway at 100 and accrued interest to Jan. 1, 1911, first and refunding sinking fund mortgage 25-year 5 per cent gold bonds of the Denver City Tramway at 95 and the accrued interest to date of exchange or to purchase the 6 per cent maturing bonds at 100 and accrued interest.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—The decree ordering the sale of the property of the Indianapolis & Cincinnati Traction Company on Nov. 3 or 4, 1910, has been made official by Judge Carter of the Supreme Court at Indianapolis. Henry Clay Allen has been appointed master commissioner to make the sale. In the decree the minimum price is given at \$1,045,000. The committee which represented the bondholders and which attempted to reorganize the company, but failed, is preparing to bid on the property.

Kansas City Railway & Light Company, Kansas City, Mo.—It is announced that the syndicate headed by Lee, Higginson & Company, which last spring underwrote Metropolitan Street Railway, Kansas City, Mo., and Kansas City Railway & Light Company notes and bonds to a total of \$8,218,000, has been closed, all of the syndicate holdings having been sold.

New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J.—The Board of Public Utility Commissioners of New Jersey has approved the sale by the New Jersey & Hudson River Railway & Ferry Company of \$100,000 of 4 per cent mortgage bonds. The proceeds from the sale of these bonds are to be used for the extension of the company's tracks and additions to the power house.

Ohio Traction Company, Cincinnati, Ohio.—The Ohio Traction Company paid a dividend of 1 per cent on its \$2,500,000 of common stock on Oct. 1, 1910. The only former dividend of the same amount was paid on Nov. 1, 1909.

Portland (Me.) Railroad.—Maynard S. Bird & Company, Portland and Rockland, Me., offer for subscription at a price to net the investor about 4¾ per cent the unsold portion of \$250,000 of first consolidated mortgage 3½ per cent gold bonds of the Portland Railroad, due July 1, 1951, but callable after July 1, 1931. These bonds are issued to pay for improvements and acquisitions made in the last few years. Of the total authorized issue of \$3,000,000 of bonds, \$1,600,000 are outstanding, \$900,000 are reserved to retire bonds due in 1913 and 1915 and \$500,000 are reserved for future extensions and additions.

Public Service Corporation of New Jersey, Newark, N. J.—Drexel & Company, Philadelphia, Pa., and J. P. Morgan & Company, New York, N. Y., have purchased the entire issue of \$4,000,000 of collateral 3-year 5 per cent gold notes, dated Oct. 1, 1909, secured by deposit of \$5,000,000 of the company's general mortgage bonds.

Scioto Valley Traction Company, Columbus, Ohio.—J. D. Ellison and William N. King have been elected directors of the Scioto Valley Traction Company to succeed E. K. Stewart and W. S. Courtright.

Second Avenue Railroad, New York, N. Y.—George W. Linch, receiver of the Second Avenue Railroad, has received permission from Justice Amend, of the Supreme Court, to issue \$2,500,000 of receiver's certificates, to bear interest at

6 per cent and mature in a year. The money is to be used to pay the interest due on Nov. 1, 1910, on \$5,682,000 of 5 per cent consolidated mortgage bonds, held by the Guaranty Trust Company, and to pay \$544,854 in franchise taxes, the amount on which the receiver and the State reached an agreement. Some of the money will also be used to improve the road and the equipment. The receiver predicted an increase of \$250,000 a year in the earnings of the company by reason of the establishment of a new terminal for the cars at Worth Street and Broadway, on which work is in progress.

Sheboygan Railway & Electric Company, Sheboygan, Wis.—The Sheboygan Railway & Electric Company, which has taken over the Sheboygan Light, Power & Railway Company, has filed a mortgage in favor of the Wisconsin Trust Company, Milwaukee, Wis., as trustee, dated Aug. 15, 1910, to secure an issue of \$600,000 of sinking fund refunding and improvement 5 per cent gold coupon bonds due in 1926, but redeemable on any interest day at 105 and interest. Of the new bonds \$400,000 are reserved to retire a like amount of first mortgage bonds of the Sheboygan Light, Power & Railway Company, dated 1896, and due April 1, 1926, and \$160,000 have been issued and are outstanding. The officers of the Sheboygan Railway & Electric Company are: Ernest Gonzenbach, president and general manager; W. O. Morgan, vice-president; August Westermeyer, secretary and treasurer; John A. Chesney, assistant secretary and assistant treasurer.

Washington, Berwyn & Laurel Electric Railway, Washington, D. C.—The Washington, Berwyn & Laurel Electric Railway, which is owned and operated by the Washington, Baltimore & Annapolis Electric Railway, has been disposed of by that company to C. F. Norment, president of the Washington Railway & Electric Company, representing that company.

Yonkers (N. Y.) Railroad.—Leslie Sutherland, receiver of the Yonkers Railroad, has applied to the Public Service Commission of the Second District of New York for permission to issue \$160,000 of 2-year 6 per cent receiver's certificates, the proceeds to be used for additional equipment in the sub-station of the company at a cost of \$48,500, the relaying and renewing of track at a cost of \$87,000, and the balance, \$24,500, to be used to defray the expense of constructing additional lines in Yonkers.

Dividends Declared

Aurora, Elgin & Chicago Railroad, Chicago, Ill., quarterly, 1½ per cent, preferred; quarterly, ¾ of 1 per cent, common.

Boston (Mass.) Suburban Electric Companies, quarterly, \$1 preferred.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1½ per cent, preferred; quarterly, 1⅛ per cent, common.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 1¾ per cent, common.

Columbus, Newark & Zanesville Electric Railway, Newark, Ohio, quarterly, 1½ per cent, preferred.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 1 per cent, common.

Ohio Traction Company, Cincinnati, Ohio, 1 per cent, common.

Ottawa (Ont.) Electric Railway, 2½ per cent, quarterly.

