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Of this issue of the Street Railway Journal 8200 copies are printed. Total circulation for 1907 to date 328,050 copies, an average of 8201 copies per week.

The Central Electric Railway Meeting

With the advent of cooler weather, the largest two sectional electric railway associations of the United States already have held meetings which are worthy introductions to those planned for Atlantic City within the next two weeks. The work of the Kingston meeting of the New York Association was reviewed in these columns last week, and it may now be in order to summarize the proceedings

of the Central Electric Railway Association at Columbus on Sept. 26.

Like their New York confreres, the interurban railway managers of Ohio and Indiana have been wrestling with the problem of making a standard code of operating rules, but they have not bound themselves so definitely to their committee's report as did the New York organization. The different methods of the two bodies in handling precisely the same subject are worthy of some attention. The New York Association, on receiving the report of its rules committee discussed each section so thoroughly that the experience of every member present was brought into play and thus made possible the adoption of a code that will serve not merely as rule storehouse but as a live standard. The Central Electric Railway Association could not easily follow this practice because of its greater and more scattered membership. It therefore decided to adopt the method of the Master Car Builders' Association of sending a printed copy of the report to its members with the request that it be returned with any desired changes. At the next meeting, therefore, the committee will have a good idea of operating conditions on the individual roads and will undoubtedly find it possible to offer a code that can be adopted in the same fashion as the New York rule book.

The Central Association's report and discussion on express handling shows that with the Ohio-Indiana railways the question is not whether such business pays, but how it can be made to pay even better than at present by the organization of a co-operative interurban express company to make through routing easier. It is plain from this that the interurbans of the Central West are outgrowing the purely local express business and are seeking broader fields to conquer. Some guiding rules might be gleaned on this subject from an inquiry into the relations between steam railroads and the old-line express companies. It should not be difficult to secure such data if those who gave the information could be assured that the sources would be kept confidential.

The discussion on fire insurance was not unlike that on express handling, as the association is trying to learn whether it is better to insure with the old-line companies or in a co-operative concern. It is a sad truth that there are still many railways whose car houses are serious fire risks, some not deserving insurance of any kind. Hence no matter what type of insurance eventually is preferred, the rates will never be as low as they should until every important piece of electric railway property is rightly protected. The discussion on single-phase and high-tension d. c. systems while not lengthy showed that the members of this organization are anxious to keep in step with the latest developments. The questions asked about current collec-

tion proved also that the trolley wheel may not dominate the field of heavy interurban traction so completely as it is doing in lighter service in this country.

Last, but not least, was the good work of the standardization committee whose present achievements should make future master mechanics and manufacturers rise and call them blessed. The efforts of this body also have simplified the work of the Engineering Association's standardization committee by revealing the standpoint of the majority of interurban railways. In the past, some have feared that the work of the sectional organizations would detract from that of the parent body, but such instances as this demonstrate that such prophecies were ungrounded. To be sure, there are many railway problems of purely local nature, but there are plenty of so tough a nature that their predigestion by the smaller societies is a necessity.

The Interurban Decision in Massachusetts

The decision of the Massachusetts Railroad Commission in regard to the public necessity and convenience of new electric high speed interurban facilities between Boston and Providence, and between Boston and the northeastern suburbs of the city is of interest to every engineer who believes that the high-speed interurban road has a field of its own in the work of transportation. As printed in our columns two weeks ago, the order of the board approves the petition of the Boston & Providence Interurban Electric Railroad Company for the right to build a line of superior character between the foremost two cities of New England, and it also recognizes the need of additional facilities of an improved character at the north of the Hub.

Thus the so-called "transportation court" of Massachusetts commits itself to the far-reaching acknowledgment that neither the steam railroad nor the highway trolley line supply the same need as does the electric interurban road on a private right of way, and thereby encourages in a remarkably populous territory a new department of railway initiative. It is clear that the board believes that existing companies conducting their business in a proper manner will not be injured by the new facilities, and it remains now for the successful promoters to prove by actual operation how great an advantage has been made by electric railway engineers and manufacturers in rapid transit equipment and facilities since the earlier days of trolley construction on the highways for a house to house service. The interurban situation in the Middle West differs so much from that in Eastern New England that comparisons between the two will be of great interest and value as time goes on.

The point raised by the Commission that the Boston & Eastern Company's plan is defective in terminating its service at the Sullivan Square elevated terminal emphasizes an important principle in rapid transit. Through cars carried to the heart of the city of Boston by a high-speed route would provide a far better service than would be possible in the original plan of transferring passengers to the Boston Elevated at Charlestown and thus adding ten or fifteen minutes to their journey over a line already heavily charged with traffic. Of course, the cost of entering the heart of the city by a new tunnel would be a matter of considerable weight, but if the existing East Boston tunnel should be

utilized, it is hard to see why the whole scheme would not be greatly advantaged. However the matter is settled, it is plain that a new era of electric railroading is at hand in Massachusetts. In some quarters there is apprehension expressed lest the new facilities will duplicate the electrified steam service expected within a few years, but a careful study of the possibilities on an electrified system inclines one to the belief that there will still be a field for each type of railroad. Economical handling of heavy freight and fast, through passenger service lies at the bottom of the heaviest railroading, and the probabilities are strong that the electric interurban of the future and the electrified steam road will supplement each other no less than do the trolley and the steam lines of to-day in the interchange of local and through business.

The High-Tension Insulator

The importance of the high-tension insulator in the successful transmission of power over long distances has been emphasized considerably of late, and the demands of new markets for power utilization in the general vicinity of large hydro-electric developments have stimulated insulator manufacturers to the most active efforts to extend the range of transmission through the use of voltages in excess of 60,000. At the recent meeting of the Canadian Electrical Association in Montreal, this aspect of the situation was discussed at length, the consideration of the topic having been introduced by C. E. Delafield, who presented a paper on "High-Tension Insulators from an Engineering and Commercial Standpoint." The author considered the intimate dependence of long distance transmission upon the insulator, outlined the type of insulator demanded by the exacting conditions of to-day, and emphasized the importance of correct manufacturing processes and careful tests prior to the acceptance of the product in commercial service.

There is room for considerable difference of opinion as to the best way of securing a satisfactory insulator for very high potentials. The canons of insulator design are so far from fixed that the engineer who specifies materials and shapes in great detail takes considerable responsibility upon his shoulders, and perhaps pays a good deal more in the end for his line construction, not to mention maintenance, than the one who asks the manufacturer for an insulator of the latter's design capable of withstanding a definite potential stress in continuous service of a specified nature. A short abstract of the paper was published in these columns recently in an account of the meeting, but the increasing use of high voltage transmission makes the topic so interesting that attention will be called to certain of the points brought out in the paper or discussion.

The author points out that an increase in voltage from 60,000 to 150,000 would make it possible to deliver Niagara power economically in New York, Boston or Philadelphia, and states that the insulator is the principal hindrance to this consummation. Without accepting this assertion in detail—for the commercially profitable sale of Niagara power in competition with coal on the Atlantic Coast involves many other factors than the voltage question—it serves to fix the central responsibility of the insulator in the transmission field. It needs little demonstration at the

present prices of copper and aluminum to show that by very high voltage only can the large powers now so successfully generated and safely handled in transformers and switching mechanism be distributed economically over very long distances.

The paper stated that wood can be safely accepted for insulator pins up to about 30,000 volts. Beyond this point, it seems advisable for mechanical reasons to use malleable iron, but the so-called pin type of insulator has reached such dimensions, in the endeavor to meet the requirements of higher voltages, that it appears to be the opinion of the leading high-tension engineers that this type of insulator has reached the limit of good line construction on account of its dimensions. It is a difficult matter, from a mechanical standpoint, to find a pin that will take the necessary stress incident to an insulator of very large size and weight, and the problem of manufacturers, from the standpoint of the pottery is one of great difficulty. It is probable, therefore, that a suspended form of insulator will be tried in the near future, as it is a comparatively simple matter mechanically to suspend any desired weight and, from an electrical standpoint, it seems possible to so design an insulator that it will be mechanically strong and a good dielectric as well.

The suspended type of insulator would have the advantage that ample arcing distance could be provided without making the insulator top-heavy and difficult to manufacture. It should be so designed, however, so that arcing cannot occur until the voltage is sufficient to rupture the air and cause the current to arc from end to end, this feature being of great importance in steel tower work. On high-tension lines where steel towers are used, the pin type of insulator for 100,000 volts or higher would seemingly be almost an impossibility owing to the size necessary to take care of surges and other line disturbances, and also because the earth potential is carried into the head of the insulator through the steel pin and towers. In proportion as the insulator accepted for a given transmission takes care of fogs, dust deposits and spray, is not handicapped by large still air spaces, exposes a large part of its surface to the wind and has a long leakage distance of small area, it is likely to be successful in the ultra high potential work of the future, and it has been pretty clearly shown that nothing but well vitrified porcelain should be used between points of opposite potential. Cemented parts should, if used, be under compression rather than tension. Insulators of the same electrical design but of different manufacture may vary greatly from one another. Thus, the one having the greatest electrolytic capacity and hence the greatest electrostatic field will be the first to suffer from brush discharge and arcing over. In another case the insulator possessing the greatest density in its body, and which is the most vitreous, will stand the more severe service.

The factor of safety which should be required in testing high-tension insulators has been the subject of much comment among engineers. Mr. Delafield urges that three times normal voltage be applied in the dry breakdown test between the insulator head inside and outside. This is a pretty strenuous requirement in the case of an insulator designed for operation at say 100,000 volts, and we question whether manufacturers are as yet willing to bid on a

specification requiring their insulators to stand a 300,000-volt test. It is probable that a 200,000-volt test would not be prohibitive if the purchaser shows himself willing to pay the cost, and Mr. Delafield is clearly right in urging that economizing in high-tension insulators to save a few cents apiece in first cost is pretty poor policy. The operating engineer and the manufacturer are coming closer together on the insulator question, and both are beginning to realize that it is not the working voltage of a long, exposed line which demands the greatest precaution—the common enemy is an excessively high potential discharge, caused by lightning or resonance in the system. The latter factor will ultimately drive the breakdown test to the highest point consistent with manufacturing possibilities.

Utilizing Records of Delays to Equipment to Check Shop Work

When accurate records of detentions which result from defective car equipment are kept with the specific causes for these delays, a master mechanic has a definite means of determining the efficiency of the repair and inspection work done in his shop. It is to be regretted that more railway systems do not keep records of this kind for the benefit of the shop department. Such records can be used not only to enable the master mechanic or shop foreman to check from month to month the efficiency of the work, but with a little systematic work in the shop they can be employed to locate the men who are in the habit of doing careless or inferior work. This plan is now in service in several large shops and it could with almost equal facility be employed in smaller ones. It requires, particularly in the inspection of cars, that each man be given definite work to do on each car, and that he be compelled to sign his name to a permanent record kept for each car inspection. Then in case of breakdown, due to faulty work on his part, he can be identified as the one responsible for the trouble.

After such a system has been introduced in a shop and a few men have been censured severely for failure to do their work properly it is safe to say more attention will be given to the manner in which all details of the inspection and repair work are carried out. In fact, the men will feel more or less as though an invisible eye were watching them and the greater the extent to which they can be imbued with this feeling the better will be the work turned out. As a consequence a noticeable reduction should follow in the number of detentions of cars due to defective apparatus. There should also be a considerable decrease in the cost of maintenance.

The system will require the keeping of some records and will necessitate more office work, but the reduced expenses of maintenance alone will usually offset the additional expenses of clerk hire.

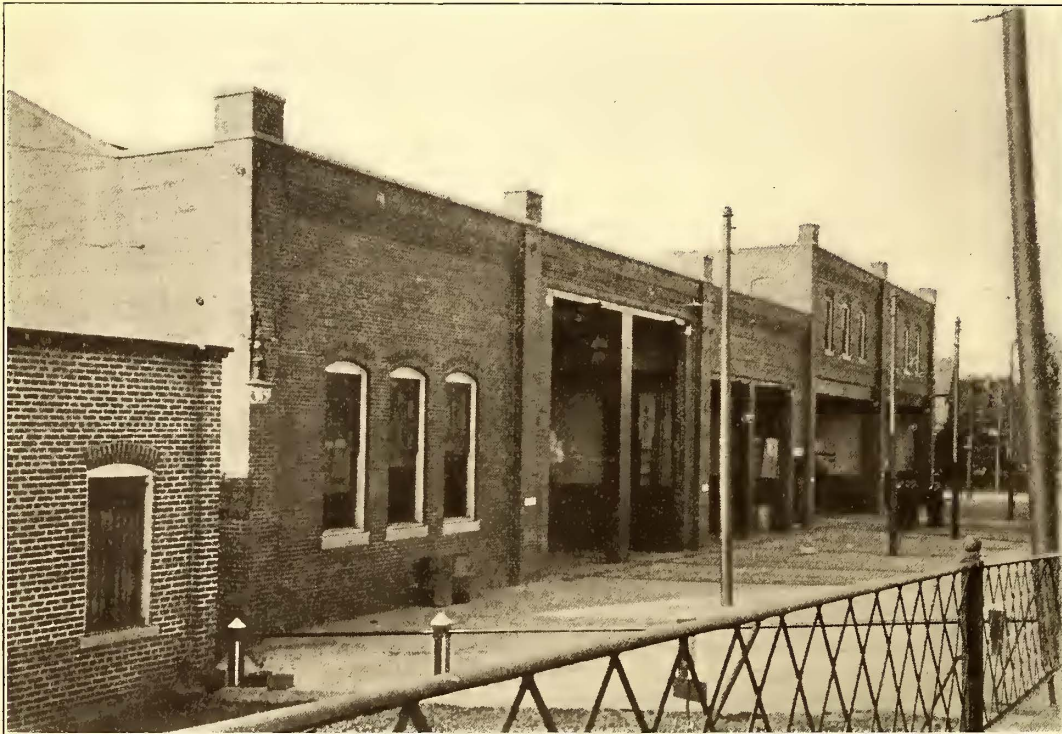
Where an attempt is made to keep records of delays and their causes some trouble may be occasioned by the fact that "defective equipment" may be offered as an excuse for delays, for which the transportation department or some other department may really be to blame. The equipment department, however, in cases of this kind may protect itself by having the motorman make detention reports entirely independent of similar reports made by the conductor or the representatives of other departments, and when the reports do not agree by having an inspection of the apparatus which is reported at fault.

NEW SHOPS AND CAR HOUSES AT KNOXVILLE—SHOP PRACTICE

During April, 1906, the car repair department of the Knoxville Railway & Light Company moved into new shops and car houses at the corner of Jasmine Street and South Fifth Avenue. Through the courtesy of C. H. Harvey, president and general manager of the system, it is possible to give the following details regarding these shops. The buildings are of modern fireproof construction in every detail, and the interior arrangement is particularly well suited for the maintenance of cars in cities of from 40,000 to 60,000 people.

The shops and the storage houses, between which there is a common wall, have a total frontage of 138 ft. The shop measures 99 ft. 4 ins. front, and 178 ft. 4 ins. depth. The houses are 399 ft. deep.

Both buildings are constructed of brick, on concrete



FRONT VIEW OF KNOXVILLE REPAIR SHOPS AND STORAGE HOUSES

foundations. The roofs are carried on steel framing. All openings are closed by Kinnear rolling steel doors, and the floors are generally of concrete.

With regard to main construction, the repair shop consists of three bays; a central one containing pit tracks; one on the east, which serves as a carpenter and repair shop, and a bay on the opposite side utilized for blacksmith and machine shops, winding room, toilet room and storeroom. The roof over all three bays is of the saw-tooth type, that over the central one being considerably higher than the other two.

A brick fire wall separates the carpenter and paint shops from the repair tracks, and the bay containing these shops is further divided at a point midway of its length by a corrugated iron partition fitted with Kinnear rolling steel doors. Two tracks in the paint shop, which is in the front portion, continue only to the partition.

REPAIR TRACKS AND CRANES

The two tracks in the repair shop are each provided with concrete pits 4 ft. deep, which extend within about 8 ft. of

the ends of the building. The method of supporting the rails is somewhat out of the ordinary. Supporting columns, consisting of 10-in. 15-lb. channel bars are placed under the rails and 7 ft. 6 ins. apart. These columns are built directly against abutments from the concrete pit walls, and are secured to the concrete work by anchor bolts. Flat plates are riveted to the channel bars at the top and bottom to serve for feet and supports for the rails. The rails which rest directly on the top plates are secured in place by angle-bolts, and also by anchor bolts, which extend into the concrete floor construction. Behind each rail and about ½ in. distance from it is placed a Z-bar, made up of a 4-in. x 3-in. and a 5-in. x 3-in. angle-bar bolted together. This Z-bar permits the rail to be removed and replaced without disturbing the concrete floor. The construction described is very well shown in the accompanying drawings and reproductions from photographs on pages 496 and 497.

The two repair tracks are served by two General Pneumatic Tool Company 8-ton electrically driven cranes, which are operated on a crane runway 16 ft. 4 ins. above the rails. Trolley wires for the cars are carried above the cranes in the usual manner, which necessitates the trolley pole being pulled down when the car passes under a crane. These traveling cranes are used almost exclusively in repair work, notwithstanding the fact that the shop is provided with two jib cranes between the tracks, as shown in one of the reproductions.

THE BLACKSMITH SHOP

The blacksmith shop occupies a space 23 ft. 6 ins. x 27 ft. It is separated from the ma-

chine shop by a corrugated-iron partition, but opens out directly on to the repair pits. The one forge in it is provided with an electrically operated blower. In the floor behind the forge is a brass furnace. The machine shop is equipped with a hydraulic wheel-press, a boring mill, lathes, and a shaper, all driven from a 10-hp motor.

WINDING ROOM

One of the illustrations on page 497 shows the interior of the winding room. A U-shaped beam overhead carries a traveler, provided with a hand-operated hoist. The beam extends over the armature racks, and above a 22-in. lathe used for banding armatures and terminates under the runway of the traveling cranes serving the repair tracks. In the winding room is installed quite an elaborate testing board. Load is carried by incandescent lamps installed in such a manner that small variations in load may be obtained by throwing knife switches. The board is used for both alternating and direct-current testing. The armature racks are so designed that the length may be varied to take any armature used on the system.

TOILET AND WASH ROOMS

In designing the shops, particular attention was given to the comfort of the employees, and a space 16 ft. x 27 ft. was set aside for wash sinks, lockers and water closets. The lockers are of the expanded metal type. The sinks are of enameled steel and are provided with cold water connections. The toilet room is entirely enclosed by a corrugated-iron partition.