Ottumwa Railway & Light Company, Ottumwa, Ia., quarterly, 1¾ per cent, preferred.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1½ per cent, common; extra, ½ of 1 per cent, common.

Portland (Maine) Railroad, 2 per cent.

Porto Rico Railways, San Juan, Porto Rico, quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1¼ per cent.

Sao Paulo Tramway, Light & Power Company, Sao Paulo, Brazil, quarterly, 2½ per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1½ per cent, second preferred.

West Penn Traction Company, Connellsville, Pa., quarterly, 1½ per cent, preferred.

Winnipeg (Man.) Electric Railway, 2½ per cent, quarterly.

Traffic and Transportation

Increase in Wages and in Passenger Tariff on New York, New Haven & Hartford Railroad

The New York, New Haven & Hartford Railroad makes the following reference in its annual report for the year ended June 30, 1910, to the advances in wages made to its employees and the increase in the passenger tariffs of the company to offset the increase in administration charges due to the additional wages:

"Serious advances in the wages paid to employees were granted in the last quarter of the fiscal year ended June 30, 1910, which advances did not become effective to any great extent until the beginning of the present fiscal year, July 1, 1910.

"Based upon the same number of employees working the same time as in this past year, these advances aggregate as below, viz.:

Maintenance department.....	\$162,900
General office clerks.....	58,500
Operating department.....	1,536,106
Total.....	\$1,757,506

"It was impossible to continue the business of the company on the basis of the tariffs heretofore in effect and pay these increases, and changes were made in our passenger tariffs to become effective as soon as possible under existing laws, substantially as below:

	Amounting to
Ten cents advance between New York, Providence and Boston, by rail.....	\$109,869
Same by New England Navigation Company, in effect May 1, 1910.....	80,963
Five cents in and out of New York, one way fares, in effect June 4, 1910, interstate, and July 1, 1910, intrastate.....	225,216
Five cents between Hartford and Springfield, in effect June 4, 1910.....	37,417
Five cents per trip "family fifty trip tickets," in effect July 1, 1910.....	31,662
Commutation to and from New York and points in New York State, in effect July 1, 1910.....	118,390
Commutation between New York and interstate points, in effect June 4, 1910.....	102,466
Between New Haven, New York, Bridgeport, boat lines, 25 cents and 10 cents, in effect June 4, 1910.....	26,562
Increase from 2 to 2¼ and 2½ cents per mile, certain lean lines, in effect July 23, 1910.....	305,692
Miscellaneous, in effect June 4, 1910.....	20,516
Total passenger.....	\$1,058,753
Allow for shrinkage, due to increased use of mileage tickets, 20 per cent.....	200,000
	\$858,753

"The above increases should return to our treasury about 50 per cent of the loss occasioned by the advances in wages above referred to, leaving the balance to be overcome by such increased proportions as will accrue to our company from the advances in through freight rates on connecting roads' business, which advances have been made but are not yet effective, owing to their having been suspended by the Interstate Commerce Commission pending investigation regarding the reasonableness of the same.

"It is believed such advances will ultimately be allowed, though after considerable delay. The above advances, with such economies as are yet possible in the operation of the property, should enable the company to maintain substantially the same net result as heretofore, and pay the usual rate of dividend upon its stock."

Adjustment of Wages of Employees of Boston & Northern Street Railway and Old Colony Street Railway

The Boston & Northern Street Railway and the Old Colony Street Railway, Boston, Mass., have issued the following statement regarding the conclusion of negotiations between the companies and their employees looking to a new agreement between the companies and representatives of the men to cover a period of one year and seven months, dating from Oct. 1, 1910:

"Sixteen delegates representing the 16 divisions of the Boston & Northern Street Railway and Old Colony Street Railway recently presented a new agreement for the consideration of these companies covering a period of one year and seven months, starting with Oct. 1, 1910. The old agreement under which the men had been working expired Sept. 30, 1910.

"The new agreement asked for by the men called for practically a 27½ per cent increase in the wages of motor-

men and conductors and about 20 per cent increase for shopmen, repair men and others. After a number of conferences between the delegates and officials of the company, covering a period of about 10 days, an agreement was reached, the same to be submitted to the local divisions for their vote upon its acceptance or rejection. It was voted on and approved.

"The new agreement is substantially the same as the old and covers a period of four years. Under this new agreement the wages of the men, as before, are subject to readjustment at the end of two years. The new scale for the conductors and motormen provides for the payment by these two companies of 22½ cents per hour the first year of employment, 23½ cents the second year, 24½ cents for the third, fourth and fifth years, 25½ cents for the sixth and seventh year and 26½ cents for the eighth year and all years thereafter. The classes remain as in previous years, this new scale providing for a uniform increase of 1½ cents per annum. For the pit men and other employes in these classes the increase amounts to about 5 per cent.

"Throughout the conference with regard to this new agreement between the officials of the companies and the men representing the employees there was the greatest harmony and general good feeling."

Abington and Brockton Fares to Be Investigated.—The Selectmen of Abington have petitioned the Massachusetts Railroad Commission for a change in the fares on the Old Colony Street Railway between Brockton and Abington. A hearing will be assigned by the board.

Complaint Closed Against Poughkeepsie City & Wappingers Falls Electric Railway.—The Public Service Commission of the Second District of New York has closed upon its records the complaint of the Board of Trustees of Wappingers Falls against the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., regarding the rate of fare charged between Wappingers Falls and Poughkeepsie. At a hearing held at Wappingers Falls on Sept. 19, 1910, the company acceded to the request of the complainants for reduced fare between those places.

Interurban Employees Being Examined in Writing.—On Sept. 26, 1910, the officials of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., began a series of written examinations of its motormen and conductors to discover the efficiency of its employees. The examinations are being conducted by M. P. Reed, general superintendent of the company, in his office in South Bend, and in order to avoid interference with the operation of cars or the running time of the crews schedules have been adopted so as to permit the men to take the examinations at intervals covering several weeks.

Indiana Railroad Commissioners Inquire Into Accidents.—The Railroad Commissioners of Indiana on Sept. 29 and 30, 1910, examined a number of witnesses in connection with an investigation into the causes of the recent collisions on the Indiana Union Traction Company's lines at Tipton and Union City. A. W. Brady, president, and H. A. Nicholl, general manager of the Indiana Union Traction Company, testified. The attorney who appeared for the trainmen whose negligence is claimed to have caused the collisions stated that he had advised the men not to testify before the commissioners, as their statements might be used against them in criminal actions for manslaughter which are pending. The commissioners are said to have admitted that under the statutes defining the powers of the commission to take testimony the trainmen could not be compelled to testify at the hearings. The commissioners have decided to withhold the publication of the result of their investigation until after it has been submitted to Governor Marshall, who, it is reported, intends to make some drastic recommendations in his message to the Legislature, which convenes in January. W. J. Woods, chairman of the railroad commission, expects to call a conference of the managers of the interurban railways in the State to discuss plans for preventing similar accidents. M. H. Hovey, a signal engineer, has been called on by the commissioners to discuss with them the practicability of installing block signals on all interurban roads. It is known that the commissioners favor block signaling as an effective means for preventing collisions.

Personal Mention

Mr. J. F. O'Connell has been elected assistant secretary of the Lincoln (Neb.) Traction Company to succeed Mr. E. B. Ransom, resigned.

Mr. C. M. Graves has been elected first vice-president of the Cœur d'Alene & Spokane Railway, Spokane, Wash., to succeed Mr. A. L. White.

Mr. Joseph B. Stewart, assistant to Mr. Matthew C. Brush, general manager of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has resigned from that company.

Mr. E. K. Ford, formerly with the Wilkes-Barre Gas & Electric Company, Wilkes-Barre, Pa., has been appointed commercial agent of the Albany Southern Railroad, Hudson, N. Y.

Mr. T. R. Crumley, superintendent of motive power of the Evansville (Ind.) Railways, has also been appointed superintendent of motive power of the Owensboro (Ky.) City Railroad.

Mr. G. W. Rounds has resigned as general superintendent of the Savannah (Ga.) Electric Company, effective on Oct. 15, 1910, to become general superintendent of the Tacoma Railway & Power Company, Tacoma, Wash.

Mr. A. J. Purington has resigned as manager of the Toledo & Chicago Interurban Railway, Kendallville, Ind., to become general superintendent of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

Mr. Richard T. Higgins, Winsted, Conn., has been appointed a member of the Connecticut Board of Railroad Commissioners by Governor Frank B. Weeks, of Connecticut, to succeed Mr. Andrew F. Gates, whose resignation was announced in the *ELECTRIC RAILWAY JOURNAL* of Oct. 1, 1910.

Mr. S. W. Reynolds has been appointed general claim adjuster of the Illinois Traction System, with headquarters at Springfield, Ill. This is an office recently created. Mr. Reynolds has been connected with the Chicago, Ottawa & Peoria Railway, La Salle, Ill., as land commissioner for the last four years.

Mr. D. B. Clark, whose resignation as master mechanic of the Cincinnati (Ohio) Traction Company was noted in the *ELECTRIC RAILWAY JOURNAL* of Oct. 1, 1910, has accepted a position with the selling department of the Hooven. Owens, Rentschler Company, Hamilton, Ohio, and will probably be connected with the Chicago office of that company.

Mr. W. C. Myers has been appointed superintendent of electric shops and equipment with jurisdiction over electric car inspections and maintenance during construction and operating periods on the Oakland, Alameda and Berkeley line of the Southern Pacific Company, which is being equipped with electricity. Mr. Myers was formerly with the General Electric Company.

Mr. David E. Matthews, second inspector for the Railroad Commissioners of the State of Indiana, has been appointed chief inspector to the commissioners to succeed Mr. Alexander Shane, whose appointment as general manager of the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., was announced in the *ELECTRIC RAILWAY JOURNAL* of Sept. 14, 1910.

Mr. Henry C. Hasbrouck, Troy, N. Y., and **Mr. W. P. Coleman**, New York City, have been appointed traveling accountants for the Public Service Commission of the Second District of New York to visit the offices of the corporations under the jurisdiction of the commission, check up their methods of accounting and assist the smaller companies in the preparation of the reports to the commission which are required by statute.

Mr. E. T. Steel, manager of the Ponce Railway & Electric Company, Ponce, Porto Rico, has been appointed general superintendent of the Savannah (Ga.) Electric Company to succeed Mr. G. W. Rounds, who is to become general superintendent of the Tacoma Railway & Power Company, Tacoma, Wash., on Oct. 15, 1910. Before becoming connected with the Ponce Railway & Electric Company Mr. Steel was purchasing agent of the Savannah Electric Com-

Mr. E. L. Brockway has resigned as superintendent of feeders of the Metropolitan Street Railway, New York, N. Y., to accept a position as representative and construction engineer with T. J. Cope, Philadelphia, Pa., electrical construction contractor and manufacturer of underground specialties. Mr. Brockway has been engaged in underground electric railroad work with the Metropolitan Street Railway for the last 12 years and superintended the installation of the feeder system during the change of power from cable to electricity.

Mr. Matthew C. Brush has resigned as general manager of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., to become assistant to Mr. C. S. Sergeant, vice-president of the Boston (Mass.) Elevated Railway. Besides being general manager of the Buffalo & Lake Erie Traction Company, Mr. Brush was general manager of the Jamestown, Chautauqua & Lake Erie Railroad, the Chautauqua Steamship Company and the Lackawanna Traction Company. An extended biography of Mr. Brush was published in the *ELECTRIC RAILWAY JOURNAL* of Sept. 11, 1909, previous to his taking up his duties with the Buffalo & Lake Erie Traction Company.