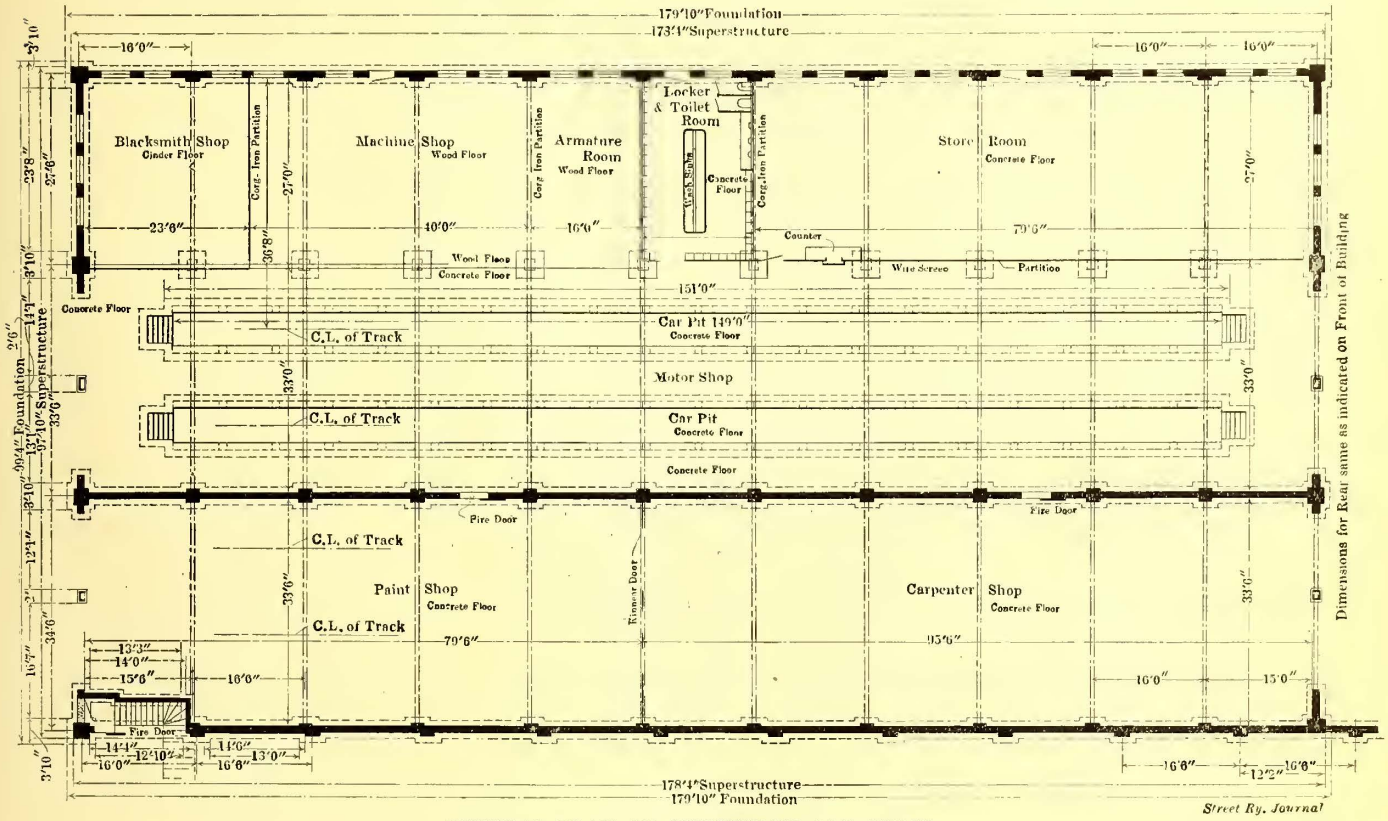
STOREROOM

The store room occupies a space 79 ft. 6 ins. x 27 ft., par-

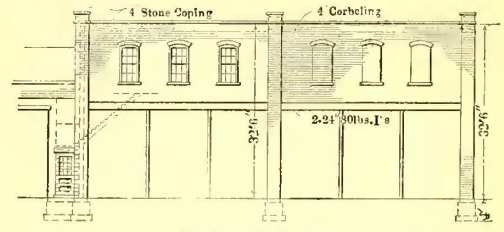
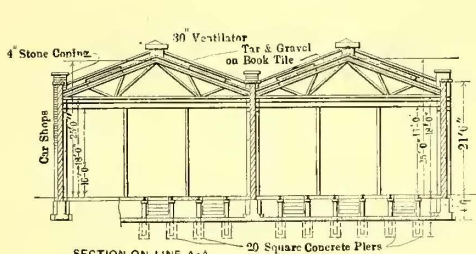
tioned off from the central bay by a wire screen. A small portion of this space at the south end is used as a storeroom office. The remainder is utilized for storing materials. Particular attention has been given to the design of shelving and racks for holding materials.

CAR-STORAGE HOUSES

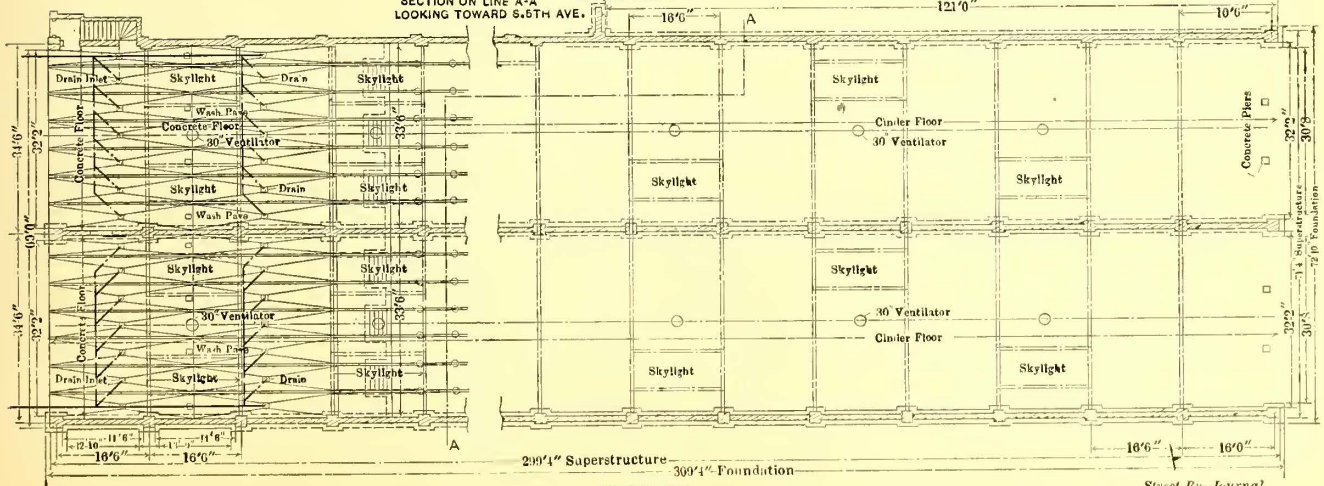
The storage houses are of the same general construction as the shops already described. The two bays are separated by a fire wall and each bay has an independent gable



GENERAL PLAN OF KNOXVILLE CAR SHOPS



MAGNOLIA AVE. ELEVATION



JASMINE ST.

Street Ry. Journal

ROOF PLAN, SECTION AND ELEVATION OF KNOXVILLE TRACTION COMPANY'S CAR HOUSE

roof which is provided with skylights and ventilators.

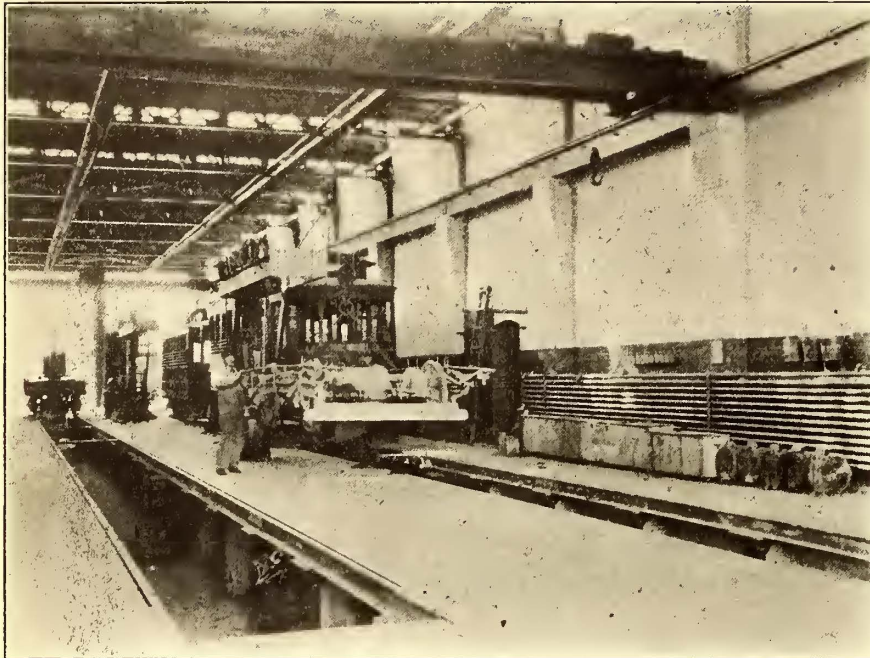
The front of the building is two stories in height. The two rooms in the second story are used by the trainmen, one as a locker and toilet room and the other as a general reading and instruction room.

The ends of the building are closed by Kinnear rolling steel doors, one door being provided for each track. The door guides between the tracks are removable, and in mild weather these may be taken out and the whole front of the building opened up.

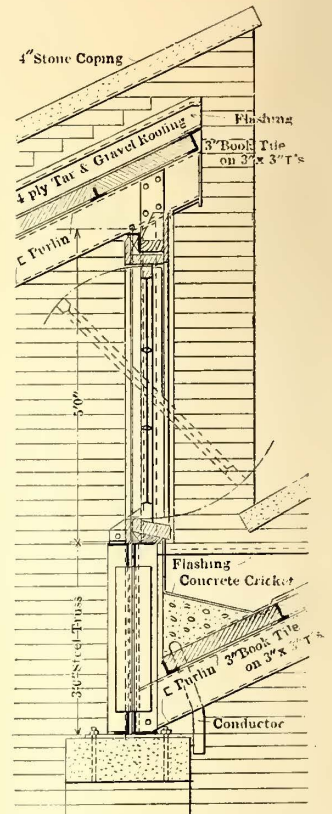
A concrete pit 90 ft. long extends the full width of each section of the car house. The tracks are supported over

ing. Cars are washed over the intervening space which is provided with a concrete floor, and drains between the tracks having tile-pipe connections with the sewer to carry the water off.

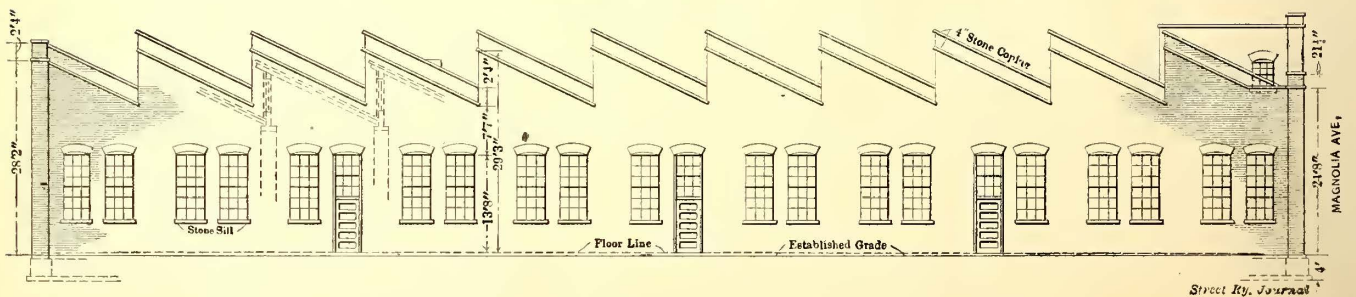
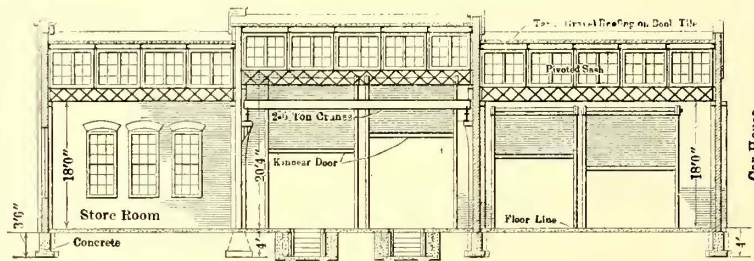
General lighting of the shop is effected with enclosed



INTERIOR OF KNOXVILLE REPAIR SHOP, SHOWING 20-TON CRANE IN USE



SECTION TAKEN ABOVE STOREROOM



SIDE AND FRONT ELEVATION OF KNOXVILLE CAR HOUSE

these pits by columns consisting of 6-in. wrought-iron pipe filled with concrete, placed 6 ft. apart. Over the space between the tracks is built a reinforced concrete platform. Tie-rods, provided with turn-buckles, extend under these platforms and tie the posts together, and at points midway between supports, adjacent rails, are connected by tie-rods.

The pits begin at a point 50 ft. from the front of the build-

ing. Cars are washed over the intervening space which is provided with a concrete floor, and drains between the tracks having tile-pipe connections with the sewer to carry the water off.

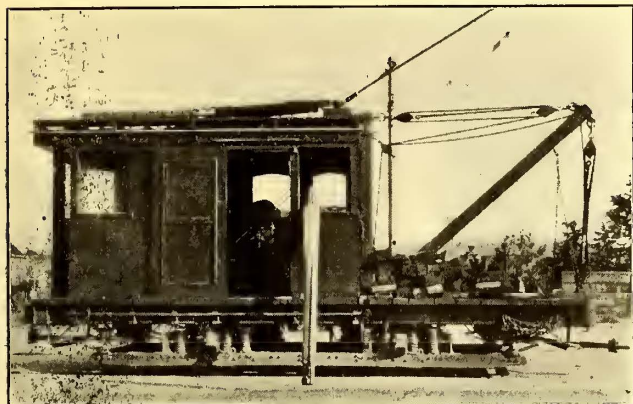
The boiler for the heating system is installed in a small brick structure west of the shop, which also contains the shop offices. The buildings were all designed and erected by Ford, Bacon & Davis. J. M. Kington, as master me-

chanic of the system, is responsible for many of the details in their construction.

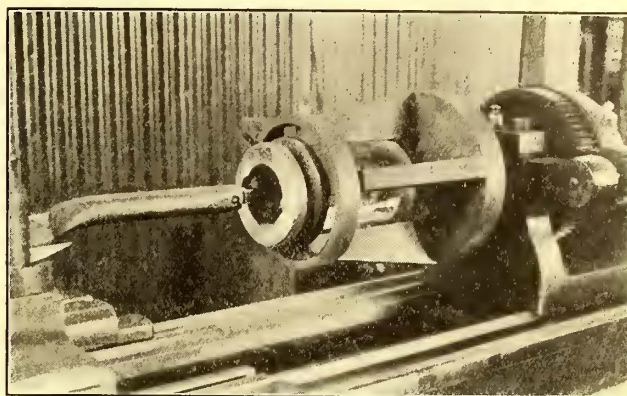
SHOP PRACTICE

Trolley wheels, bearing shells, and practically all of the

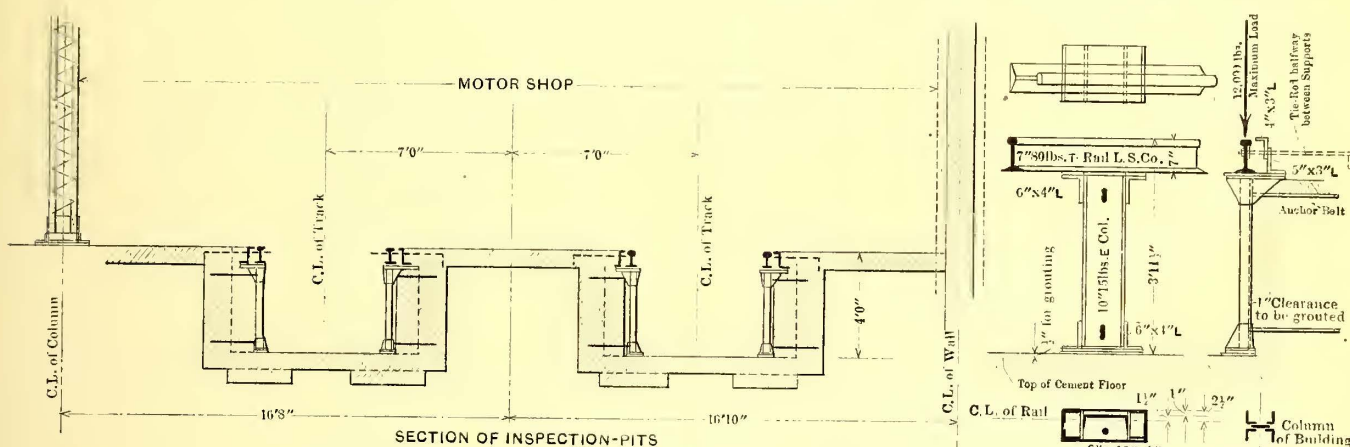
which would have to be purchased at the prevailing price for new brass and copper. One of the reproductions from a photograph shows a chuck used in turning trolley wheels. The wheel, after being bored, is centered on a lug project-



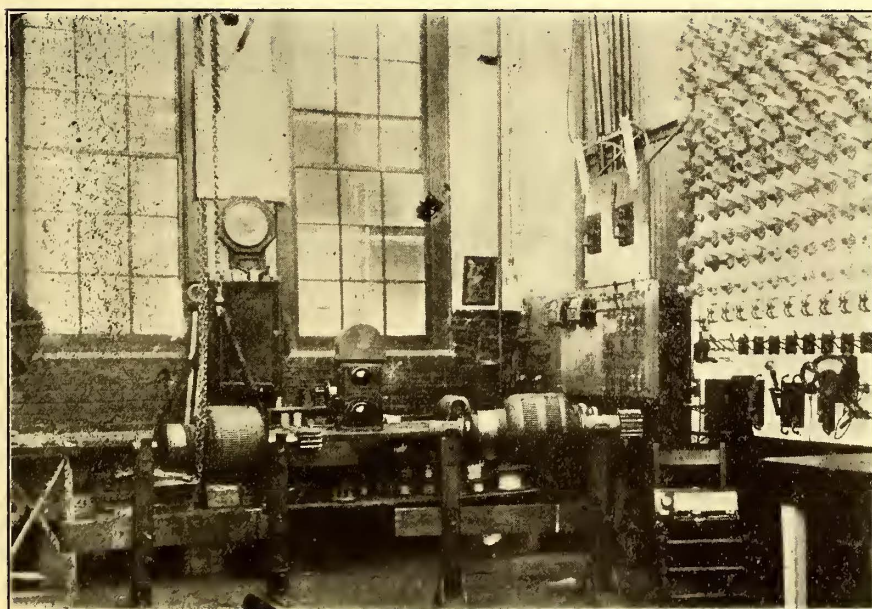
EMERGENCY CAR SUPPLIED WITH A MOTOR-OPERATED CRANE



METHOD OF BORING ARMATURE BEARINGS, SHOWING CHUCK FOR HOLDING THEM IN THE LATHE



SECTION OF INSPECTION PITS AND DETAIL OF CHANNEL COLUMN CARRYING T-RAIL



ADJUSTABLE ARMATURE STANDS AND TESTING BOARDS IN WINDING ROOM

brass fittings required are manufactured in the shop. Brass casting, however, is largely confined to using up scrap metal. The reduced price obtained for scrap makes it very advantageous to use this up by turning it into castings.

ing from one of the halves of the chuck. Pins extending from one of the halves project through between the spokes of the wheel and drive it.

A tension of 24½ lbs. is carried on trolley wheels, as this tension is required to operate the automatic signals with which several of the lines are equipped.

Bearings are turned in a special chuck, as shown in a reproduction from a photograph, which assures of their proper alignment and centering at all times. The jaws of the chuck have flexibility sufficient to grip the bearing when the clamp shown is pulled down over the ends of the arms.

One of the illustrations shows a square brass grid, which is put over the end of the brake beam of Baltimore trucks to take up wear of the runway. The method of applying this grid is shown in the reproduction.