Mr. H. T. Edgar, whose appointment as manager of the Seattle (Wash.) Electric Company was noted in the *ELECTRIC RAILWAY JOURNAL* of Oct. 1, 1910, gained his first experience in the electric light business with the Edison Electric Illuminating Company, New Brunswick, N. J., with which he became connected in January, 1886. In the fall of 1886 Mr. Edgar entered the employ of the Edison Electric Light Company, New York, N. Y., the parent company, of which Mr. J. H. Vail was then general superintendent. He remained with this company until Jan. 1, 1893, when he was appointed secretary and general manager of the Georgia Electric Light Company, Atlanta, Ga. In April, 1897, Mr. Edgar resigned from the Georgia Electric Light Company to represent the Jandus Electric Company and the Buckeye Electric Company, Cleveland, in New York and New England. On March 1, 1899, he became associated with Stone & Webster, Boston, Mass., and was appointed manager of the Lowell (Mass.) Electric Light Company. In the fall of 1901 Mr. Edgar was elected vice-president and manager of the El Paso Electric Railway, also a Stone & Webster property, and supervised the construction of the electric railway in El Paso, which was placed in operation in the spring of 1902. In the fall of 1905 he was elected vice-president and manager of the Northern Texas Traction Company, Fort Worth, Tex., from which position he has just resigned to become manager of the Seattle Electric Company.

Mr. E. E. Potter, general manager of the Seattle (Wash.) Electric Company, has been appointed executive head of a new department established at the home office of Stone & Webster, Boston, Mass., to appraise railroad and electric properties. Mr. Potter will assume his duties on Oct. 15, 1910. Effective on that date, Mr. H. T. Edgar, manager of the Northern Texas Traction Company, Fort Worth, Tex., is to succeed Mr. Potter as manager of the Seattle Electric Company, as announced in the *ELECTRIC RAILWAY JOURNAL* of Oct. 1, 1910. The establishment of the new department, which will be officially known as the appraisal department, has been made necessary by the growing business of Stone & Webster in appraising the physical property of electric companies and railway systems in the East and the South and suggesting plans for the readjustment of the finances of such companies. Mr. Potter became connected with the Seattle Electric Company in November, 1907, as assistant to the late Howard F. Grant, who was then general manager of the company. In April, 1908, he was appointed manager of the Seattle Electric Company. His duties as manager began immediately following the financial depression of 1907 and continued through the preparations for the Alaska-Yukon-Pacific Exposition and during the period of the exposition. Mr. Potter was largely instrumental in organizing the Stone & Webster Club of Washington, which comprises in its membership officials and department heads of the properties controlled by Stone & Webster in Seattle, Tacoma, Bellingham and Everett.

OBITUARY

Horace F. Hardy, secretary and treasurer of the South Side Elevated Railroad, Chicago, Ill., is dead.

Construction News

RECENT INCORPORATIONS

Fairview Interurban Railway, Delta, Col.—Incorporated in Colorado to build an interurban railway from Delta to Cedar Edge and a spur to the Fairview coal mines. Another branch will run from Delta to the upper part of Montrose County. Capital stock, \$250,000. Incorporators: Charles G. Montz, Mudge Zeigler, Henry Zeigler and Watson Z. Zeigler. [E. R. J., Oct. 1, '10.]

Hagerman Valley & Western Railway, Hagerman, Ida.—Application for a charter has been made in Idaho by this company to build steam and electric railways in Idaho. Capital stock, \$200,000. Directors: J. Morton, W. Coltharp, H. Stroud, W. Clifford, E. M. Bell and J. Stewart Clark. [E. R. J., Aug. 14, '10.]

Logansport & Southern Traction Company, Frankfort, Ind.—Application for a charter has been made in Indiana by this company to build an electric railway to connect Frankfort and Logansport and intervening towns in Clinton, Carroll and Cass counties. Capital stock, \$25,000. Directors: Owen E. Brumburgh, Elmer E. Sheridan and James R. Brown. [E. R. J., May 14, '10.]

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Incorporated in Kentucky to build a 50-mile electric railway to connect Hodgenville and Glasgow via Lincoln Farm and Mammoth Cave. A company with the same name and incorporators was incorporated in Arizona in March, as noted in the *ELECTRIC RAILWAY JOURNAL*. Incorporators: L. W. Preston, J. C. Preston, J. A. McDaniel, J. F. Taylor and J. L. Williams. [E. R. J., Sept. 24, '10.]

St. Paul Railway Promotion Company, St. Paul, Minn.—Application for a charter has been made in Minneapolis by this company to construct a network of interurban lines radiating from St. Paul and also to operate telegraph and telephone lines in connection with the projected electric railways. Capital stock, \$400,000. Incorporators: W. J. Hoy, H. C. Struchen, W. L. Sontag, E. J. Dunnigan, John D. Dandson, C. E. Van Kirk, Kay Alexander, Walter L. Van Ormun, C. M. Converse and A. C. Orthausen.

***Midland Pennsylvania Railroad, Pottsville, Pa.**—Chartered in Pennsylvania to build a 43-mile railway to connect Midland, Killinger, Berrysburg, Gratz, Sacramento, Hegius, Weisample, Maple and Gordon. Ground was recently broken at Killinger and engineering corps are busy at other points. It is probable that gasoline cars will be used. Capital stock, \$430,000. Directors: Walter E. Harrington, Pottsville, president; John H. Williams, Charles G. Shodle, Joseph D. Romberger, Harry B. Reeves, Edgar D. Rank and Harry I. Silliman, Philadelphia.

Twin City Railways, South Bend, Wash.—Application for a charter has been made in Washington by this company to build an electric railway to connect South Bend and Raymond. Capital stock, \$10,000. Incorporators: J. B. Crary, Aberdeen, and J. B. Bridges. [E. R. J., Sept. 3, '10.]

FRANCHISES

Montgomery, Ala.—C. F. Woodward and associates have been granted a franchise by the City Council to build a street railway in Montgomery from the railroad depot to the city limits. [E. R. J., Sept. 10, '10.]

Montgomery, Ala.—The Montgomery Traction Company has been granted a franchise by the County Board of Revenue to build an extension of its lines in Montgomery.

Portersville, Cal.—F. U. Nofziger, representing the Portersville Northeastern Railroad, has been granted a franchise by the Supervisors to build an electric railway over the county road between Portersville and Springville. [E. R. J., July 23, '10.]

Denver, Col.—The Denver City Tramway has asked the City Council for a franchise to operate over the lines of the Denver & Intermountain Railroad, which it recently absorbed, in Denver and to lay a third rail. The franchise also provides for a few changes in the route of the proposed extension of the tramway line to Fort Logan by way of West Alameda and Valverde.

***St. Vital, Man.**—Joseph Bernier, Manitoba, secretary of the Rural Railway, Manitoba, has applied to the Municipal Council for a 30-year franchise to build a 5-mile electric railway from either Winnipeg or St. Boniface to St. Vital. Charles E. Lewis, Minneapolis, Minn., is president.

Springfield, Mass.—The Springfield Street Railway has asked the City Council for a franchise to extend its tracks into the Armory grounds in Springfield.

***Jefferson City, Mo.**—The Jefferson City Bridge Company has been granted a franchise by the City Council to construct an electric railway in Jefferson City. This proposed railway will connect Jefferson City with suburban towns on the Callaway side of the river. A. J. Moerschel and Cecil W. Thomas, Jefferson City, are backing the enterprise.

Billings, Mont.—The Eastern Montana Electric Railway has accepted the franchise granted it by the City Council to build its tracks in Denver. According to the franchise the company must begin work within eight months and have 12 miles completed outside the city limits within three years. This proposed 85-mile railway will connect Laurel, Bearcreek, Billings, Red Lodge, Rockvale, Belfry and Fromberg. F. A. Kesselhuth, chief engineer. [E. R. J., July 2, '10.]

Ellwood City, Pa.—The Pittsburg, Butler, Slippery Rock & Grove City Railway, Butler, has been granted a franchise by the City Council to build an electric railway in Ellwood City. This proposed 20-mile electric railway will connect Butler, Slippery Rock, Grove City, Prospect and West Liberty. [E. R. J., Aug. 27, '10.]

Richmond, Va.—The Richmond & Henrico Railway has applied to the City Council for a franchise to extend its tracks in the West End of Richmond. W. S. Forbes, president. [E. R. J., Sept. 14, '10.]

Roanoke, Va.—The Roanoke Railway & Electric Company, Roanoke, has been granted a franchise by the County Supervisors to build an extension of its line on Virginia Avenue and Grandin Road in Roanoke.

TRACK AND ROADWAY

Calgary (Alta.) Municipal Railway.—The electors passed a by-law on Sept. 15, '10, authorizing an expenditure of \$484,000 to be used for extensions and improvements to the municipal street railway system.

Little Rock Railway & Electric Company, Little Rock, Ark.—This company advises that it is now rebuilding about 4 miles of track with Lorain Section 72-331 6-in. high T rail and paving with brick on the company's portion.

***Vancouver, B. C.**—It is reported that surveys are being made to build a proposed electric railway from Barkerville, B. C., down the Willow River to connect with the Grand Trunk Pacific Railway at or near Ft. George.

St. Clair Traction Company, Belleville, Ill.—This company, recently incorporated, is securing right-of-way for its projected railway to connect Belleville and Freeburg. Edward L. Thomas is interested. [E. R. J., Sept. 17, '10.]

Union Elevated Railroad, Chicago, Ill.—A contract has been awarded by the Board of Supervising Engineers, Chicago Traction, to the Strobel Steel Construction Company for making changes to the supporting structure of the Union Elevated Loop of Chicago so that proper special work may be installed to permit the through joint operation of street car service by the Chicago Railways and the Chicago City Railway companies. Twenty-two columns supporting the elevated structure interfere with the clearance for the large new cars, and these columns will be relocated by the contractor at a cost of \$115,000. The removal of these obstructions will permit the through-route operation of cars on six of the 22 proposed through routes.

Chicago, Kankakee & Champaign Electric Railway, Kankakee, Ill.—This company is reported to have completed preliminary arrangements and secured the necessary capital for building its proposed 75-mile railway to connect Kankakee and Champaign. It is expected to begin work soon at Kankakee and extend it south through Iroquois County, running nearly parallel with the Illinois Central Railroad to Urbana and there continue to Charleston via Villa Grove. George M. Bennett, Urbana, president. [E. R. J., July 24, '09.]

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.—This company has completed the work of building an additional track between Mishawaka and South Bend, and it is now double tracking the entire distance between South Bend and Elkhart. This improvement includes the elimination of all the curves and obstructed track.

Tri-City Railway, Davenport, Ia.—This company is now building a 1-mile extension of its Twenty-seventh Street line in Davenport.

New Orleans Railway & Light Company, New Orleans, La.—This company is considering plans to build an extension of its line around Audubon Park.

***Baltimore, Md.**—Press reports state that plans are being considered for building an interurban railway to connect Walbrook, Forest Park, Howard Park, Villa Nova and Sudbrook Park, a distance of about 4 miles. Among those interested are J. Glenn Cook, H. C. Gilbert and T. B. Williams, all of Baltimore, and Abbott Morris, Norfolk, Va.