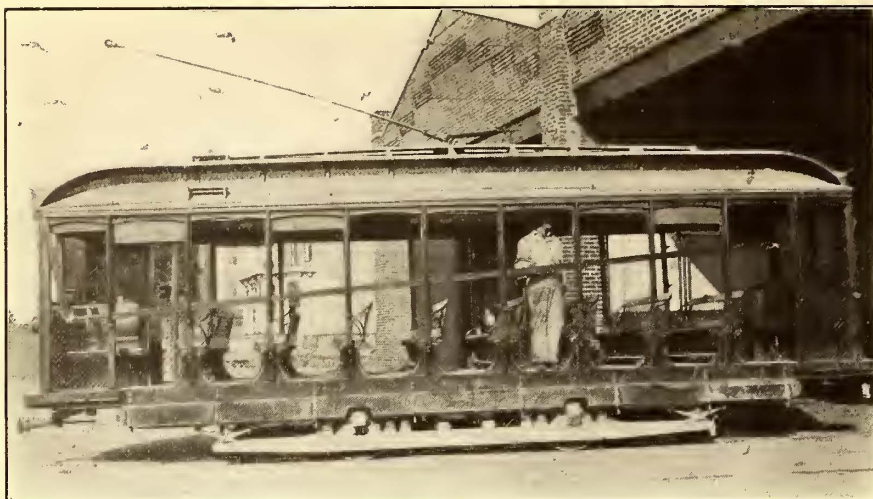
The use of grease for motor lubrication has been abandoned. Grease boxes have been fitted with oil cups, and the substitution of oil for grease has resulted in a great saving, both in lubrication and in maintenance due to defective lubrication. At present the cost of

lubrication is 90 cents per day for thirty cars, making an average mileage of 160 miles per day. This brings the cost of lubrication down to about 18 cents per thousand miles.

A rather neat rack for holding armatures which takes up

When up, the arms are reversed in position. Only one hook, and this is placed near the left arm, is required to hold the rail up.

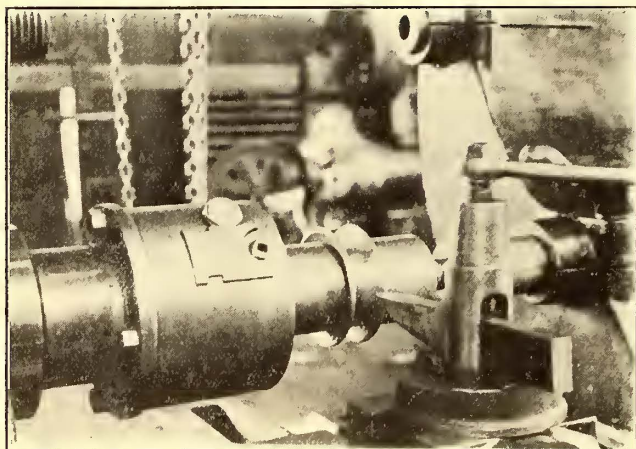
The shops are provided with a combination line-car, wrecking car and general utility car. The hoist is operated by a 2-hp motor. Ladders on top are provided to facilitate line repairs. The car is kept loaded with blocks, jacks, and other wrecking tools for emergencies. Stretchers are also provided.



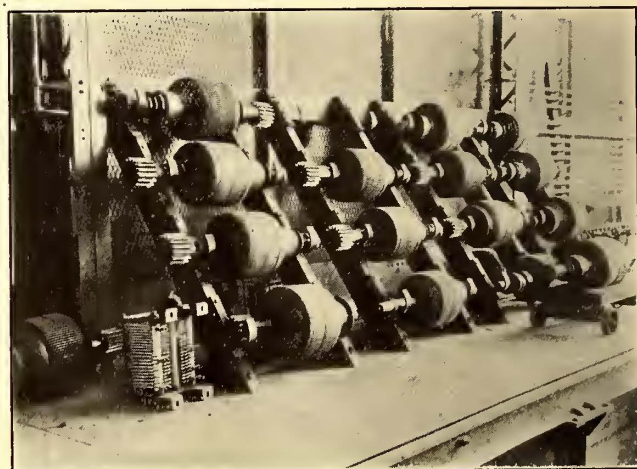
DOUBLE-JOINTED HAND RAIL ON KNOXVILLE SUMMER CAR

TRACK BRAKE AT KNOXVILLE

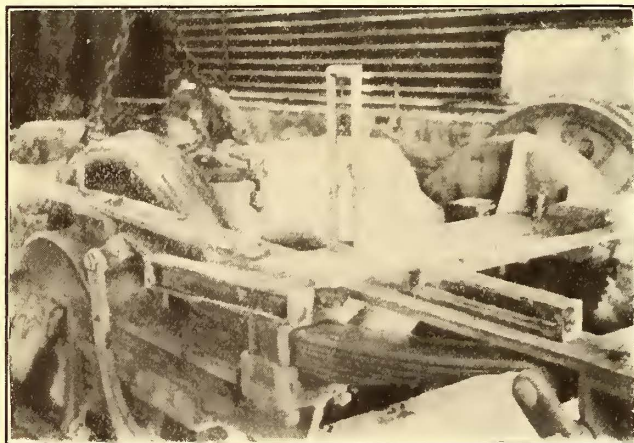
Knoxville, Tenn., is a rather hilly city and grades as high as 13 per cent are found on the electric railway lines. As an additional safeguard in the event of failure of the wheel brakes, track brakes of the type shown in the reproduction have been fitted to some of the cars. The brake is operated from a lever in the cab. It may be noted that



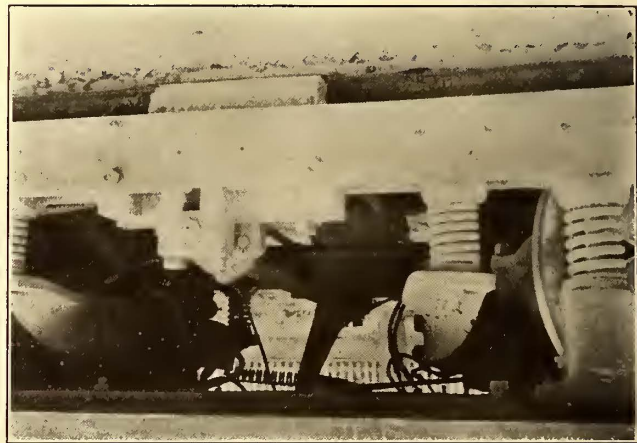
METHOD OF HOLDING THE TROLLEY WHEEL IN THE LATHE WHILE TURNING



ARMATURE RACK AND PADDED ARMATURE CAST, SHOWING ALSO WIRE NETTING PARTITIONS OF THE STOREROOM



DEVICE TO TAKE UP WEAR IN THE BRAKE RIGGING OF BALTIMORE TRUCKS



TRACK BRAKE FOR KNOXVILLE'S HILLY LINES.

very little floor space is shown in one of the illustrations.

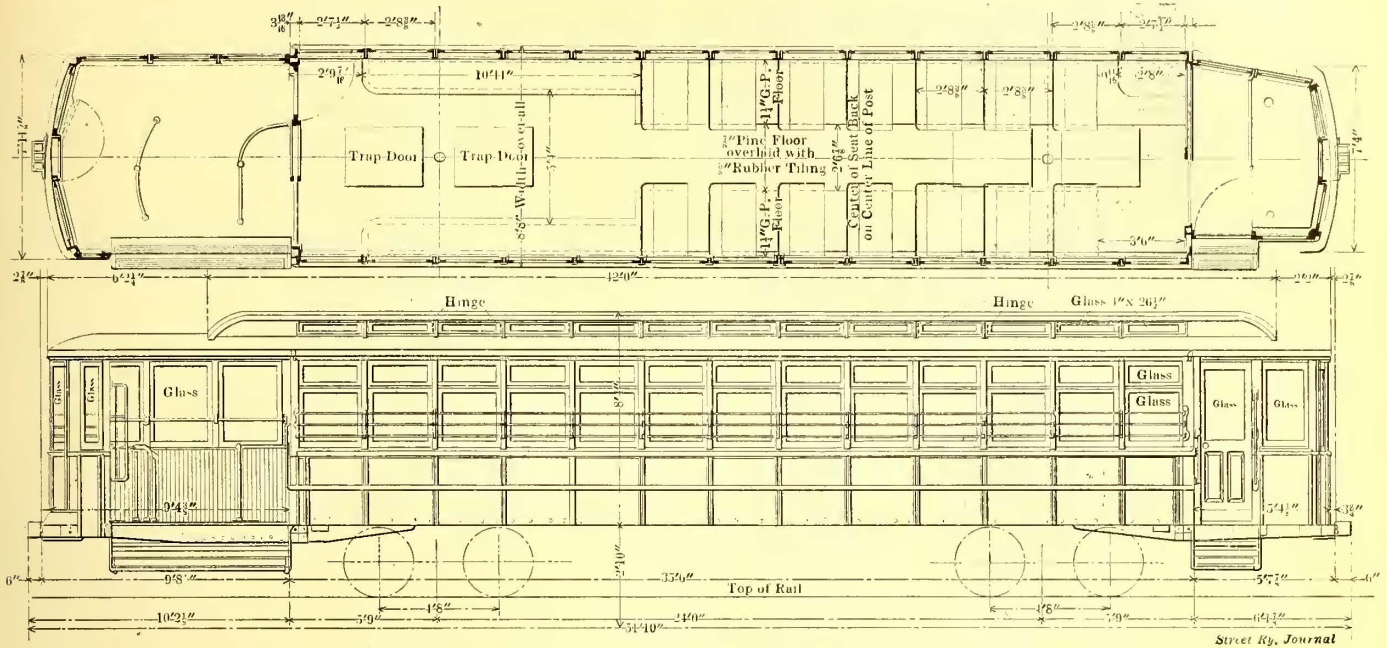
Several of the summer cars are equipped with a double-jointed arm rail which has advantages over the ordinary rail. As shown in the illustration, when the rail is down, the left short arm is vertical and the right one is horizontal.

the rock shaft is made of a square bar, and thus precludes the possibility of the levers slipping on it. The wood shoe is secured in a clamp in such a manner that it is held firmly, yet can be taken out and renewed without difficulty.

PRESSED STEEL PAY-AS-YOU-ENTER CARS FOR MONTREAL

The recent delivery of ten pressed steel pay-as-you-enter cars to the Montreal Street Railway Company may be taken as an indication that this progressive railway refuses to be left behind others in trying out the very latest ideas in electric rolling stock. The cars were built at the Pittsburg

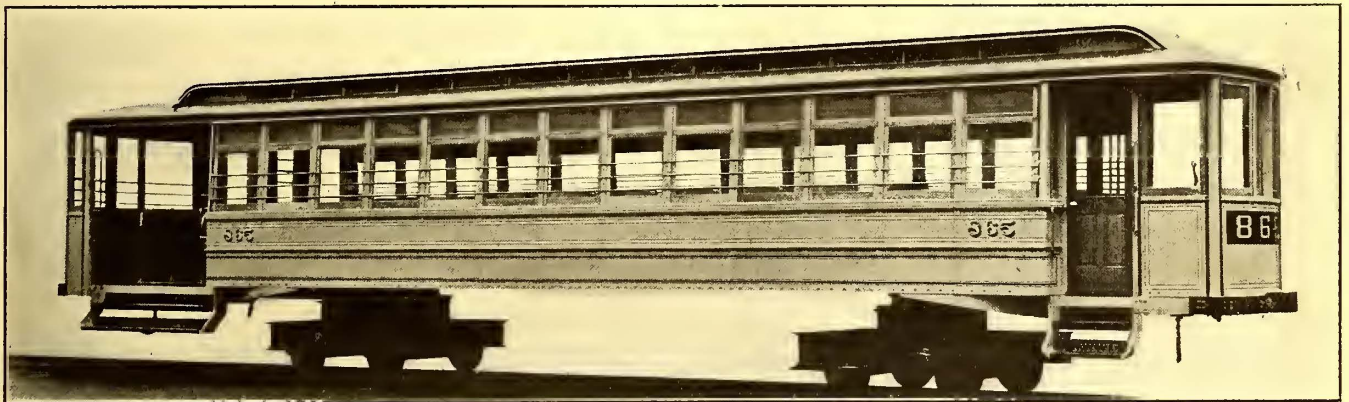
forged channel shapes with cover and bottom plates. It is 9½ ins. deep at the center bearing and 5 ins. deep at the side bearing. The channel shapes are attached to the side sills by a wrought bracket construction, the cover plates overlapping the channels. The center bearing consists of a casting riveted between the side channels, while the side bearings consist of castings shaped on a 2-ft. 5-in. radius bolted to the lower side of the bolster for easy removal.



PLAN AND ELEVATION OF MONTREAL PRESSED STEEL PAY-AS-YOU-ENTER CAR

works of the Pressed Steel Car Company, of New York, and resemble the wooden pay-as-you-enter car type so closely that it is doubtful whether the Montreal public will

The platforms are built up of four channel members, which are bolted to the body underframe to facilitate their removal in case repairs are required. The corner posts



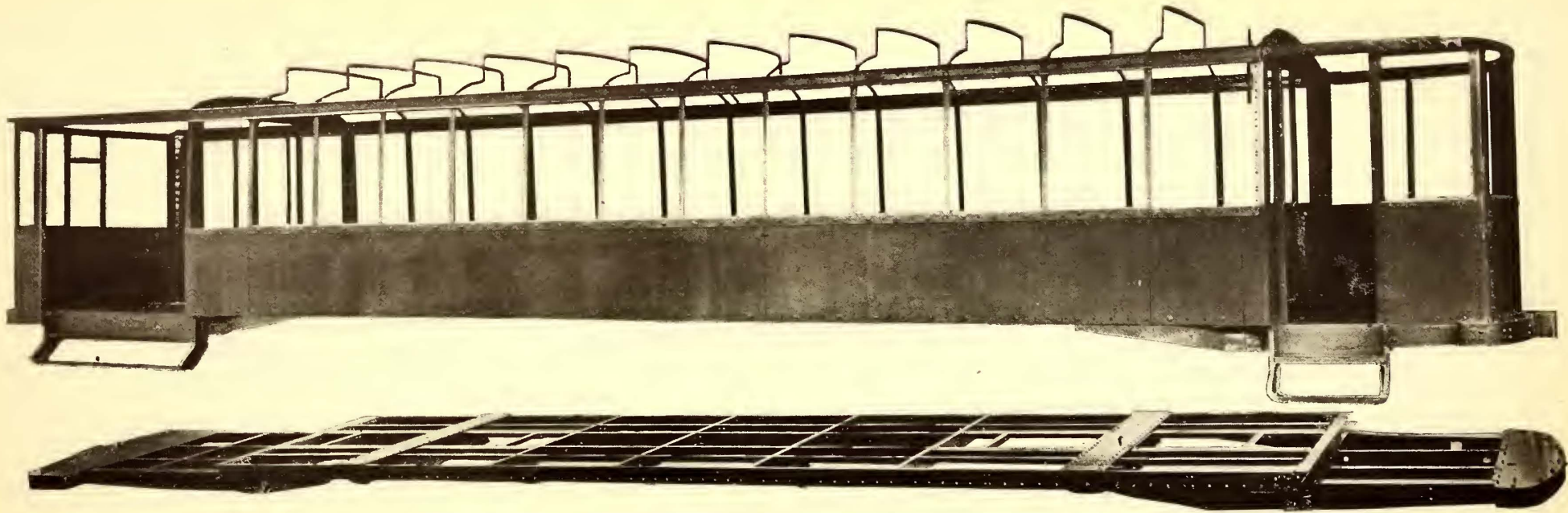
GENERAL VIEW OF STEEL PAY-AS-YOU-ENTER CAR BEFORE MOUNTING ON THE TRUCKS

detect the difference. The general appearance of the car body and its interior are well shown in two of the accompanying half-tone illustrations.

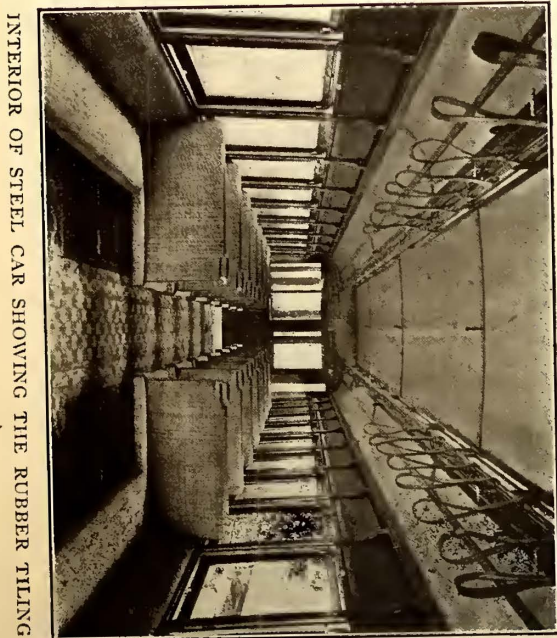
The underframing of the car body proper consists of two longitudinal side sills and two center sills of rolled steel channel sections and angles. The center sills are spaced to allow for the four motor trap doors required. On each side between the center and side sills is a light sill which helps to carry the floor construction. The longitudinal members are tied by the two body bolsters and end sills of the channel section. The rest of the body underframe consists of four needle beams between the bolsters extending from side sill to side sill and shorter beams between the center sills for the trap doors. Each bolster is formed of special

are of pressed steel, the side posts of rolled tees and the top plates of steel angles. There are twelve wrought iron carlines. The vestibule framing and platform bearers are of steel throughout. The outside panels, which are 3/16-in. cold rolled steel, are riveted horizontally under the belt rail and vertically at each post to permit the removal of single damaged panels. All except the bottom line of rivets are covered with a steel molding to give the car the same appearance as the ordinary type. The roof consists of tongued and grooved white wood, painted with thick white lead and covered with No. 8 cotton duck, which is given three coats of white lead.

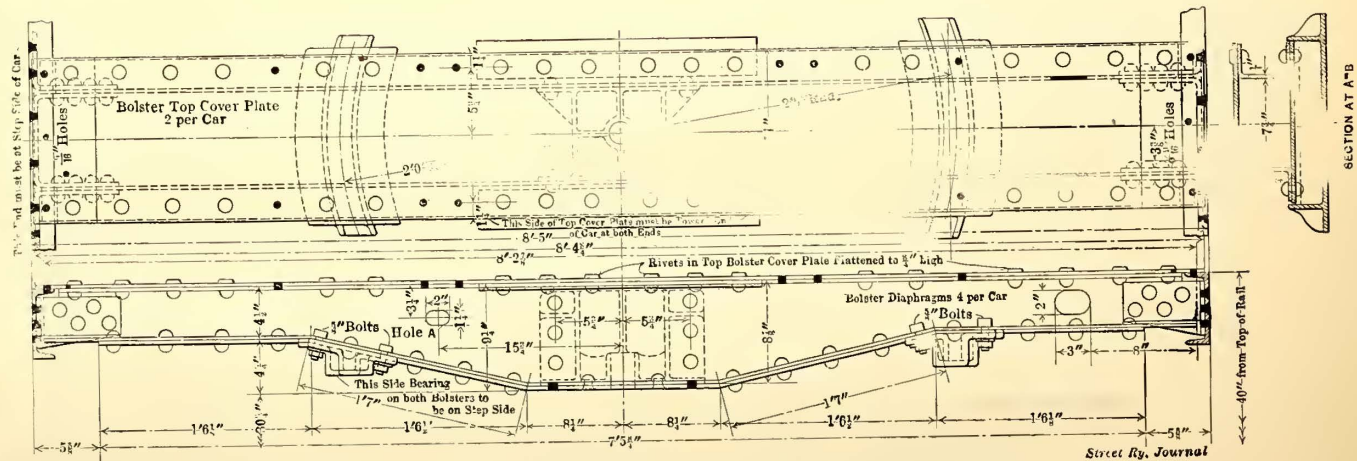
The car doors are made of oak. Those in the front are of the single half-glass sliding type. The front vestibule



UNDERFRAME AND GENERAL FRAMING OF MONTREAL STEEL PAY-AS-YOU-ENTER CAR



INTERIOR OF STEEL CAR SHOWING THE RUBBER TILING



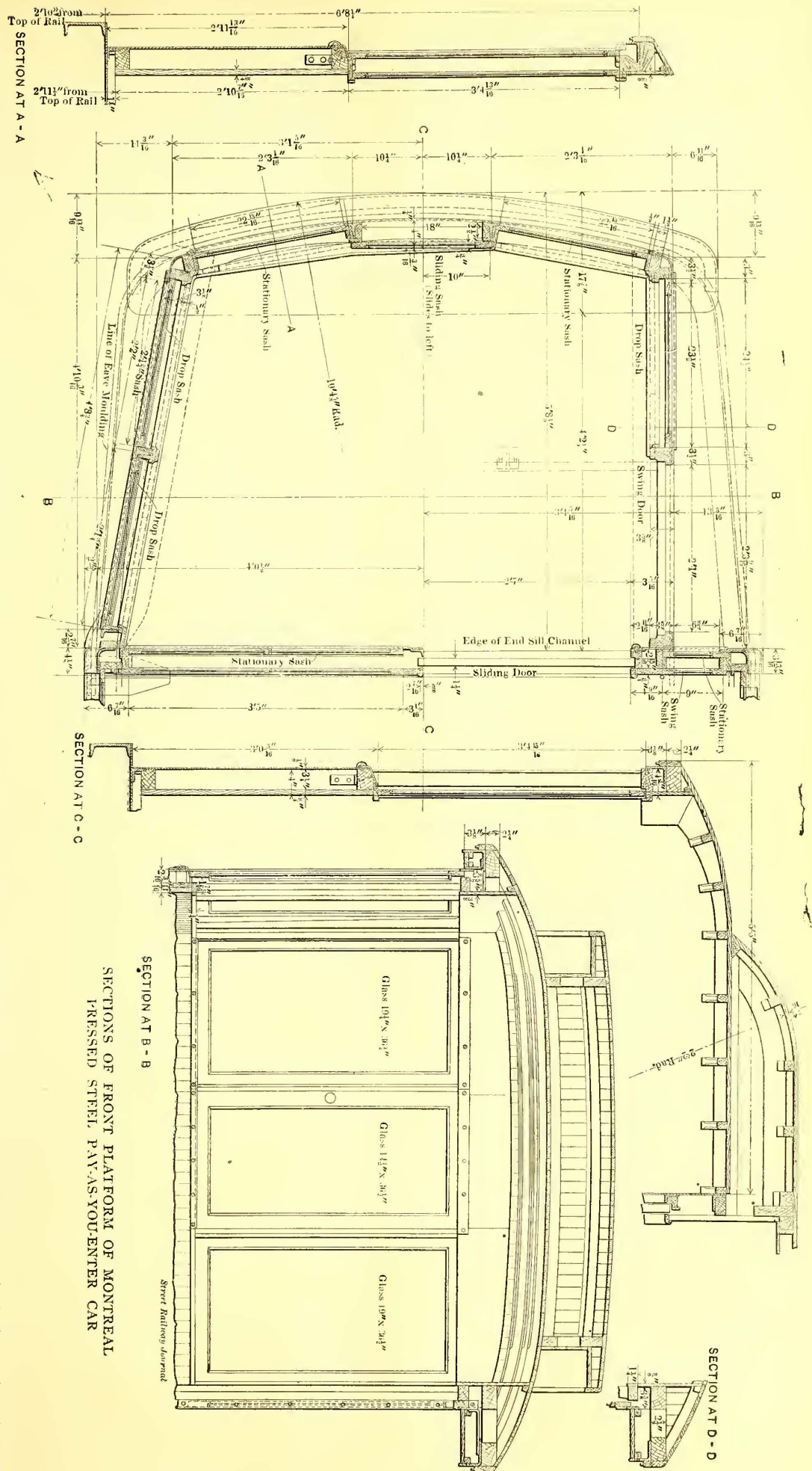
DETAIL OF BODY BOLSTER FOR PRESSED STEEL PAY-AS-YOU-ENTER CAR

door opens inwardly. The rear platform entrance door also opens inwardly, but the exit door is of the sliding type. All doors are glazed with 1/4-in. plate glass. The steps are covered with Mason safety treads and provided with a back riser of malleable iron to close the step opening and thus prevent accidents to passengers by their feet slipping through.

There are thirteen square windows on each side with the upper part stationary and the lower dropping into pockets below the belt rail, as shown in the cross section. Pantasote spring roller curtains are used. Storm sash and guards are applied to each window. There are three ventilators at the front end and three at the back end on both sides of the car hinged at the ends and made to open outward by cranks and handles inside the cars. The remaining six on each side of the car are hinged.

The top of the floor in the car is covered with the 3/8-in. interlocking blue and white rubber tiling which has been found so successful in the other cars. The first course of flooring laid on the underframe consists of 1/16-in. steel plate, upon which 13/16-in. long leaf yellow pine boards are placed. The interior finish of the car consists of oak linings and moldings for the doors, a white maple ceiling and polished brass trimmings.

Each car is fitted with two longitudinal seats at the rear or entering end and one corner seat in the forward



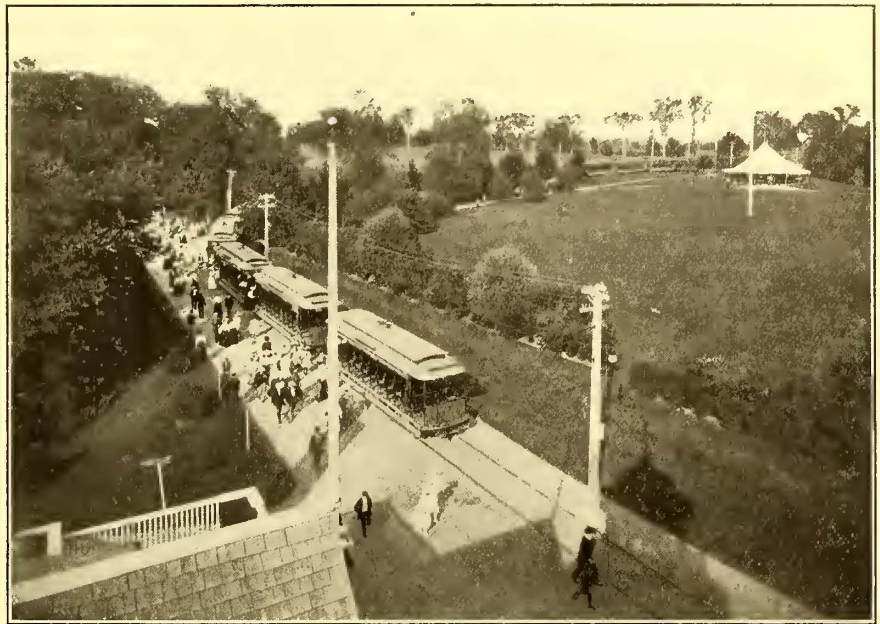
SECTIONS OF FRONT PLATFORM OF MONTREAL PRESSED STEEL PAVAS YOU-ENTER CAR

brakes in addition to air brakes. The body is mounted on two Montreal trucks.

The following are the principal dimensions of the new cars: Length of car over bumper casting (over all), 51 ft. 10 ins.; length of car body over end sills, 35 ft. 6 ins.; length inside of car (end lining), 34 ft. 10³/₈ ins.; distance from center to center of trucks, 24 ft. 0 in.; width of car outside of side sheets, 8 ft. 5³/₈ ins.; width of car inside between truss planks, 7 ft. 7¹/₈ ins.; width of car over belt rails (over all), 8 ft. 8 ins.; width over eaves, upper deck, 5 ft. 9¹/₂ ins.; width over eaves, lower deck, 8 ft. 3 ins.; width of side window opening, 2 ft. 5⁷/₈ ins.; height from rail to top of body floor, 3 ft. 5¹/₄ ins.; height from rail to top of platform floor, 2 ft. 11¹/₄ ins.; height from top of body floor to top of roof, 7 ft. 8³/₄ ins.; height from floor to ceiling, center, 7 ft. 6¹/₁₆ ins.; height from rail to top of car, 11 ft. 2 ins.; height from rail to eaves, lower deck, 9 ft. 4¹⁵/₁₆ ins.

RIVERTON PARK, PORTLAND, MAINE

The ordinary electric railway park usually attracts business only during the warm months of the year and consequently the lines serving it must be sure of heavy summer business to make the venture profitable. This is especially



A LINE OF CARS UNLOADING AT RIVERTON PARK, PORTLAND, MAINE

BOSTON ELEVATED EARNINGS

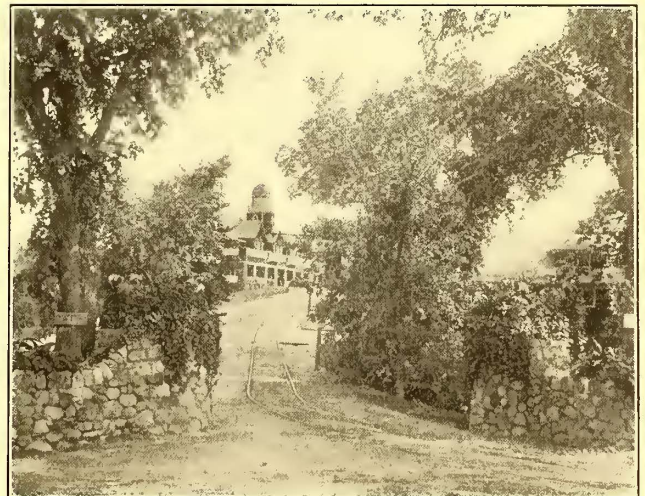
It is reported that the fiscal year of the Boston Elevated Railway will show an increase of about 3¹/₂ per cent in gross earnings over 1906. Earnings for the year ended Sept. 30, 1906, were \$13,527,185, so that an increase of 3¹/₂ per cent in the last twelve months will bring gross receipts for the year up to approximately \$14,000,000. During the 1906 fiscal year the company spent \$500,000 in maintenance of way and equipment expenditures above the

true of territories like the northeastern coast of the United States, where a few weeks of raw weather in summer mean a great shrinkage in traffic receipts. In many cases, however, this disadvantage can be more than balanced by laying out a park that will be attractive in all seasons and thus be a steady money-maker.

Riverton Park, Portland, Maine, which is operated by the



CAR ENTRANCE TO RIVERTON PARK, SHOWING THE PRESUMPSCOT RIVER BOAT HOUSE



THE ARTISTIC CAR ENTRANCE TO RIVERTON PARK. THE CASINO IN THE BACKGROUND

average of the preceding few years. For this reason the track and rolling stock are in such prime condition that the company has not been obliged to make the heavy charges against the earnings for maintenance which it did during the 1906 year. The saving thus realized has been utilized in meeting larger fixed charges and overcoming an increased operating ratio due to extremely adverse weather.

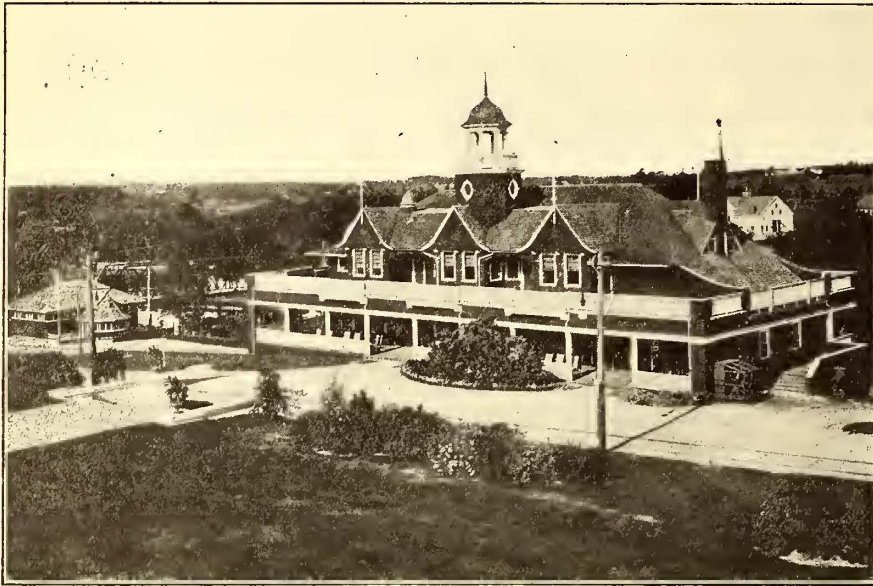
Portland Railroad Company, is a conspicuous example of a perennial pleasure ground. It covers some 40 acres along the Presumpscot River in the Deering district about 6 miles from the business center of Portland, and therefore is readily accessible. The natural configuration of the landscape has been so artistically modified that the park may well claim it to be the prettiest in New England—and

for that matter, in the United States. It is designed to appeal to people who can appreciate a playground of this kind and are willing to help keep everything on a high plane. When the car turns into the grounds, the visitor on glancing at the artistic stone gateway is inclined to imagine that he is entering the garden of some great mansion and not of a public park. The impression gained at the gate is strengthened upon inspecting the park itself, for the art

stocked library. The dance hall, naturally enough, is one of the most popular features of the casino with the young folks. Recently the piazzas have been furnished with some slot machines of the different types so popular in penny arcades. On the whole, the casino's manifold attractions make it an excellent all-the-year resort, and it has become a favorite place for Portlanders to hold banquets and various cold-weather festivities.

The casino, souvenir house and one or two other structures in the open portions of the park are not built in the so-called rustic style, but the latter is applied with artistic effect to the open-air theater and other places where the woodland offers an appropriate background. The theater, which is situated on the river bank, has 2500 seats, of which only 250 are reserved, and for the nominal cost of 10 cents. Here refined vaudeville is given every afternoon and evening. In addition to the theatrical feature, there is an orchestra which plays daily either at the casino or the theater.

Canoeing on the river is one of the most popular recreations, and to encourage this pastime the company has built a fine canoe house where patrons may keep their own canoes or rent others. There is also an electric launch for those who want the ride on the river without effort. Among other features of the park are the fine menagerie with its elk, deer and other animals, the rustic arbors, bridges and benches and the numerous swings for the children.



THE CASINO IN RIVERTON PARK

displayed in the different structures, walks and groves is not generally to be enjoyed so cheaply.

The main building in the park is a handsome casino, whose broad piazzas, commanding a view of the entire grounds, cozy parlors and attractive dining hall offer a



OPEN-AIR THEATRE IN RIVERTON PARK

never-failing attraction. In the dining room, visitors are served singly or in parties with light lunch or regular dinners. The reception or red room is elegantly furnished after the colonial type and its walls are ornamented with copies of famous pictures. A feature especially appreciated in inclement weather is the card room where conveniences are at hand for all the popular table games, including chess, checkers and dominoes. There is also a fine reading room furnished in Oriental style and having a well-



A RUSTIC BRIDGE IN RIVERTON PARK

The park is reached by cars of the Portland Railroad Company, which leave the heart of the city every 15 minutes during the periods of heavy travel. The round trip costs 20 cents, which includes admission to the grounds.

Taken all in all, Riverton Park is a splendid example of a railway park and while a part of its attractiveness is due to a location rarely found, the taste displayed in laying out the park and the ability in managing it could well be imitated by others in the same field.

TO THE INVENTOR OF ELECTRIC RAILWAY APPLIANCES

BY JOHN HOBBS.

A word to the inventor or the would-be inventor of electric railway apparatus may not be amiss. Their number is probably greater than in any other line of work, due partly to the substantial reward that is offered to those who are successful, partly to the fact that the deficiencies of much of the apparatus in use at present are very evident and partly because statistics show that trolley cars are used by a much larger proportion of the population of this country than any other electrical invention. To almost any one who is familiar with street railway apparatus, there appear numerous ways in which the device and methods in use in electric railway service could either be improved or be substituted by others, with the result that the cost of maintenance would be lessened, the safety of passengers would be increased, or operation would be facilitated in some other way.

These facts cause many who are not familiar with electric railway operation or the requirements of electric railway apparatus to attempt the role of inventors. Such people are greatly handicapped by a lack of knowledge of the actual requirements; on the other hand they have the advantage of looking at the question from the outside and with a free and untrammelled mind which is rarely possessed by those confined to one line of work. Their limited knowledge of operating conditions, however, usually causes them to waste the greater portion of their efforts by attempting to develop something which is impracticable or whose adoption after being perfected would probably introduce more difficulties than its use would avoid. On the other hand, the fact that they are not constantly thinking about one line of work often enables these outsiders to develop a really much needed article.

There is one device which is as alluring and which is seemingly as impossible to reach as the pot of gold at the end of the rainbow and the average inventor should regard it with caution. This is a self-replacing trolley wheel or a trolley wheel that will not jump the wire. The patent records will show that device after device, all supposed to be improvements on the present trolley, have been patented only to lie dormant. While employed in the shop of a large railway system the writer remembers that it was out of the ordinary if more than two or three weeks went by without some new trolley or trolley harp being offered for trial. The master mechanic of the railway system was one of those broad-minded men who are always willing to investigate and give any new piece of apparatus a trial if it shows possibilities of success or if such trial will rid the inventor's mind of delusions. But he regarded several of these trolley devices as too dangerous to overhead construction to be permitted on a car, even on trial. In fact once or twice, in testing some of them at very slow speed, trolley cars were caught and pulled from the span wires. Of all the devices submitted not one was suitable and the road, like practically all other direct current roads in the country, is to-day using the simple trolley wheel and harp.

Those who have devised apparatus which they consider great improvements often complain because the railway companies do not give them proper encouragement by allowing the apparatus to be tried or by offering facilities for its development. They do not realize to what trouble and expense the roads would be subjected if they offered encouragement to the many half-hatched schemes submitted.

The writer is reminded of one or two instances which are typical. Permission was obtained by some alleged inventors to try a scheme of motor control without loss in resistances and the facilities of the shop were put at their disposal.

Under their directions all the controller reverse fingers in the storeroom were mounted on long boards and a car was also brought over the pit and the fields removed from the motors. In addition quite an amount of wire was cut into small pieces. After several days of inactivity orders were gotten to replace the fields in the car, the so-called inventors left the shop and the incident was closed. It afterward developed that the new "invention" consisted in weakening the fields by shunting them or by winding them in sections. Operations came to a stop because a point was reached where about one hundred and fifty dollars had to be expended and those responsible for the scheme either did not have the money or did not have enough faith in their idea to risk parting with this amount.

On another occasion after repeated solicitation a man from a small town of about 1000 people, through which an interurban line ran, was given permission to install an automatic track switch on condition that the company would not be inconvenienced or the street torn up. After the delivery of about two wagon loads of various materials, constituting the parts of one switch, and which included some timbers about ten or twelve inches square and a dozen feet long, the management decided to call a halt, and the inventor (?) considered he had not received fair treatment from the railway company.