Hattiesburg (Miss.) Traction Company.—This company is reported to be considering plans for building a 30-mile extension to connect Laurel and Hattiesburg.

Public Service Railway, Newark, N. J.—The Board of Public Utility Commissioners of New Jersey has approved an ordinance adopted by the Newark Board of Street & Water Commissioners granting permission to this company to construct and operate street railway connections between its tracks in Bridge Street, Front Street and Ogden Street, Newark, it being found that the permission sought is necessary and proper for the public convenience.

Union Railway, New York, N. Y.—The Public Service Commission ordered a hearing to be held on Oct. 7 on an application of this company to build a 3-mile crosstown railway in the Bronx to connect Westchester Avenue on the east and Jerome Avenue on the west, the route being along the general line of East 167th Street.

***Penn Yan, N. Y.**—It is reported that right-of-way has been secured to build an electric railway from Penn Yan to run along the east shore of Lake Keuka 14 miles to Keuka Landing and from that point to Savona and thence into Steuben County to Canandaigua or Geneva.

New York & Stamford Railway, Port Chester, N. Y.—The Public Service Commission, Second District, has granted the application of this company for permission to build two turnouts in Mamaroneck and the approval of plans for such turnouts.

Tidewater Power Company, Wilmington, N. C.—This company reports that it will soon rebuild 3 miles of track in paved streets in Wilmington.

Fostoria-Fremont Railway, Lima, Ohio.—This railway, which is being built to be operated in connection with the Western Ohio Railway for through service to Cleveland, reports that it is now grading 20 miles for its proposed railway to connect Fostoria and Fremont.

Toronto (Ont.) Railway.—This company has signified its intention of proceeding immediately with the construction of 25 miles of new track in Toronto.

Mount Hood Railway & Power Company, Portland, Ore.—This company has granted the contract to A. Mason to grade its extension between Montavilla and Gresham. Work will begin at once under the direction of Smith, Kerry & Chase.

Slippery Rock & Grove City Street Railway, Grove City, Pa.—This company reports that all concrete work, bridges and culverts are completed, grading is two-thirds done and the line is about ready for the ties. It will connect Slippery Rock and Grove City. James A. Jolliffe, secretary. [E. R. J., Aug. 6, '10.]

***Oval, Pa.**—Meetings are being held in Oval for the purpose of considering plans for the organization of a company to build a railway in the Nippenose valley.

Philadelphia & Western Railway, Philadelphia, Pa.—This company has begun surveying for its proposed extension into Conshohocken. It is the purpose of the company to continue the line to other towns in the Schuylkill Valley.

Titusville Electric Traction Company, Titusville, Pa.—This company announces that it will build a 6-mile extension from Tryonville to Townville, provided the local Board of Trade will assist in raising the necessary capital.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has begun work building several new lines in Chattanooga and on its Chickamauga Park short line.

Austin (Tex.) Electric Railway.—This company has been granted right of way over the Congress Avenue Bridge and will build an extension to South Austin of about 2 miles. The company will place contracts during the next six weeks for building 1½ miles of track and overhead line.

San Antonio (Tex.) Traction Company.—This company reports that it completed and placed in operation on Oct. 2 the 1½-mile extension of its South Flores Street line to Harlandale.

Manitowoc & Northern Traction Company, Manitowoc, Wis.—This company is said to be considering plans for extending its railway to Mishicott.

SHOPS AND BUILDINGS

Vallejo & Northern Railway, Vallejo, Cal.—This company will soon build a new station between Main Street and Second Street in Woodland.

Georgia Railway & Electric Railway, Atlanta, Ga.—This company has just completed its brick machine shop at Virginia Avenue and car house on Butler Street in Atlanta. The carpenter and paint shop, now framework, will be rebuilt of brick, so that the entire plant will soon be fireproof.

Rockford & Interurban Railway, Rockford, Ill.—This company has begun grading for the erection of its car shops on North Second Street in Rockford. The structure will be of reinforced concrete.

Bowling Green (Ky.) Railway.—This company advises that it is now building a concrete and brick car house at Deerfield, which is about 2 miles distant from Bowling Green.

Oklahoma (Okla.) Railway.—This company expects to begin the construction of its principal work shop on Ollie Street, Oklahoma. The structure will be 96 ft. x 216 ft. This will be followed by the building of paint shops, inspection shops, car construction shops and two large storage houses.

POWER HOUSES AND SUBSTATIONS

Little Rock Railway & Electric Company, Little Rock, Ark.—This company advises that it is now installing in its power house in Little Rock a 1000 kw rotary converter purchased from the Westinghouse Electric & Manufacturing Company.

Pacific Electric Railway, Los Angeles, Cal.—This company is installing at its power house on Bertie Street, Pomona, new transformers and a generator, which will double the present capacity of the plant.

Connecticut Company, New Haven, Conn.—This company has begun work on an addition to its power station on Grand Avenue in New Haven. The building will be 50 ft. x 45 ft. and 30 ft. high. A smokestack about 125 ft. high will also be erected.

Chicago, Kankakee & Champaign Electric Railway, Kankakee, Ill.—Press reports state that this company will soon build a power plant at Urbana and another at Kankakee. George M. Bennett, Urbana, president.

Berkshire Street Railway, Pittsfield, Mass.—This company has let the contract to Fred T. Ley & Company, Springfield, for building its new power house at Zylonite. The structure will be 150 ft. x 100 ft., is to be of brick and concrete construction and will consist of a basement, main floor and a fan room projecting above the first story. Preliminary arrangements have been made and construction will begin at once.

Oklahoma (Okla.) Railway.—This company has begun work and contracts have been placed for the installation of 2000 kw additional generating capacity at the power house and the corresponding number of converting units at the substation, which will involve an expenditure of at least \$165,000.