Before bothering a railway company the inventor should feel certain that his device is a practical one and that he has gotten it in as advanced a state as is possible, until some of its defects are made evident by trial. But he should not assume that he can make repeated trials to the inconvenience of an accommodating railway company in order to perfect the apparatus. Every breakdown causes the master mechanic, the superintendent of track or of overhead or whoever permits the trial to lose confidence in both the apparatus and the inventor. Breakdown of experimental apparatus due to a single weak point has often caused the condemnation of an otherwise good article.

In developing an idea the inventor should keep simplicity uppermost in his mind. Simplicity carries with it the idea of being easily understood and of something not likely to get out of order. It must be remembered, too, that the apparatus will fall into the hands of men who are not as skilled and as careful as watchmakers and should consequently be built in such a manner that it will stand more than a reasonable amount of abuse. Street railway apparatus and appliances are in fact subjected to about as hard a treatment as any machinery devised and it is the lack of proper design and construction to withstand such treatment that causes many new devices to be thrown out.

But if the path of the inventor of street railway apparatus is a rather thorny one, the reward is equally commensurate. The electric railway fraternity is always ready to adopt a piece of apparatus that proves itself of worth and it is willing to pay well for it.

The writer remembers one casting that sold for about \$9 which to all appearance could not have cost more than 50 cents. On much other apparatus the difference between the cost price and the price at which railways are willing to purchase is almost as great.

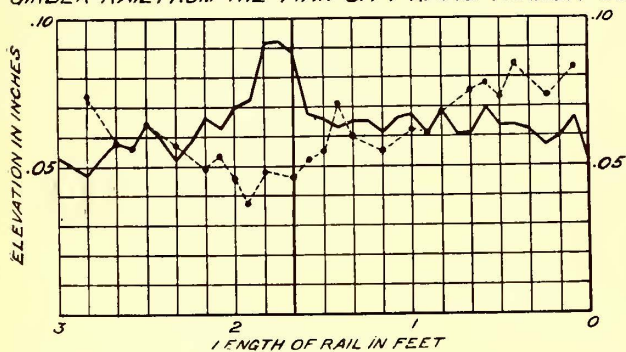
THE HARDNESS OF CORRUGATED RAILS

BY GEORGE L. FOWLER.

There has been much discussion regarding that annoying phenomenon of rail wear known as corrugation that apparently obeys no law and appears unexpectedly in all sorts of places. While manifesting itself at times on the rails of steam roads, its occurrence has been particularly frequent upon electric railways. Without stopping to discuss the various causes that have been assigned to this trouble, it will be sufficient to mention the one taken in especial consideration in this connection.

Among the theories that have been put forth to account for rail corrugation is the one that the hardness of the rail varies in spots and that the soft places are worn away by the action of the wheels, leaving the hard sections raised in relief. These alternate portions of hard and soft places are supposed to be caused by unequal action of the rolls in the manufacture of the rail, or by segregation of carbon or other elements. But all revert to the original proposition

GIRDER RAIL FROM THE TWIN CITY RAPID TRANSIT Co.



RECORD MADE WITH TWIN CITY CORRUGATED RAIL

that spots of unequal density or hardness prevail in the head.

With the view of checking the accuracy or fallacy of this theory, it was decided to make an examination of a few rails that had become corrugated and ascertain their condition definitely. In order to do this, samples of such rails were obtained from the Boston Elevated, the Milwaukee Electric Railway & Light Company, and the Twin City Rapid Transit Company, of Minneapolis, Minn. The rails were accurately measured for their elevations at 1-in. intervals for their whole length, and the profile so obtained was plotted. The method of doing this was as follows: The rail was leveled on horses at a convenient working height and beside it a pair of angle-iron guides were placed parallel to it, but a little higher, and these were accurately leveled. A straight-edge was then fitted with a micrometer head reading to .0001 in. The straight-edge was laid across the guide and the micrometer brought down to a bearing on the rail. The readings thus obtained gave the profile with references to the guides and they have been plotted to show the contour of the rail in the accompanying diagram.

From this it will be seen that the T-rail from Milwaukee and rolled by the Lorain Steel Company was not truly corrugated as the term is generally understood. It was badly worn and had three distinct waves in its length of 15 ft. The fact that one end of the rail appears to be so much higher than the other is due to the fact that it was worn more at the lower end and the profile is plotted with reference to the bottom of the flange which was level. The crests of the waves thus formed were 4 ft. 5 ins. and 7 ft. 6 ins. apart, with some minor corrugations in between, noticeably between the 10 ft. and 14 ft. marks.

The girder rail from the Boston Elevated Railway showed a general crowning, extending throughout its whole length of 15 ft. 10 ins., with continual minor corrugations over the whole surface, with an average pitch from crest to crest of about 3 ins. The short length of girder rail from the Twin City Rapid Transit Company was a piece of truly corrugated rail, the pitch of whose corrugations varied from 2 ins. to 6 ins.

The test for hardness was made by means of a drop and worked out on the Martel scale. By way of explanation it may be stated that an elaborate investigation on the part of Lieutenant-Colonel Martel, of the French army, has shown that with a given form of punch, the amount of metal displaced by the indentation made by allowing this punch to fall through a given distance with a given weight is a measure of the hardness. That is to say, the hardness varies inversely with the amount of metal displaced. The fact thus developed has been given expression in the formula:

$$V = \frac{Wh}{D} \text{ or } D = \frac{Wh}{V}$$

in which

D = the hardness in degrees of the Martel scale,

W = weight of punch and head in kilograms,

h = height of fall in millimeters,

V = volume of material displaced.

This scale has been standardized by the French Government.

In this case the standard form of punch was used, which, with the head to which it was attached, weighed 3.522 kgs. The punch was a four-sided pyramid with two opposite edges, one pair making an angle of about 60 degrees with each other and the other two about 9 degrees.

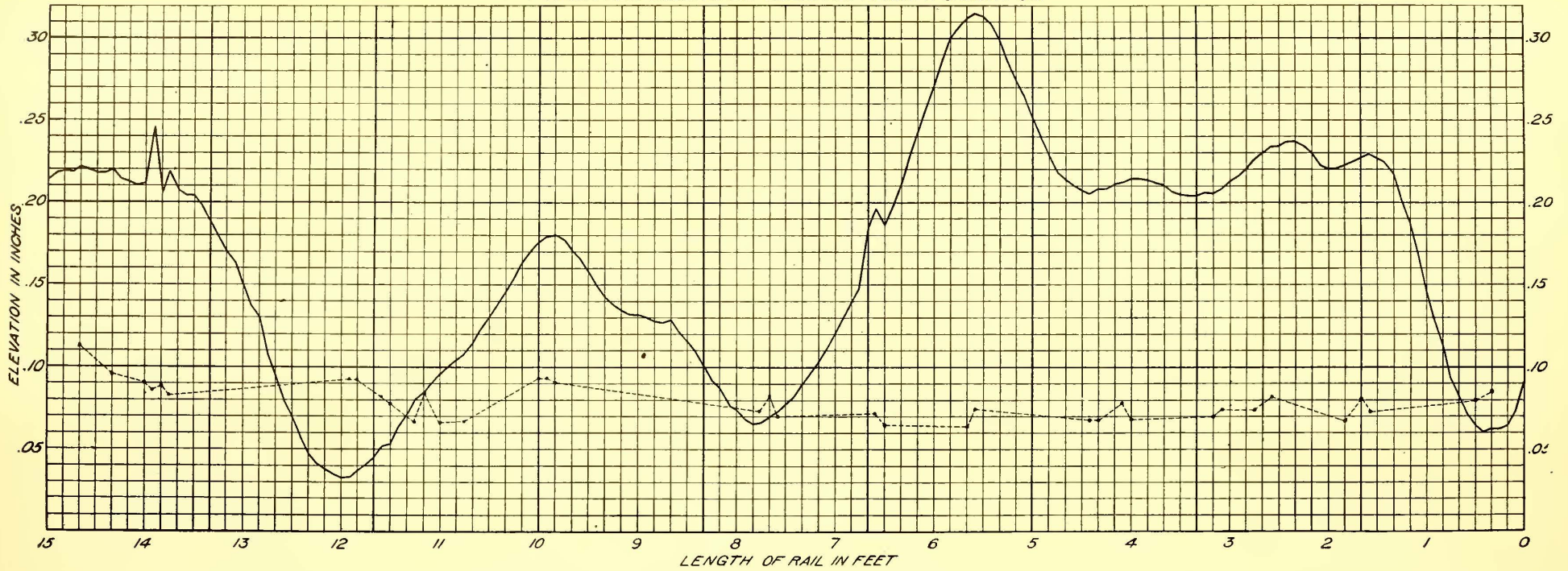
By multiplying the cube of the length of the indentation that was made by the punch by a fixed factor the amount of metal displaced could be ascertained. It was evidently necessary to measure the length of these indentations very accurately and this was done by means of a microscope carrying cross-hairs and moved by a micrometer screw reading to .0001 in. The height of the drop used in making the test was 600 mms.

This explanation will serve to show that the methods employed in this determination were such as to secure accurate results.

It may be stated here that no disappointment was experienced at the results obtained, for the work was undertaken with the sole object of either eliminating or substantiating a theory of the cause of rail corrugation that is somewhat widely advocated though the possibility of proving it a valid one was rather remote. It does not seem that a careful consideration of the matter could lead one to think that the action of the rolls or the vagaries of the effects of segregation on the chemical composition of the rail could produce regular alternations of hardness and softness. As a matter of fact this investigation did not show that there was the slightest trace of any such action. While there was some variation in hardness, the variations that were manifested bore no relation whatever to the profile of the head of the rail.

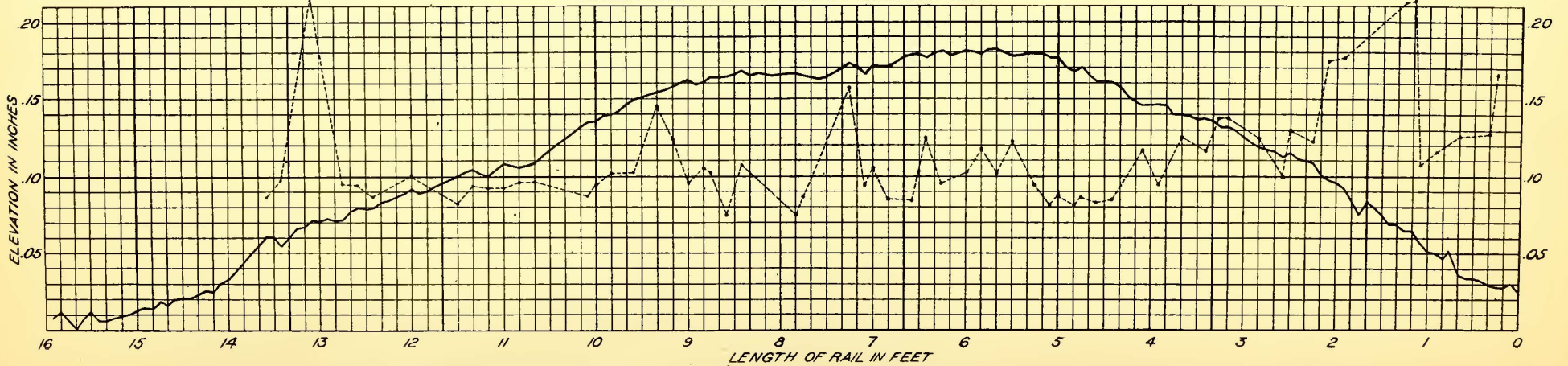
To the diagrams showing the profile of the three rails there has been added a dotted line showing, on a greatly exaggerated scale, the variations in hardness. It will be seen that these do not rise and fall in any sort of harmony with the profiles. The variations were most pronounced in the girder rail from the Boston Elevated Railroad. But these variations appear mostly in the form of hard spots

T RAIL FROM MILWAUKEE ELECTRIC RAILWAY & LIGHT Co.



CURVES OBTAINED FROM TEST ON T RAIL, FROM MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

GIRDER RAIL FROM THE BOSTON ELEVATED R. R.



CURVES OBTAINED FROM TEST ON GIRDER RAIL, FROM THE BOSTON ELEVATED RAILWAY

that were probably developed in the rail by the service which it had been called upon to render, rather than by a defect inherent in the rail itself. With the T-rail from Milwaukee, rolled by the Lorain Steel Company, there is a practical uniformity of hardness throughout its whole extent.

While these tests might well be considered too meagre upon which to have based a positive statement that corrugations are caused by variations of hardness, it is quite evident that had such a cause existed it would have shown some evidence of it in one of the three rails that were tested. And as no such evidence did appear in any way, shape or manner, it seems quite reasonable to conclude that it does not exist, and that therefore we may eliminate this variation of hardness from among the possible causes of rail corrugation.

TEST OF A COMBINED RAILWAY AND LIGHTING PLANT

The economy of combined railway and lighting plants is of general interest on account of the division of the load between several classes of service and the opportunity which is afforded a careful management to utilize the machinery to the best advantage. In the STREET RAILWAY JOURNAL of Dec. 29, 1906, a description was published of the new turbine plant of the Suburban Manufacturing Company at Waltham, Mass., which supplies central station service to Waltham and trolley current to the Newton and Waltham group of street railways. Below are given the results of a careful thesis test on the same plant, in March of this year, by Messrs. Macomber, McChesney, Packard and Nichols of the Massachusetts Institute of Technology.

The main generating equipment of the station consists of two 500-kw Westinghouse-Parsons turbo alternator sets, operating at 2300 volts, three phase, 60 cycles and 3600 r. p. m. Direct current power is obtained from a 432-kw Westinghouse, 2300-volt 60-cycle synchronous motor direct connected to a 400-kw 600-volt generator. This set supplies the railway power. Direct current is also obtained from a 175-hp induction motor-generator set, the motor being direct connected to a 120-kw 600-volt generator. Two 25-kw exciters of the engine-driven type are in service. Each turbine is provided with an Alberger surface condenser outfit. The boiler plant consists of two batteries of 4-375-hp Stirling boilers, the operating steam pressure being 175 lbs. Coal is handled by a Robins conveyer system, and the boilers are fired by hand.

Three tests were made: A 72-hour economy test of the whole plant; a series of tests under artificial load of one turbine; and a 10-hour economy test under commercial load, of the same turbine.

The data obtained in the 72-hour test were as follows:

Barometer	30.39 ins.
Boiler pressure	168.2 lbs.

TEST OF PLANT.

Temperature, outside air.....	51.16° F.
Temperature, inside air.....	68.18° F.
Temperature, feed-water before heater.....	47.30° F.
Temperature, feed-water after heater.....	189.1° F.
Quality of steam .....	.988
Kind of coal used.....	Orinda steam
Moisture in coal.....	0.85
Total water fed to boilers.....	846,738 gals.
Coal fired	94,391 lbs.
Ash and clinker	9,290 lbs.
Analysis of flue gases.....	
CO ₂ , 5.25 per cent; O, 14.54 per cent; CO, 0.35 per cent	
Temperature of flue gases.....	366.9° F.
Steam used by auxiliaries.....	200,474 lbs.
Drips	24,043 lbs.
Vacuum in condenser No. 1.....	29.06 ins.
Vacuum in condenser No. 2.....	27.43 ins.

Temperature condensation, No. 1.....	75.2° F.
Temperature condensation, No. 2.....	92.8° F.
Temperature cooling water at river.....	39.3° F.
Temperature cooling water after discharge, No. 1.....	47.9° F.
Temperature cooling water after discharge, No. 2.....	51° F.
Heat of combustion of coal.....	13,668 B. T. U.
Moisture in coal.....	0.85 per cent
Draft, normal 0.2 ins.—0.4 ins., maximum.....	0.8 ins.
Heating surface per boiler.....	3,540 sq. ft.
Grate surface per boiler.....	81 sq. ft.
Ratio, heating to grate surface.....	43.7
Dry coal burned.....	83,589 lbs.
Dry combustible coal burned.....	74,299 lbs.
Total ash in per cent dry coal.....	11.1 per cent
Total kw-hour output of turbines.....	23,945
Number of boilers used in test.....	2

RESULTS OF 72-HOUR TEST.

Total equivalent evaporation from and at 212° F.....	901,445 lbs.
Equivalent evaporation from and at 212° per lb. of dry coal	10.78 lbs.
Equivalent evaporation from and at 212° per lb. combustible	12.13 lbs.
Equivalent evaporation from and at 212° per sq. ft. heating surface per hour.....	1.77 lbs.
Coal burned per sq. ft. of grate surface per hour.....	8.09 lbs.
Boiler horse-power developed, A. S. M. E. rating.....	362.9
Maximum possible error.....	1.37 per cent
Air per lb. of coal from analysis of flue gases.....	36.41 lbs.
Air per lb. of coal per formula $12C + 36(H - \frac{O}{8})$	10.56 lbs.

Excess air supplied per lb. coal.....	244.8 lbs.
Heat carried off by flue gases per lb. coal.....	2645 B.T. U.
Heat absorbed by water in boiler per lb. of coal fired	9224 B. T. U.
Heat radiated per lb. coal fired.....	1799 B. T. U.
Heat carried off by flue gases.....	19.36 per cent
Thermal efficiency of boiler plant.....	67.47 per cent
Heat lost by radiation.....	13.16 per cent
Cooling water over weir per hour.....	30,500 lbs.
Per cent total steam used by auxiliaries.....	23.67
Per cent total steam returned in drips.....	2.84
Total steam per kw-hour.....	33.93 lbs.
Total coal per kw-hour.....	3.78 lbs.

EFFICIENCY TESTS ON TURBINE NO. I

The object of these tests was to determine the steam consumption per kw-h at various artificial loads. In order to maintain the load fairly constant at given values the generator was loaded by means of barrel rheostats. Large hogsheads were mounted on low platforms placed in a line about 12 ft. apart. The bottoms were then connected by a 4-in. iron pipe, the bottom of each hogshead being bolted to a flange at that end of the pipe and the middle hogshead being connected to the center of the pipe. By this means a flow of water was secured from one barrel to another and an even water level maintained in all. A small supply pipe was run from the city main along the wall parallel with the barrels, and a rubber hose tapped off into each barrel so that water could be run into the barrels when necessary. Each barrel was provided with two iron plates for electrodes. One plate was attached to the iron pipe at the bottom of each barrel, while the other was suspended in the barrel by means of ropes manipulated by pulleys. The iron connecting pipe between barrels was grounded. The arrangement was such that the barrels were connected in Y with the neutral point grounded.

On the a. c. switchboard of the plant are two sets of bus-bars, one of which is not used ordinarily. Rubber covered wires were run from these bus-bars to the water barrels, care being taken to keep the circuits out of the way of passers-by. By means of a double-throw switch on the generator panel the unit could be thrown on or off the artificial load as required. Salt was used in the water.

The steam consumption of the exciter was not directly measured, on account of the pipe layout. This was obtained by securing the curve of steam consumption of the particular set from the Westinghouse Machine Company for given electrical outputs.

The gland water is ordinarily supplied from the circulating system. During these tests the exact weight of gland water used was obtained as follows: A staging was built in the turbine room and on this a barrel placed high enough to give the required head. Still above this supply barrel was placed a small barrel on scales, which delivered into the supply barrel. This small barrel was filled by a hose from the boiler-room, and by bringing the level in the supply barrel to a certain mark when the test was started and stopped, the weight of water taken from the small barrel was known. The gland connection to the cooling system was broken, and was connected to the supply barrel on the staging, and the required pressure was obtained by throttling the supply with a valve at the turbine. The discharge from the wet pump was led over two weighing barrels which delivered the water after being weighed into a pit in the basement. Two tests were run to determine the condenser leakage. The circulating water was started, then the dry air pump, and the condenser pumped dry by the wet pump. By starting the leakage test at this point and keeping all pumps going, the data were obtained.

PLANT TEST WALTHAM
EFFICIENCY RUNS, TURBO UNIT NO. 1

	1	2	3	4	5
Duration hours	2	2	2	2	1
K.w.h. output	337.68	534.30	784.67	1019.67	654.45
Percent of full load	33.8	53.4	78.5	102.0	130.9
Barometer, inches	30.32	30.36	30.36	30.36	30.38
Barometer, lbs. per sq. in.	14.89	14.91	14.91	14.91	14.92
Steam pressure, lbs. per sq. in.	174.4	173.6	172.5	171.9	173.4
Calorimeter gage	9.3	9.2	9.1	9.0	9.1
Calorimeter temperature, °F	299.1	293.9	293.7	293.0	297.0
Condenser vacuum, inches	28.9	29.10	29.24	29.16	29.05
Turbine vacuum, inches	28.7	29.	28.9	28.6	28.2
Temperature condensation, °F	83.3	77.8	75.7	80.8	87.1
Lbs. steam through condenser	9,018	11,830	16,597	20,780	13,167
Condenser leakage	.36	.36	.36	.36	.18
Gland water used	224	223	183	237	125
Gland water pressure	3	3	3	3	3
Steam used by exciter, lbs.	766	820	854	900	480
Net condensation, excluding exciter, lbs.	8,758	11,571	16,378	20,507	13,024
Net dry steam condensation, excluding exciter, lbs.	8,659	11,425	16,169	20,245	12,868
Lbs. steam for k.w.h., excluding exciter	25.64	21.79	20.61	19.85	19.66
Lbs. dry steam condensation, including exciter	9,416	12,234	17,012	21,144	13,342
Lbs. steam per k.w.h., including exciter	27.88	22.81	21.68	20.74	20.39
Thermal efficiency of unit, excluding exciter, per cent	9.23	13.61	14.40	14.97	15.20
Thermal efficiency of unit, including exciter, per cent	8.49	12.71	13.69	14.33	14.66

The above tests show that the unit more than fulfilled the guarantee of its manufacturers, it proving from 1.5 to 2 per cent better than the guaranteed consumption on various loads. The condenser leakage was practically negligible.

TEN-HOUR COMMERCIAL TEST TURBO UNIT NO. 1

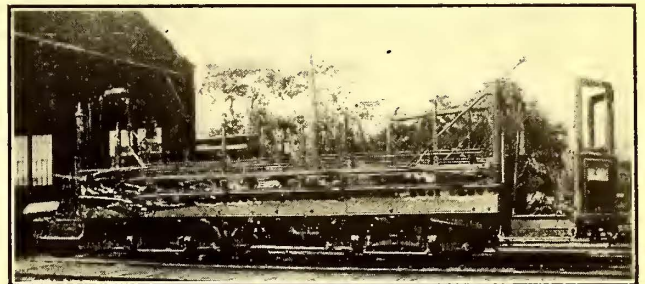
The following data were obtained:

Kw-hour output	4,206
Average per cent of full load	84.1
Barometer	30.52 ins.
Steam pressure, lbs. per sq. in.	172.4
Calorimeter gage, lbs.	9.1
Calorimeter temperature, degs. F.	296.4
Condenser, vacuum inches	29.3
Turbine, vacuum inches	28.9
Condensed steam temperature, degs. F.	83.1
Lbs. steam through condenser	89,714
Condenser leakage, lbs.	180
Gland water used, lbs.	11.37
Gland water pressure, lbs.	3
Steam used by exciter, lbs.	4,770
Quality of steam	0.983
Net condensed steam, excluding exciter, lbs.	88,397
Net condensed dry steam, excluding exciter, lbs.	87,630
Net dry steam condensed, including exciter, lbs.	92,073
Steam per kw-hour, output, lbs.	20.77

Steam per kw-hour, including exciter, lbs. 21.9
 Thermal efficiency of unit..... 14.4 per cent
 Flue gas analysis.....
 CO₂, 6.3 per cent; O, 13.7 per cent; CO, 0. per cent
 Temperature of flue gas..... 405° F.

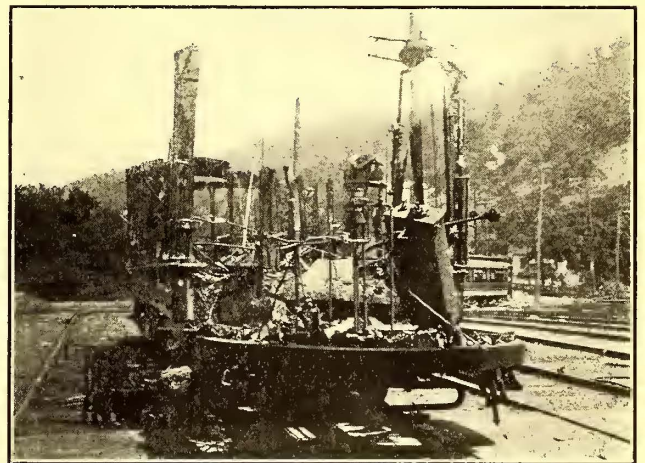
AN ODD ELECTRICAL ACCIDENT FROM A BROKEN TROLLEY WIRE

The accompanying illustrations show all that was left of one of the Wheeling Traction Company's cars after passing through a peculiar electrical accident a short time ago while en route between Moundsville and Wheeling. The line is single track and the trolley wire parted after the south bound car had passed. The north bound car ran into the break before the motorman saw it. One end of the wire wrapped around the expansion chamber of the hot water heater, which was located on top of the car.



SIDE VIEW OF DAMAGED CAR

This caused a short circuit between certain parts of the heating system and other metal parts of the car at several different places and caused a number of arcs which ignited the woodwork of the car. As the car was quite a distance from fire protection of any kind before a fire engine or chemicals could be had from the nearest town, it was almost entirely consumed. No passengers on the car were injured, as all had ample time to leave the car in safety.



END VIEW OF DAMAGED CAR

To prevent a recurrence of such accidents General Manager Nagle has ordered wood boxes to be placed over the expansion chambers of the heaters, a section of non-combustible non-conducting material inserted in the stove pipe (which also extends above the roof of the car) and an insulated joint inserted in the air whistle pipe located on the roof. With these improvements he believes the cars will be free from danger of another accident of this kind.

All parts of the car above the trucks were damaged to such an extent that they could not be again used, although the trucks, motors and apparatus under the car body, with the exception of the wiring, was not materially injured.

OPERATING RESULTS OF THE MONTREAL PAY-AS-YOU-ENTER CAR

Previous issues* of the STREET RAILWAY JOURNAL have contained illustrated articles on the Montreal Street Railway Company's pay-as-you-enter car, but hitherto no operating statistics have been presented on the results achieved with this type. Such figures have now been made available by the Montreal company and they show that so far as Montreal is concerned the new car is an emphatic success in giving better schedules, practical elimination of platform accidents and increase in receipts. There are, of course, other advantageous features, but the three mentioned are surely enough to arouse any street railway man's attention.

The company did not begin its experiment with the pay-as-you-enter car on some quiet branch line, but placed the very first car in June, 1905, on St. Catherine Street, one of the busiest in the city. Thus the general public became familiar with it at once, thereby simplifying its later introduction on other lines. St. Catherine Street, Montreal, runs longitudinally and has over a dozen transfer points. It will be seen, therefore, that quick fare collection is a necessity on this line. The success of the first car led to the complete equipment of the St. Catherine line, on which thirty-seven pay-as-you-enter cars were required in March and April. The months mentioned were chosen for comparison with the same months of 1905 to show conditions when all the cars were of the old type, and also to show there is nothing in the contention that in cold or disagreeable weather passengers would not have their fare handy and therefore would block others from entering.

Referring now to the accompanying table, it will be noted that in 1907 the March receipts were \$53,227.50, or 27.69

23,938 in March, 1905, to 20,048 in March, 1907, or fully 16.25 per cent; the corresponding reduction for April was equal to 13.18 per cent.

The ordinary type of car used early in 1905 on the St. Catherine line seated the same number of passengers as the pay-as-you-enter car and had a platform of five feet, while the pay-as-you-enter car has a larger platform.

The decrease in platform accidents naturally has been very great, because the conductor is always stationed at the back of the car, where he can control the entrance of all and the exit of most of the passengers. Those leaving through the front door, of course, are observed by the motorman. During all of 1906 there were but two slight accidents on pay-as-you-enter cars.

The operation of this car has attracted a great deal of attention among street railway managers, a number of whom have either visited Montreal in person or sent experienced employees to study these cars in service. Orders for these cars have already been placed by the New York City Railway, the Chicago City Railway, and the International Railway Company, of Buffalo. In Montreal, a number of these cars are now also in use outside of the St. Catherine Street line, and additional ones are being put on as fast as the cars can be built.

FIRST FALL MONTHLY MEETING OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers will hold the first monthly meeting this fall on Tuesday evening, Oct. 8, at 7:45, in the main auditorium of the Engineering Societies Building at 29 West Thirty-Ninth Street, New York. The subject of this meeting is Industrial Education. The college technical courses and the student apprenticeship courses

MONTREAL STREET RAILWAY COMPANY ST. CATHERINE LINE, WITH PAY-AS-YOU-ENTER CARS

	Receipts		Cars		Car Hours		Speed		Mileage		Receipts per Car Hour		Receipts per Car Mile	
	1907	1905	1907	1905	1907	1905	1907	1905	1907	1905	1907	1905	1907	1905
March	53,227.50	41,684.37	37	39	20,048	23,938	8.34	7.60	167,176	181,850	2.66	1.74	31.84	22.92
April	52,626.67	40,101.92	37	38	19,243	22,163	8.32	7.75	160,148	171,678	2.72	1.81	32.86	23.36
PER CENT INCREASE														
March	27.69%				16.25%*				8.07%*		52.87%		38.92%	
April	31.23%				13.18%*				6.72%*		50.28%		40.67%	

*Decrease.

per cent greater than in 1905; similarly the April receipts were \$52,626.67, or 31.23 per cent greater in 1905, notwithstanding that there were no additional cars put on this line during these months. The receipts per car-hour increased 52.87 per cent for March, and 50.28 per cent for April. The increase in the receipts per car mile were 38.92 per cent and 40.67 per cent. The average percentage increases per car hour and per car mile on the entire system was: per car hour 24.09 per cent March, 1907, compared with March, 1905, and 27.14 per cent April, 1907, compared with April, 1905, and per car mile—17.35 per cent March, 1907, compared with March, 1905, and 19.99 per cent April, 1907, compared with April, 1905.

The favorable influence of the new car on schedules is shown by the fact that the operating speed for March increased from 7.60 miles to 8.34 miles, and for April from 7.75 miles to 8.32 miles. The car hours were reduced from

will be discussed at length by men who have been in charge of theoretical and practical institutions. Professor John Price Jackson has written a paper on the College Technical Courses and Apprenticeship Courses offered by manufacturing establishments. He gives data in the form of letters from several of the largest manufacturing establishments in America in which they outline the courses offered by the factories and explains the manner of conducting the same.

Dr. Henry S. Pritchett, president of the Carnegie Foundation and president of the Society for the Promotion of Industrial Education, and Professor Dugald C. Jackson, of Massachusetts Institute of Technology, and president of the Society for Promotion of Engineering Education, will deliver short addresses on the subjects allied to their societies. Other manufacturers have been invited to speak informally at the meeting of their experiences, and altogether it is expected that the meeting will prove interesting and instructive.

* See Jan. 27, 1906; June 3 and May 20, 1905, STREET RAILWAY JOURNAL.

COLUMBUS MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

While the first fall meeting of the Central Electric Railway Association, held at Columbus last Thursday, was particularly interesting from every point of view, there was not the wealth of general discussion that has characterized some of the sessions in the past.

Messrs. Spring, Sloat and Ohmer, appointed by the president as a committee to prepare resolutions on the death of F. J. Stout, late general manager of the Lake Shore Electric, and A. W. Anderson, of Dayton, will make their report at the next meeting. Both of the deceased were members of the association and had taken an active part in its work. The esteem in which they were held was expressed feelingly by President Nicholl.

A special Pullman car has been secured for the use of the Ohio and Indiana men who will attend the annual convention of the American Street & Interurban Railway Association at Atlantic City. In addition to credentials from the Central Electrical Railway Association, it will be necessary to secure cards from the national association to take advantage of this service. A guarantee of eighteen passengers had to be made in order to secure the Pullman.

President Nicholl announced that, while the association is not wealthy, there is a balance of about \$850 in the treasury. With expenses necessary in the future, all dues will be needed, however, and those who had neglected to remit were urged to do so, that the records might be kept clear and everything put in as good shape as possible. Four new members were admitted.

In presenting his report, F. D. Carpenter, chairman of the committee appointed some time ago to arrange and compile a set of standard train rules, said that the members had used every endeavor to familiarize themselves thoroughly with the rules of roads all over the country. To that end they secured copies of the rules of many roads, and from them selected only such as could be used to advantage by all interurban roads. Mr. Carpenter said that he is confident that they could be taken up and applied successfully upon all electric lines. Every precaution was taken to make the rules plain and accurate in language and convenient for the use of all who have to do with the train service.

Mr. Carpenter said that the rules take up about twenty-three pages of typewritten matter, and because of the time that would be required in reading them, they would be submitted without that formality. President Nicholl thought they should be adopted before the annual convention of the American Street & Interurban Railway Association, that the larger organization might have an opportunity to take them up in connection with its work along this line.

Objections were made to the adoption of rules that none of the members had heard read, especially since this association is considered the second most important of the kind in the United States. Argument was presented to the effect that the association would show a weakness in going before the national body with a set of rules that the members had little knowledge of and that they would be in a poor position to ask their adoption at Atlantic City. Mr. Norveil asked that they be read at once, even if the remainder of the day were consumed in the reading and discussion, as no more important subject could be brought before the association. Another member suggested that they be printed and sent to members for their consideration and that they be directed to communicate their approval or dis-

approval to the secretary before the date of the national meeting, the vote thus made to decide their adoption or rejection. This idea was seconded by another member, who said that rules meant to be standard should be thoroughly studied before any action is taken on them, whether they were in shape for presentation at the national meeting or not. President Nicholl stated that the rules, if adopted now, would be subject to amendment in the future when found necessary. Their adoption would not render them fixed and binding, if changes are found desirable at any time.

C. N. Wilcoxon stated that there seemed to be some confusion as to what the adoption of this set of rules means. The committee had tried to avoid all local fads, but had endeavored to make them broad and applicable to all roads. Their adoption will be in the nature of a recommendation of their use by members, but will bind no company. The report was simply offered as a complete set of rules, so that managers may revise their own rules in case they find the new ones an improvement. No one will be expected to use any of the rules that will affect his policy or work harm to his business. The committee has followed the example of steam road associations and the American Street & Interurban Railway Association in this matter. Both have recommended changes when necessary and will in the future. Following this talk, the question of adoption was put to a vote and was carried. On motion of Mr. Wilcoxon, Chairman F. D. Carpenter was instructed to have the rules printed and distributed among the members interested and to any others who desire them.

DISCUSSION ON CATENARY CONSTRUCTION

The paper read by G. D. Nicholl, electrical and mechanical engineer of the Indianapolis & Cincinnati Traction Company, on "Single Phase Catenary Line Construction," which is printed on page 516, called out a large number of inquiries. Mr. Nicholl, in answer to a question, said that sliding contact on the side and on top of the trolley had been discussed, but so far as he knew the side contact had never been used in this country. Answering a question by R. C. Taylor, the speaker said that there is little or no stagger in the trolley wire and that the wearing surface on the bows is from 8 ins. to 16 ins. About 15 lbs. tension is carried on the bow and has been found sufficient to keep it on the wire. The pressure is easily adjusted with springs, so that the bow will follow the trolley in a variation of from 16 to 22 ft. above the track. The collector consists of a bar of copper 16 ins. long and about 3 ins. wide, placed in the center of an oak strip 40 ins. long and $\frac{1}{2}$ in. thick. As the sides are flanked with aluminum, the sliding surface is really 6 ins. wide. Two grooves on the top, $\frac{1}{4}$ in. wide, are filled with grease for lubrication. The bows are good for from 1500 to 2000 miles, although there is quite a little difference in them so far as their durability is concerned.

In answer to a question by F. J. J. Sloat as to whether the bow trolley could be applied to the usual d. c. lines and how it could stand the arcing, Mr. Nicholl said that with the contact wire in line, held parallel with the track by the messenger wires, he believed it would work out all right. One of the points about the Indianapolis & Cincinnati Traction Company's line is that the trolley wire has been kept practically parallel with the tracks, thus avoiding the troubles that come through the effort of the trolley to reach the wire at various heights. Mr. Nicholl thought that either a sliding or rolling type of trolley could be used with satisfaction.

Mr. Nicholl stated that he had experienced no trouble with the catenary construction due to changes of tempera-

ture. The trolley line is more slack in summer than in winter, but as yet he had not been compelled to take up slack on the straight lines. There has been no kinking due to the difference in contraction of the trolley and the messenger wires. On curves it has been necessary once or twice to give some attention to the wire, but this was due to the poles giving in the ground. No trouble has been experienced from the messenger wires falling against the bracket arm and burning off, although the arms are not insulated.

Wheel trolleys have been used on the line at times, when the bow trolleys have given out. The wheels sometimes pound on the hangers, but no trouble had been encountered from arcing. Little trouble has resulted from breaking of the trolley. Once or twice it slipped out of the sleeve and caused a little inconvenience, but there has never been trouble with the trolley and messenger wire at the same time. Owing to the unevenness of the trolley wire in some places, the current collector occasionally shows some wear on the edges, but as any kind of a trolley will show wear, this can not be made an objection. Replying to a question by W. H. Abbott, he said that his road uses no trolley catchers, and in the past six months there has not been a bow trolley off the line.

A vote of thanks was tendered Mr. Nicholl for his paper and a suggestion made that this subject be continued at future meetings, as the members all seem to be very greatly interested in it and there is a lack of information as to the actual operation of the single-phase system.

DISCUSSION ON FIRE INSURANCE

In discussing the report of the committee on insurance, which is published on page 513, C. D. Emmons said he understood the plan included the payment of 1 per cent of the gross earnings into the premium fund, and asked Mr. Staats, the chairman, if he was not wrong in stating the agents of the old-line companies receive a commission of from 20 to 25 per cent. Mr. Staats said that he referred particularly to Cleveland, Cincinnati, Chicago and some other large cities when he gave those figures, since agents in those cities receive more than in the smaller cities and towns over the country. Mr. Staats referred to the reduction of the rates on the properties of the Cleveland Electric Railway Company, from \$1.50 to 15 cents per \$100, but of course the properties had to be protected with sprinkler systems to secure that figure. Mr. Staats said it would not be necessary for railway companies to protect their properties with sprinklers to secure the benefit of the service of the American Railway Insurance Company, and that properties in small towns, where there is little or no fire protection, would be taken care of. The inspection bureau maintained at his office would fix an adequate rate in each case, and then at the end of the year the amount not used in paying losses would be returned to the owners of the properties. The intention is to protect all the properties at actual cost. If the old-line companies are carrying insurance on properties of any company under cost, then that company will be advised to let them carry it as long as they will. It is the province of the railway insurance companies to secure low rates for the railway companies and not to make money, so there is no incentive for the officers to advise a change as long as the insurance is being secured at or below cost. But the old-line companies can not continue to carry business at less than cost, and when they attempt to increase the rates to a point which is excessive, then the railway insurance companies will take the business and carry it on their plan.