Utah Light & Railway Company, Salt Lake City, Utah.—It is said that this company will soon replace the temporary transformer station between Murray and Midvale with a new building.

Manufactures & Supplies

ROLLING STOCK

Austin (Tex.) Electric Railway expects to close an order during the next few weeks for two closed single-truck cars.

Johnstown (Pa.) Traction Company has placed an order with the J. G. Brill Company for six new cars.

Meadville, Conneaut Lake & Linesville Railway, Meadville, Pa., has built a new baggage and express car in its own shops.

Colorado Springs & Interurban Railway, Colorado Springs, Col., expects to build soon six 38-ft. closed trail cars in its own shops.

Little Rock Railway & Electric Company, Little Rock, Ark., is rebuilding and converting 15 13-bench open cars into center-aisle cars with drop platforms. Consolidated heaters are being installed on these cars.

Norfolk & Bristol Street Railway, Foxboro, Mass., noted in the ELECTRIC RAILWAY JOURNAL of July 30, 1910, as considering the purchase of two new cars, expects to close an order for these cars within a few days.

Hudson & Manhattan Railroad, New York, N. Y., will soon order 30 steel passenger cars for service between Newark and New York. The general size and arrangement of these cars will be the same as those now being operated.

El Paso (Tex.) Electric Company, noted in the ELECTRIC RAILWAY JOURNAL of July 23, 1910, as having ordered six single-truck prepayment cars from the Cincinnati Car Company, has specified the following details for these cars:

Length of body.....	21 ft.	Hand brakes.....	Peacock
Over vestibule.....	33 ft.	Headlinings.....	Agosote
Width over sill.....	8 ft.	Headlights.....	Crouse-Hinds
Sill to trolley base..	9 ft. 4 in.	Journal boxes....	Symington
Body	composite	Motors.....	2 G. E. 80
Interior trim.....	mahogany	Push button signal	
Underframe	composite	battery system	
Axles	4½ in.	Registers	International
Brakeshoes.....	A. B. S. & F. Co.	Roofs.....	Monitor deck
Bumpers.....	angle iron	Sash fixtures....	Dayton locks
Car trimmings.....	bronze	Seats	Heywood
Couplers.....	C. C. Co. radial	Seating material....	rattan
Curtain fixtures....	Forsythe	Step treads.....	Universal
Curtain material....	Pantasote	Trolley retrievers...	Wilson
Destination signs....	Hunter	Ventilators.....	deck sash
Gongs....	14-in. P. Wall Co.	Wheels.....	St. Louis

TRADE NOTES

Electricische Kraftbetriebe und Bahnen, Berlin, and **Eugene Eichel**, consulting engineer, have moved their office from 106 Alte Jacobstrasse to 42 and 43 Krausenstrasse, Berlin.

Silliker Car Company, Halifax, N. S., of which C. J. Silliker is president, is said to have passed to the control of W. B. Tenant, St. John, and J. R. Douglas, Amherst, N. S.

U. S. Metal & Manufacturing Company, New York, N. Y., has moved its Chicago office from the Railway Exchange Building to suite 1104-1105 McCormick Building, Michigan Avenue and Van Buren Street.

McKeen Motor Car Company, Omaha, Neb., reports that it has recently delivered the following cars: One 70-ft. to the Southern Pacific Company, No. 45; one 70-ft. to the Chicago Great Western Railroad Company, No. 1001; one 70-ft. to the Rock Island Lines, No. 9023. This makes a total of 88 McKeen cars in daily service in the United States and Mexico.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., has moved its New York office from 1 Liberty Street to 50 Church Street, Hudson Terminal Building. The company's interests in New York and New England have been placed in charge of Wm. F. Zimmerman, M. E., second vice-president. Mr. Zimmerman, who reassociated himself with the company last spring, has had 25 years' experience in the engineering, manufacturing and contracting field.

Western Electric Company, New York, N. Y., announces that the Péré Marquette Railroad is soon to join the long list of railroads using the telephone in place of the telegraph to dispatch trains. This railroad has ordered instruments, selectors and line material to equip a line from Saginaw,

Mich., to Toledo, Ohio., approximately 135 miles in length. This is understood to be the first step in adopting the telephone system over the entire road. The equipment is being furnished by the Western Electric Company.

W. N. Matthews & Brother, St. Louis, Mo., have bought a controlling interest in the Davis Expansion Boring Tool Company. The stock bought formerly was held by Alexander Landan and A. E. Lensler. W. N. Matthews will be president and treasurer of the company. Emery E. Davis is vice-president, and Claude L. Matthews is secretary. The company's business will be increased and several new tools will be added to the line it handles, among which is an expansion reamer invented by Mr. Davis.

Duncan McDonald, president of the Pay-As-You-Enter Car Corporation, has just returned from a trip to Europe, where he attended the International Street and Interurban Railway Congress at Brussels in company with Thomas W. Casey, general manager of the corporation, to demonstrate the possibilities of pay-as-you-enter cars on European tramways. Mr. McDonald reports that prospects are promising for the trial of this type of car in Paris. Mr. Casey will not return for another week, as he expects to visit several English cities in the interest of the company.

Westinghouse Air Brake Company, Pittsburgh, Pa., in its annual report for the year ended July 31, 1910, shows net earnings for the year of \$4,653,102, as compared with \$2,039,273 in 1909. After charging off \$429,824 for depreciation, etc., there remained a surplus of \$4,223,278, as compared with \$1,920,557 last year, representing 30.16 per cent earned on the \$14,000,000 capitalization against 13.72 per cent earned in 1909. The payment of \$2,749,268 in dividends, against \$1,374,481 last year, left a balance of \$1,474,010, which brought the total surplus up to \$6,931,760. The company has moved its offices from Richmond, Va., and Cincinnati, Ohio, to the Candler Building, Atlanta, Ga.

ADVERTISING LITERATURE

Brandt Cashier Company, Chicago, Ill., lists and illustrates in a 20-page booklet its various models of automatic cashiers.

Chicago Concrete Machinery Company, Milwaukee, Wis., has issued a booklet illustrating the various types of Chicago concrete mixers which it makes.

Murphy Varnish Company, Newark, N. J., has issued a booklet describing the Murphy systems of railway finishing for wooden and steel cars of both steam and electric railroads.

Garwood Electric Company, Garwood, N. J., is mailing a series of illustrations which show various broken car parts and other miscellaneous machinery repaired by the use of Garwood electric welding equipment.

Leeds & Northrup Company, Philadelphia, Pa., has printed a booklet devoted exclusively to its coming convention exhibit of electrical measuring instruments. Among the latter is the well-known Herrick inspection test set.

Carnegie Steel Company, Pittsburgh, Pa., has issued a pamphlet of standard specifications for steel products published by the Association of American Steel Manufacturers, Carnegie Steel Company and the American Society of Testing Materials.

Goldschmidt Thermit Company, New York, N. Y., has included in its publication "Reactions," for the third quarter of 1910, the following articles: "Electrolysis Again," "Thermit Weld on Main Driving Shaft of S. S. Manhasset," "Thermit Weld on Large Dredge Pump Shell," "Thermit on the Vaudeville Stage," "Around the Railroad Shops" and "Welding Electric Motor Cases on the United Railroads of San Francisco."

Bird-Archer Company, New York, N. Y., has issued a 48-page catalog entitled "Boiler Troubles and Their Prevention." The contents include "About Boiler Compounds," "Action of Feed Water Impurities Within the Boiler," "Oil and Grease Within the Boiler," "Corrosion," "Methods of Feeding Boiler Compounds," "Hints About Blow-Off Valves," "Guarantee of Bird-Archer Boiler Compounds."

Pettingell-Andrews Company, Boston, Mass., has issued a de luxe catalog of electric lighting fixtures for residences, offices and public buildings. The book is 12 in. x 15 in. in size and is bound with heavy board covers and soft leather

back. Nearly 400 stock and special fixtures are illustrated with artistic half-tone engravings. The catalog is a beautiful piece of book-making and is in keeping with the handsome fixtures which it illustrates.

The J. G. Brill Company, Philadelphia, Pa., prints in the "Brill Magazine" for September the twenty-first in the series of articles describing the street railway system of some important city of the world with particular reference to the type of car which is used. The city considered is Cleveland, Ohio. The publication also contains the following articles: "Plantation Equipment for Peru," "Café-Chair Service of the Chicago & Milwaukee Electric Railroad," "Cars for the Lehigh Valley Transit Company," "Equipment for Guadalajara, Mexico," and "Cars for the Houston Electric Company." The subject of the biographical sketch in the present issue is John M. Roach, president of the Chicago Railways and managing receiver of the Consolidated Traction Company.

Titanium Alloy Manufacturing Company, Pittsburgh, Pa., has issued a 42-page catalog in which is discussed the durability of steel rails treated with titanium alloy. The reports of several prominent metallurgists on their investigations of the company's product are quoted. Numerous illustrations are presented showing titanium rails in service on some of the important steam and electric railroads in the United States. Among these are the Boston Elevated Railway, Chicago & Oak Park Elevated Railroad, Interborough Rapid Transit Company, Los Angeles Railway, New York State Railways, New York Central & Hudson River Railroad, Baltimore & Ohio Railroad, Chicago, Milwaukee & St. Paul Railroad and Chicago, Rock Island & Pacific Railroad. The publication also contains a number of illustrations showing the effects of various tests applied to titanium rails.

NEW PUBLICATIONS

Switchboards. By Hervey S. Walker. Walker Electric Company, Philadelphia, 1910; 213 pages; illustrated. Price, \$1.00, express prepaid.

The author of this book is a well-known specialist in switchboard design and manufacture. In one sense his book is an advertisement of the work of his company, but in another it can be considered as a valuable résumé of switchboard history, design and operation. Illustrated descriptions are presented of many switchboards and switchboard instruments as installed for every variety of alternating current and direct current service.

Hendricks' Commercial Register. New York: S. E. Hendricks Company, 1910; 1344 pages. Price, \$10.

This well-known buyers and sellers' register has now reached its nineteenth annual edition. It is a valuable guide for buyers of practically everything required in the operation of an electric railway and in fact any other public service utilities. Fully 100 pages are required merely to index the contents. The total number of classifications is 35,481, and the number of names and addresses exceeds the enormous total of 350,000. The classifications are so arranged that the book can easily be used for either purchasing or mailing purposes.

Miscellaneous Tests on Car Equipment. By Eugene C. Parham and John C. Shedd. McGraw-Hill Book Company, New York, 1910; 156 pages with index; illustrated. Price, \$1.00 net.

This book should be welcomed by car maintenance engineers, as it brings together in simple form a mass of pertinent data, which otherwise could be secured only piecemeal from the files of technical papers and different text books. However, this book is much more than a compilation, as it is largely the outcome of the shop and laboratory experience of the authors. It contains a novel chapter on current collectors, wherein some practical hints are given on trolley wheel pressure. Other chapters discuss tests on fuses, circuit breakers, controllers, resistance, lightning arresters, cables, brushes, etc. Part 2, called "Motor Tests," is of more ambitious scope, treating of such matters as tests of motor balancing, heating, efficiency, speed and train resistance. This book also includes a chapter on reviving shocked persons, and a catechism based on the data in the book. This volume is bound uniform with its companion "Shop Tests on Car Equipment," which was written by the same authors.