J. C. Rotherty, of West Virginia, stated that last year the rate on their properties was \$1.70, but this year it had been advanced to \$2.45, although there had been no change in the risks and no reason for the action, except to get more money, which the companies claim they need to even up the losses on the San Francisco business. In this case the insurance amounted to about \$125,000 and the advance made considerable difference. He believed the new plan should receive the support of the association, as the losses would then be paid promptly, while they are now evaded, if possible. He suggested that the report be printed, and made a motion to that effect, which was carried. Mr. Staats offered to bear the expense of printing and distributing the report.

ADOPTION OF STANDARDIZATION REPORT

R. C. Taylor, chairman of the standardization committee, in presenting the report printed on page 517, said it was an amendment to the one presented May 23. The standards recommended are practically the same as those approved by the committee of the American Street & Interurban Railway Engineering Association at its New York meeting, except that no provision is made for narrow tread wheels and an axle $7\frac{1}{2}$ ins. in motor fit, with the same dimensions as the 7-in. axle of the Engineering Association, is recommended. The report was approved and adopted with practically no discussion.

DISCUSSION ON EXPRESS BUSINESS

The report by A. A. Anderson, chairman of the express committee, was read by J. F. Starkey, the writer being absent. An abstract of this report is printed on page 514.

C. D. Emmons, general manager of the Fort Wayne & Wabash Valley, stated that his company had a temporary arrangement with the United States Express Company, which had been forced to close its offices along the Lake Shore & Michigan Southern some time ago, and that the Wells-Fargo Express Company had been endeavoring to make a contract. He said that it is a question whether an express company operated by a small system would be profitable, unless connections could be made with the old-line companies at the larger towns and cities, so that through business might be cared for in that way. It seems to resolve itself into the question as to whether it is better to make individual contracts with the express companies than for all the railroad companies to get together and contract as a body.

Mr. Starkey said that he was afraid that an express arrangement with the old companies would flood the cars with express traffic to the detriment of the passenger service. The passenger business was the most important at this time and should receive first consideration. Mr. Kenworthy replied that all companies should provide themselves with sufficient equipment to take care of all business offered, providing the financial return makes it attractive.

F. J. J. Sloat related an interesting experience with an express company, in which he showed that electric railway companies may build up a good business of their own by hard work and the exercise of a little patience. His company at one time had a contract with the Wells-Fargo Express Company between Dayton and Hamilton. In July, 1899, the railroad company's portion of the receipts was \$125. This contract was finally canceled and the company put on its own express car. For two years the business did not amount to as much as had been received that month from the Wells-Fargo people. Within five years, though, a business of \$75,000 annually was built up. The rates of

the Southern Ohio Express Company, which was organized to take care of this business, are somewhat higher than the freight rates of the steam roads, yet low enough to attract the business from the other express companies. Rates on some classes of merchandise are too low, perhaps, but they may always be amended to suit the cost of hauling. The secret of success is hustling in the smaller as well as the larger towns and cities. In the small places especially the old companies make no effort to get business, but merely take what comes to them. By putting out wagons and solicitors in these places his company soon built up a good business and came to be recognized as a carrier. He believed that almost any road may build up a business for itself in that way.

The agreement of the Detroit United and allied roads with an old-line express company was explained to some extent, although the terms of the contract were not made known. A fixed guarantee contract has been made with the company, the business to be done on a tonnage basis. Regular freight cars are used for carrying the expressage. The increase in the business will necessitate additional equipment, perhaps, and the question with the carriers is whether the additional income will be in proportion to the cost thus incurred. In addition to the tonnage price, the express company pays a portion of the salaries of conductors, when they perform messenger service. Agents of the railroad company also act as agents of the express company at a number of points and are paid for the service by the company.

DISCUSSION ON 1200-VOLT MOTORS

The talk of E. H. Anderson of the General Electric Company on the 1200-volt system was based principally on the paper published in the *STREET RAILWAY JOURNAL* of June 29, 1907, and on one by W. J. Davis, Jr., published in the *STREET RAILWAY JOURNAL* of Sept. 7, and entitled "High Voltage, Direct Current and Alternating Current Systems for Interurban Railways." During his remarks he disclosed the fact that the 125-hp d. c. motors ordered by the Southern Pacific Railroad for its Oakland lines will be built for 1200 volts.

In answer to a question by W. H. Abbott, Mr. Anderson said that ventilation is important, but that the closed motors are being used largely to keep out brakeshoe dust. As to insulation, asbestos and mica were coming into more general use, but the former contains so much iron that compounds are necessary. It also powders when heated, thus making necessary the introduction of some other substance with it.

Mr. Anderson said that sub-station apparatus for the 1200-volt machines may be made by using two 600-volt rotaries in series or the regular sub-station sets made for them.

MISCELLANEOUS

C. N. Wilcoxon was appointed an additional member of the delegation from the association to the meeting of the national organization at Atlantic City, to give special attention to the action taken regarding train rules, and support the report made at this meeting on the subject. The other members of the committee are: F. D. Carpenter, chairman, Lima, Ohio; C. D. Emmons, Ft. Wayne, Ind.; C. A. Baldwin, Anderson, Ind., and F. J. J. Sloat, Dayton, Ohio.

It was also announced that the standardization committee would have a report on brake apparatus at the next meeting, which will be held in the Claypool Hotel, Indianapolis, on the fourth Thursday in November.

REPORT OF COMMITTEE ON FIRE INSURANCE*

We have organizations for co-operating along lines reaching out to every branch of the electric railway business, but one field that has not been cultivated and to a very large extent overlooked has been that of fire insurance. I am fully convinced that through unified action on the part of the Central Electric Railway Association, and by co-operation with other associations having risks of a similar character much good can be accomplished in reducing insurance to a minimum cost.

There is no important branch of the electric railway business that has received less attention and yet deserves greater consideration than the insurance of our valuable interests against loss by fire. We pay in the aggregate hundreds of thousands of dollars annually to insurance companies. So far as I have been able to learn only a small per cent of this money is returned to the policy holders in fire losses on electric railway properties. I am confident that from one-half to two-thirds of the money paid for insurance premiums by electric railway companies can be saved through co-operation with the American Railway Insurance Company.

After very careful consideration on the part of the executive officers of a number of the leading electric traction and electric light companies as to the best plan for producing the lowest cost of insurance, it was decided that it was not only feasible, but advisable, for said companies to perfect their own organization and to surround themselves with the best methods for safeguarding their properties against fire loss.

The American Railway Insurance Company has completed its organization with a capital and surplus of \$500,000, subscribed by individuals connected with electric traction and electric light companies. The officers and directors represent thirty traction and lighting companies. An inspection and survey bureau has been established with offices in the Citizens Building, Cleveland, Ohio. Expert underwriters have been employed and the services of experienced engineers secured.

The amount of each subscription has been fixed on a basis of 1 per cent of the gross earnings of each separate traction and lighting company for the year 1906. For example, if the gross earnings are \$1,000,000 your subscription will be \$10,000. By this method each electric railway or electric light company adds to the capital and surplus of the organization, and through co-operation the fund will be increased to an amount that will warrant our companies in time to carry their own insurance in their own organization.

The Electric Mutual Insurance Company and the Traction Mutual Insurance Company have been incorporated under the laws of Ohio, and will co-operate with the American Railway Insurance Company in writing business. These companies, however, will be conducted on the plan of the Factory Mutual Insurance Companies, which has proven very successful during the past seventy years.

Electric traction companies and electric light companies of the United States have found that it has been impossible to secure from what is commonly known as old line or stock insurance companies satisfactory rates of insurance, and for the following reasons:

First. The stock companies are controlled by a limited

*Presented by Henry N. Staats, chairman, at the Columbus meeting of the Central Electric Railway Association on Sept. 26, 1907.

number of stockholders. Their desire is to make as large an amount of money on their investment as may be possible. Therefore, their prime object is to secure in every instance as high rate of insurance as can be obtained.

Second. The present method of stock insurance companies of paying from 20 per cent to 25 per cent of the entire premium as commission to agents is a wrong principle. This commission is a strong inducement for the agents to accept undesirable properties to obtain their commissions. Through these methods good properties are compelled to help pay losses on undesirable properties.

Third. There is no sufficient reason for placing electric railway and electric lighting insurance in the hands of strangers whose only object is to make the maximum amount of money out of their business.

Fourth. It is a part of wisdom for the traction companies and electric light and power companies to have their own insurance organization, that they may bring their insurance down to actual cost. This can be accomplished by the united action of the traction companies and electric lighting companies in following out correct principles of underwriting.

Two years ago H. J. Davies, secretary of the Cleveland Electric Railway Company, mailed to every street railway company in the United States and Canada, a letter requesting a report, showing the amount of money paid for fire insurance for the ten years from Jan. 1, 1895, to Jan. 1, 1905, the amount of losses sustained and the amount actually recovered from fire insurance companies. Reports were received from about 420 companies, and these show that there was paid for fire insurance premiums by said companies \$6,049,641.45. There was recovered \$1,673,336.27 from insurance companies by fire loss, leaving a balance of \$4,376,305.18 to the credit of the insurance companies.

These figures prove beyond question that electric traction companies of the United States and Canada have been paying excessive rates of insurance, and some of the leading traction companies have felt the burden of this heavy taxation to such an extent that they have established a fund to carry their own insurance. This plan has not proven entirely satisfactory for the reason that the insurance fund in many instances has been drawn upon to promote other interests of the traction company.

There are a few companies, however, who have been eminently successful in carrying the major portion of their insurance under their own insurance fund. I refer to the United States Steel Corporation, the Pennsylvania Railroad Company and the Philadelphia Rapid Transit Company. The last named company has for years set aside sums for this purpose until its insurance funds amount to \$1,600,000. The interest on this accumulation is sufficient to keep up this amount. No single loss can exhaust this fund, for the company has not \$1,600,000 worth of property in any one location, unless it be at its power plants, which are substantially fire proof, or at least certainly not subject to a total loss. Not many electric light companies are able to do what the Philadelphia company has done. Several of them, however, may unite to carry their own insurance—and this is exactly what some of us are trying to do for the benefit of all of us.

The plan of organization and working of the American Railway Insurance Company, the Electric Mutual Insurance Company and the Traction Mutual Insurance Company has been approved and endorsed by the American Street & Interurban Railway Association and by the Central Electric

Railway Association. The American Railway Insurance Company has recently been admitted to membership in the National Electric Light Association. W. H. Blood, insurance expert of the association, approves the plan.

If these great associations will co-operate in establishing an insurance organization composed of their members, confining lines of insurance to their own properties and kindred risks, employ expert underwriters and skilled engineers to conduct their business, we will in a comparatively short time compel the so-called old-line insurance companies to lower materially their basis rates of insurance; and, through our own organization we will be enabled to carry a goodly portion of our insurance at actual cost, and at the same time build up a power by which we can hold down the reduced rates that may be given by other insurance companies.

I would, therefore, strongly urge that each member of the Central Electric Railway Association co-operate in this very important movement to bring about reduction in rates of insurance on the properties of electric railway companies.

REPORT ON HANDLING EXPRESS BUSINESS ON INTER-URBAN CARS*

Inquiries were sent to eighty interurban roads of Indiana, Ohio and neighboring states, including members and non-members of the association, to learn what roads have contracts with old-line companies. Opinions were asked as to the advisability of entering into contracts with old-line companies or of organizing an independent, interurban express company. Interurban companies having contracts, were asked for copies of same or detailed information as to the terms of their contracts and compensation. Information and suggestions were solicited and the purpose of the inquiry fully set forth.

Replies were received from twenty interurban railways, giving information with reference to twenty-three properties. Four of the companies operate under one contract. Replies were received from seventeen interurban companies that they have no contracts with the old-line companies.

Five interurban companies have received proposals for express contracts from old-line companies as follows: The Wells-Fargo Company, three; the Pacific Express Company, one, and one company, name not given. The proposal received from the Pacific Express Company was offered on a mileage basis but was rejected, as the interurban company was unwilling to enter into an agreement on that basis, the interurban company offering to go into an agreement on the basis of 50 per cent of the revenue derived from such business. The interurban company which rejected a proposal from an old-line express company preferred to act independently.

One of the interurban companies declined a contract with the Wells-Fargo Company, assigning as a reason that, inasmuch as practically express service is given to a considerable quantity of small freight, and for a rate scarcely higher than freight rates, but which seems to get for the traction lines more freight business than they could otherwise, it would be unwise to enter into an arrangement with the old-line express company, as it would interfere with their business if this express service for small freight was continued.

Another interurban company rejected a proposition from the Wells-Fargo Company, believing that the organization of an interurban express company would be better than to

*Abstract of report presented at the Columbus meeting of the Central Electric Railway Association on Sept. 26, 1907.

go in with any of the old lines, and thinks it best not to handle any express business, only such as is handled in the regular way, by their passenger combination cars and regular baggage cars and freight cars. The third interurban company was offered a contract by the Wells-Fargo Company on a tonnage basis, which was not satisfactory.

Seven of the interurban companies heard from, favor the organization of an independent interurban express company. One of the companies gives no reason for such conclusion. Another favors the organization of such a company because it has tried to make contracts with old-line express companies, which refused in every instance to enter into any arrangement. A manager of one of the seven interurban roads favoring the organization of an independent company, writes as follows:

"The writer has been in charge of this property since 1886, during which time for sixteen years the road was run as a steam road exclusively. We are now operating by electricity in the passenger business and steam for freight. Our experience with old line express companies was of short duration. We had the Adams Express on our road for three months, with poor results. This was in 1886. I then got our people to let me organize our own express at that time, and we called the Adams Express off the line. Since then the road has been very successful with this express business, and if you will look in *Bullinger's Guide* you will notice that the Cincinnati, Georgetown & Portsmouth Railroad appears there as one of the express companies. We have all our own blanks, which are independent from our freight department. We have our messengers on our express cars and our regular agents do all the billing. We handle C. O. D. business, bills and notes for collection. We handle cash packages from banks to banks and do a very large parcel business. Our experience is that any line having a mileage sufficient is justified in organizing its own express, thereby enjoying the entire revenues on same. We connect with and have the confidence of all the large express companies at Cincinnati, exchanging business with them daily. It must be remembered that the old line express companies retain, as I understand it, either 40 or 60 per cent of the gross earnings. Besides this, you have their messengers to haul, and another matter of great importance is the fact that you do not get to check up any of their business. You cannot state at any time what you are entitled to or what you are hauling, as you have no access to the billing, unless they have made new rules of which I know nothing. We have frequently had the old line express companies come around and endeavor to contract with us, but have always declined any advances and have never given them any encouragement."

A second writer says:

"At the present time we think it best not to handle any express except what is offered in a regular way in our passenger combination cars and regular baggage and freight cars. In the course of a year or so, after a lot of the missing links are built, we think an interurban express company can be operated successfully."

A third writer says:

"It seems to me that it would be preferable for interurban roads operating over any considerable stretch of territory to handle express matter through the organization of an independent express company, rather than to do so through the old line express companies. On the other hand, for properties operating interurban roads of comparatively short lengths, it would probably be better to have a contract with an old line express company, though if the business was of sufficient magnitude, an independent express company, which would practically be 'a wheel within a wheel,' would doubtless be a good source of revenue. Doubtless a contract with an old line express company would have to be on a tonnage basis, the express company getting most of the profit, and its shipments taking up space in the interurban cars, which might otherwise earn more per trip."

Five different interurban roads do not favor the organization of an interurban express company. Some of the reasons are as follows:

"I am not in favor of entering into an arrangement whereby interurban roads are to do their own express business, since

we have an established freight business that equals anything in service that the old line express companies could offer, but at a lesser rate. I fear if the interurban lines should undertake to inaugurate a service of this kind at a high rate, it would demoralize the freight business. This may not be true with certain interurban lines, but with competition of steam roads, it would work out that way with us.

"My impression is that if a proper contract would be made with old line express companies which do not otherwise reach the territory traversed by the traction lines, that it would be a good thing to have such an agreement. It appears to me that a purely interurban express company would not, for years, be able to reach territory and obtain shipments that the old line companies would be able to obtain."

Five other interurban companies express themselves very decidedly in favor of contracting with old-line companies. Two of these companies are now operating under contracts and one of them assigns as a reason that the law in Indiana requires express companies to make delivery of express. By the handling of the business as freight, the interurban companies get away from the delivery obligation. Any matter handled as express, in connection with an old-line express company would put the delivery on the express company.

Replies were received from four different companies having contracts with old-line companies. Two of them operate contracts in connection with two other interurban roads. These are as follows: The Iowa & Illinois Railway Company of Clinton, Ia., which has a satisfactory tonnage contract with the American Express Company for carrying its express between Clinton, Davenport, Rock Island and Moline. The Evansville, Suburban & Newburgh Railway Company, operating between Evansville, Newburgh and Booneville, has a contract with the old-line companies. The Western Ohio Railway Company, the Dayton & Troy Electric Railway Company, the Springfield, Troy & Piqua Railway Company, and the Toledo, Urban & Interurban Company have a joint contract with the Pacific Express Company for a period of five years, the interurban companies receiving 50 per cent of the gross earnings. The Columbus, Delaware & Marion Railway Company has a contract with the Wells-Fargo Express Company, the Northern Ohio Traction Company has a contract with the American Express Company. The Lake Shore Electric Railway Company and Cleveland, South Western & Columbus Railway Company have a contract with the Wells-Fargo Company and the U. S. Express Company, all on a tonnage basis. The Ft. Wayne & Wabash Valley Traction Company has a temporary working contract with the United States Express Company on a percentage basis.

The conclusion of the committee is, that although little has been done along the line of contracting with old-line express companies, there seems to be a general opinion in favor of the same. For each company, or the few companies who operate connecting lines, to operate separate express companies, would make so many, that the work of auditing and getting at the proportion due the various companies would be immense. If an electric express company could be organized, and all the electric railroads become members of same, they to exchange business with the old line companies at points wherever convenient, some additional revenue might be derived.

As one manager puts it: "The matter is one which depends largely on local conditions as to the advisable course to pursue, and furthermore is one which requires careful investigation of costs and revenue to be derived from the service. It is a question of similar interest to that of the interchange of freight with steam roads, and into both must

necessarily enter a question of policy, which would naturally be governed by not only the resulting revenue from, and cost of the service, but also the effect it would have on interurban companies with the public, with the steam roads, and the laws bearing on both."

SINGLE-PHASE CATENARY LINE CONSTRUCTION *

The object of this paper is merely to promote a general discussion of the relative merits of catenary construction for the operation of high-voltage electric railways. While there are some high-voltage direct-current railways under construction, I believe none is in commercial operation at the present time, and these remarks will bear particularly on line construction for alternating-current railways.

The introduction of the single-phase alternating-current railway motor brought about the possibility of delivering energy to the car equipments at high voltages, and decreasing the investment necessary in copper for the distributing system.

It has also been a problem to collect the current for heavy equipments at high speeds with the ordinary type of wheel trolley, and considerable experimental work has been done to develop a current collector of the sliding type. There is a difference of opinion among engineers as to whether the current collector should be of the underrunning type or make contact with the conductor on the side or top. In this country, however, the general practice has been to use the underrunning type of current collector with the trolley wire over the center of the track. To operate the sliding current collector successfully at high speeds, it is necessary that the trolley wire have a practically smooth and even surface, free from kinks that might cause the sliding current collector to break contact.

Various types of catenary construction have been proposed for different classes of railway service. For trunk-line railroads having two or more tracks, the double catenary will undoubtedly be used, the messenger wires being supported from steel bridges spanning the tracks. This class of construction has two messenger wires spreading at the points of support and converging at the center of the span, the trolley wire being supported from both messenger wires by hangers of various lengths. A tie also is used between the messenger wires at each trolley support. This type of construction has been used by the New York, New Haven & Hartford Railroad on its electrified division near New York City. This class of construction is expensive, and its cost is not warranted for the average interurban line of the Middle West.

Single catenary consists of a single messenger wire with the trolley supported directly underneath by means of hangers of various lengths. The lines of the Indianapolis & Cincinnati Traction Company have single catenary construction. The line from Indianapolis to Rushville was built in the fall and winter of 1904-5, and was, I believe, the first single-phase alternating-current railway in commercial operation using the catenary trolley construction and the bow or sliding trolley. On the portion of the line from Indianapolis to Rushville, the trolley poles are spaced 100 ft. apart. From the experience gained on this portion of the line, it was decided to increase the distance between the trolley poles, so that on that portion of the line constructed during the year 1906, the spacing of the trolley poles was increased to 120 ft. on tangent track; the distance between poles on curves depending on the degree of curvature. The

shortest curve being of three degrees radius, the poles are spaced 50 ft. apart. The center of the poles is located 7 ft. from the center of the track.

The trolley brackets are made of 2-in. x 2½-in. x ¼-in. angle iron. The outer end of the bracket is drawn into a loop to form a support for the messenger wire insulator. The loop in the trolley bracket is 16 ins. long, to allow an adjustment of 8 ins. each side of the center line of the track for staggering the messenger and trolley wires and for aligning the trolley wire, due to the unevenness of pole diameters and adjustment of messenger wire on curves. The inner or pole end of the bracket arm is bent at right angles to the arm and is fastened to the pole by two through bolts, and the outer end of the bracket arm is supported by a ⅝-in. brace rod.

The messenger wire is supported on an especially designed porcelain insulator, cemented into a cast-iron base, fastened to the bracket arm by four hook bolts. The messenger wire, which is composed of seven-strand steel cable, having a nominal outside diameter of 7/16-in., is supported in the groove of the porcelain insulator and tied to it by a steel tie wire.

The trolley wire, of No. 000 grooved section, is supported from the messenger wire by steel hangers spaced 10 ft. apart. Five different lengths of hangers are used, twelve hangers being used between two poles on a 120 ft. span, as follows: Two 11-in., two 9-in., two 7¾-in., two 6¾-in., and four 6-in. hangers. The hangers are fastened to the messenger wire by a "U" clamp and a through bolt, and to the trolley wire by a screwed clamp that fits into the groove. On curves the trolley wire is held directly under the messenger wire by treated hickory steady strains, one end of the steady strain being clamped to the bracket arm and the other end to the trolley wire.

The messenger wire is anchored every mile, a pole being set on the opposite side of the track from the trolley poles and well anchored. A 7/16-in. steel cable is stretched diagonally across the track and securely fastened to the messenger wire. Extra heavy wood-strain insulators are placed in this anchor wire to insulate it from the poles, and the ends made up into turnbuckles so the anchor cable can be easily adjusted.

Section insulators of treated hickory are installed about every 11 miles. Connection is made to the trolley wire at each end of these section insulators by a knife-blade switch. Normally, this switch is open, but in case of trouble it can be closed and two sections of the line fed from one transformer station.

In towns, span wire construction is used, extra heavy wood-break insulators being placed in the span wires. The messenger wire is fastened to the span wire by clamps, permitting easy adjustment for aligning the messenger wire with the track. The same style and length of hangers is used on span construction as on bracket arm construction. On private right of way the trolley wire is supported approximately 18 ft. from the top of the rails.

Lightning arresters are installed, three per mile, with ground connections to a galvanized iron pipe driven 10 ft. into the ground.

In building this line, both messenger and trolley wires were run out at the same time and both pulled to the same tension; an equalizer being used between the two wires.

With the length of hangers noted above the trolley wire is supported at an almost uniform distance above the track rails, as the successful use of the bow or sliding trolley at high speeds requires this type of construction. The operation of the bow trolley has proved very satisfactory. There

*Abstract of paper presented by G. D. Nicholl at the Columbus meeting of the Central Electric Railway Association, Sept. 26, 1907.

has been no difficulty in collecting current at speeds of 65 miles an hour.

The insulation of these lines was designed to operate at 3300 volts alternating current, and no trouble has been experienced with this viltage. On several occasions the lines have been covered with sleet and wet snow, but no trouble developed.

REPORT OF STANDARDIZATION COMMITTEE

The Standardization Committee appointed to investigate standards as applied to electric railway equipment presented to the association at the Indianapolis meeting, May 23, 1907, certain recommendations covering the subjects of brake shoes and brake-shoe head and key, axles, journal boxes, flange and head of wheels, and rail sections.

The details of these recommendations were published in pamphlet form and mailed to the members of the associa-

the Standardization Committee of the American Street & Interurban Railway Engineering Association, had the privilege of discussing the proposed standards in detail on July 26, 27 and 28, at Cleveland, Ohio, with representatives of the General Electric Company, Westinghouse Electric & Manufacturing Company, Cast-Iron Car Wheel Manufacturers Association, Standard Steel Wheel Company, Schoen Steel Wheel Company, American Brake Shoe & Foundry Company, Columbia Brake Shoe Company, Symington Journal Box Company, J. G. Brill Car & Truck Company, Pennsylvania Steel Company, Lorain Steel Company, and William Wharton, Jr., & Company.

As a result of these investigations and discussions and as a result of the meeting of your committee, held at Columbus, Sept. 25, it is respectfully recommended that the following standards be adopted by this association:

AXLES

The four standard axles recommended are shown in the

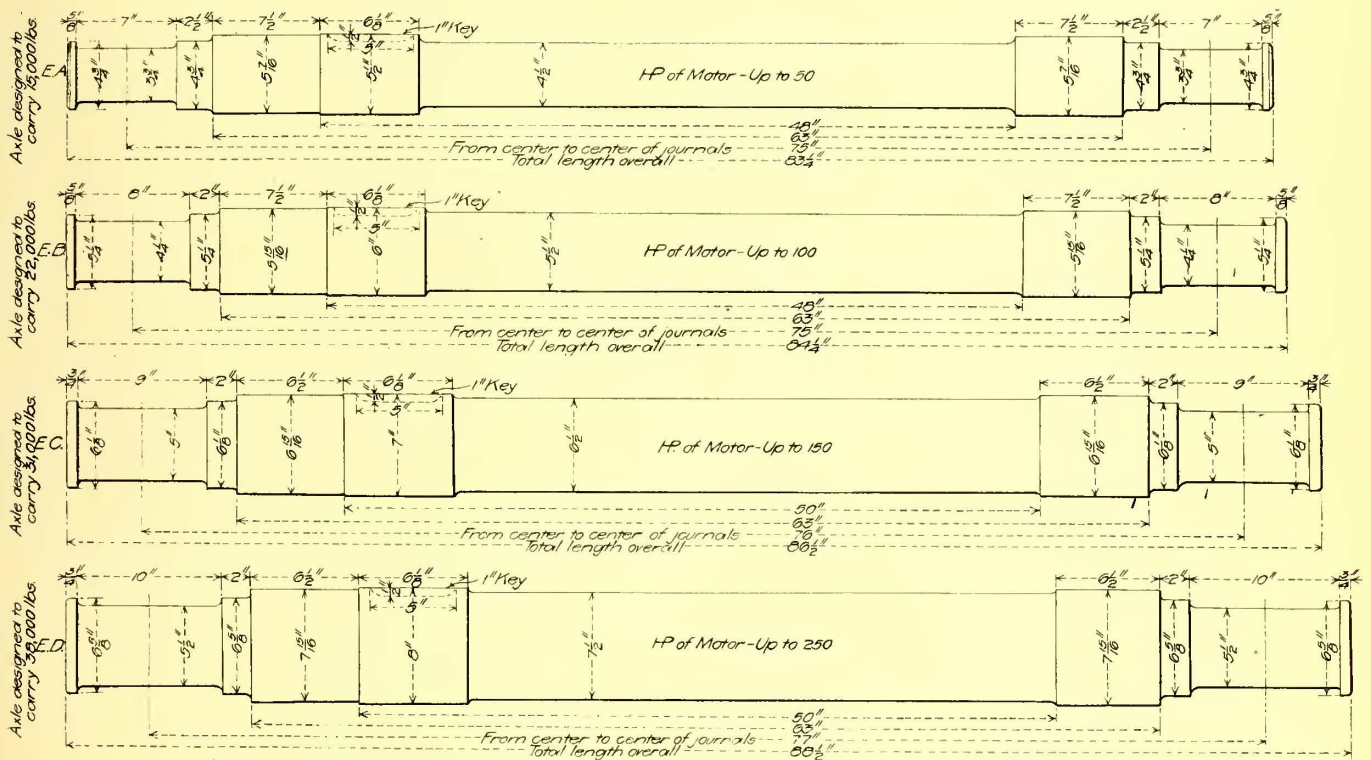


FIG. 1.—STANDARD MOTOR AXLES RECOMMENDED BY THE CENTRAL ELECTRIC RAILWAY ASSOCIATION.

tion so that ample time might be allowed for full investigation and consideration of these important subjects, and it is hoped that all of these matters will be given thorough and complete discussion at this meeting.

Your committee realized when it submitted its report on May 23, 1907, that a great many of the details (although fully considered and thoroughly discussed in committee) were absolutely arbitrary and would undoubtedly result in a spirited discussion by the members of this association. Your committee also realized that any recommendations affecting such important subjects must be of the most practical kind and commend themselves to the executive and operating officials of the electric railway properties comprising our association, and also commend themselves to the manufacturers of the apparatus which we are attempting to standardize. With these facts in mind each member of your committee has exerted every effort to obtain the most extensive information on the various subjects. The chairman of your committee, by virtue of his membership on

accompanying illustrations. They have been slightly modified from print No. 75 (Fig. 1) of the Central Electric Railway Association, dated May 7, 1907, to meet the requirements of the General Electric and Westinghouse companies, manufacturers of railway motors. Both of these companies agree that it is absolutely essential on the two largest axles to provide 50 ins. between wheel hubs to accommodate motors from 150 to 250 hp. Axle E. A. has a standard 3 3/4-in. x 7-in. journal. It is designed to carry a load of 15,000 lbs. per axle and accommodate motors up to 50 hp. Axle E. B. has a standard 4 1/8-in. x 8-in. journal and is designed to carry 22,000 lbs. per axle and to accommodate motors of a 100 hp. Axle E. C. has a standard 5-in. x 9-in. journal and is designed to carry 31,000 lbs. per axle and may accommodate a motor of 150 hp. Axle E. D. has a standard 5 1/2-in. x 10-in. journal and is designed to carry 38,000 lbs. and may accommodate motors of 250-hp capacity.

Special attention is directed to all the dimensions of these axles, which were carefully considered by the committee and

recommended only after a full discussion with each other and with the manufacturers whose product is affected by the dimensions. The dimensions observed standardize at once the diameter and length of journals; diameter and length of wheel fits; diameter and length of gear fits; diameter and

The sketches show a pair of shoes designed for 33-in. wheels, but the radius and width of the rubbing surface may be modified for any diameter and tread of wheel used generally on electric roads. As the brake shoes are an expensive item of maintenance on all railways the recommended standards of this part of the equipment should find ready adoption and result in both mechanical and financial advantages.

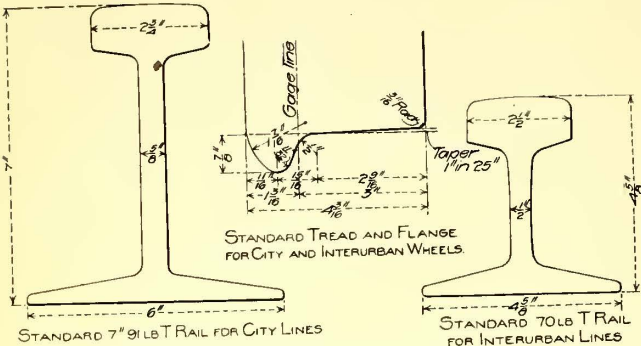


FIG. 2.—SECTION OF STANDARD CITY AND INTERURBAN WHEEL AND SECTIONS OF STANDARD 4 5/8 IN. AND 7 IN. RAILS FOR CITY AND INTERURBAN SERVICE

length of motor fits, and length, width and depth of gear keys. These dimensions are consistent with the best practice of successful installations and if adopted will result in commendable uniformity of everything connected with an electric motor axle.

BRAKE SHOES, BRAKE-SHOE HEAD AND KEY

Drawing No. 76 (Fig. 3) of the Central Electric Railway Association, dated May 7, 1907, shows in detail the recommendation of the committee on brake shoes, brake-shoe head and key. Two shoes are recommended, one with a flange to be used in situations where it is impossible to use a brake beam; the other a shoe without a flange which

JOURNAL BOXES

Drawing No. 78 of the Central Electric Railway Association, dated May 9, 1907, showing pedestal-fit dimensions, was submitted as your committee's recommendation. After conferring with the manufacturers of M. C. B. boxes your committee desires to substitute in place of drawing 78 a series of sheets Nos. 79, 80, 81 and 82 (Figs. 4, 5, 6 and 7) of the accompanying illustration. These dimensions were worked out by Mr. Weston of the Symington Journal Box Company, and are a modification of the M. C. B. box to electric trucks. It will be observed that these drawings standardize the exterior as well as the interior dimensions and if adopted should result in decided commercial benefits to operating companies.

SECTION OF FLANGE AND TREAD OF WHEEL

Drawing No. 77, Central Electric Railway Association, dated May 8, 1907, shows details of recommended flange and thread 1 in. in 25 ins. instead of 1 in. in 32 ins., as previously new wheels and worn wheels were examined by your committee and it is believed the flange shown for T-rail construction will prove quite acceptable. Your committee after further consideration has decided to recommend a taper of thread 1 in. in 25 ins. instead of 1 in. in 32 ins. as previously recommended. It is believed that this taper will have a tendency to save flange wear.

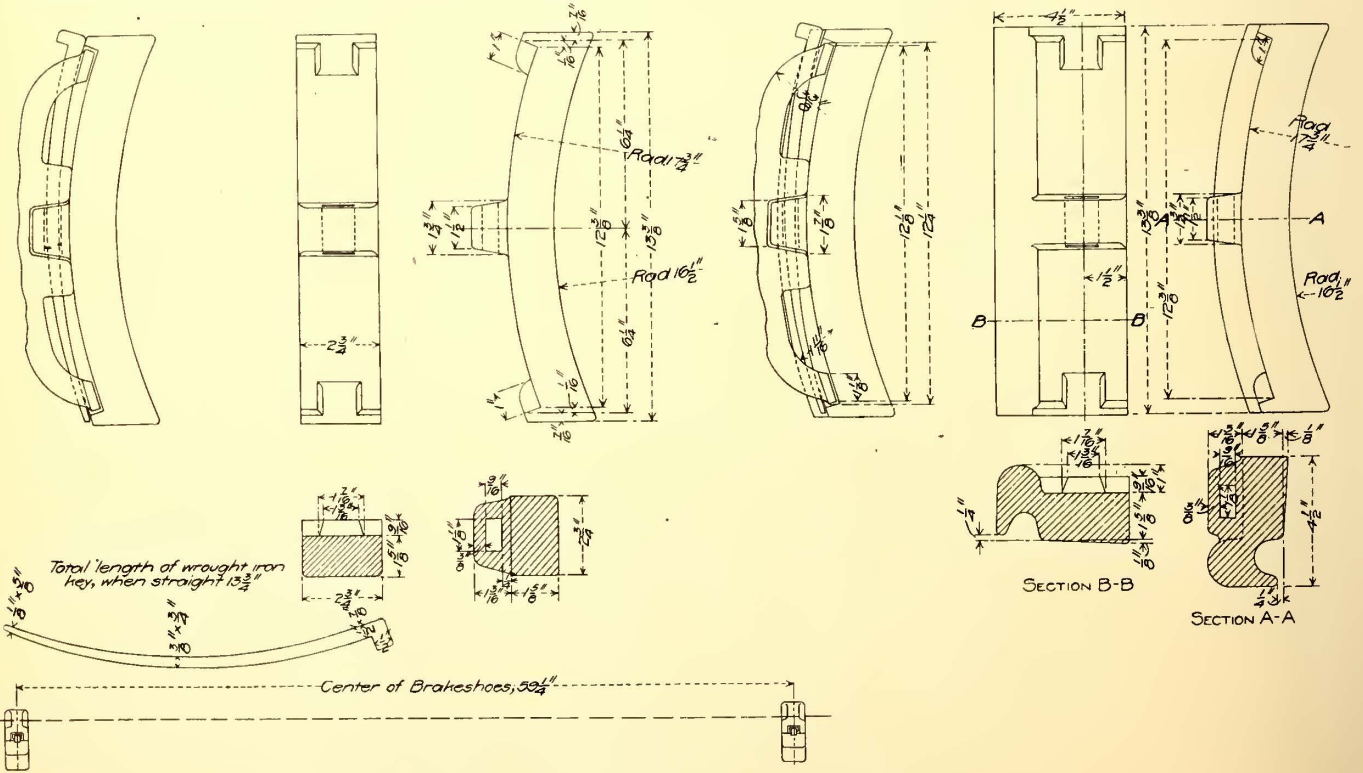


FIG. 3.—STANDARD BRAKE SHOES, BRAKE SHOE HEAD AND KEY

should be used wherever it is possible to do so. The design of the shoe head and key is identical so far as its attachment to the shoe is concerned with the M. C. B. standard. Either one of the shoes will fit this head. The flange shoe may be reversed by changing to the other wheel on the same axle. The flangeless shoe may be reversed on any wheel.

RAIL SECTIONS

These recommendations are also shown on drawing No. 77 (Fig. 2). It will be noted that both sections are T-rail 7 ins. 91 lbs. for city streets and 70 lbs. American Society C. E. for interurban lines. Your committee is aware that due to municipal restrictions in many cities T-rail might not be

permitted and it is doubtful whether it would be possible to recommend a standard that would cover such cases. We have, therefore, recommended what is considered best prac-

WHEEL HUBS AND GEARS

Drawing 83 (Fig. 8), Central Electric Railway Association, dated Sept. 20, 1907, shows the committee's recommen-

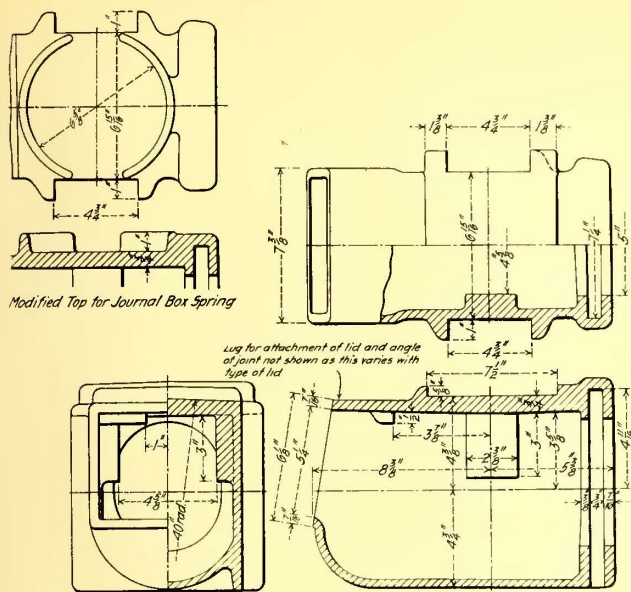


FIG. 4.—PROPOSED STANDARD, 3 3/4 IN. X 7 IN., JOURNAL BOX

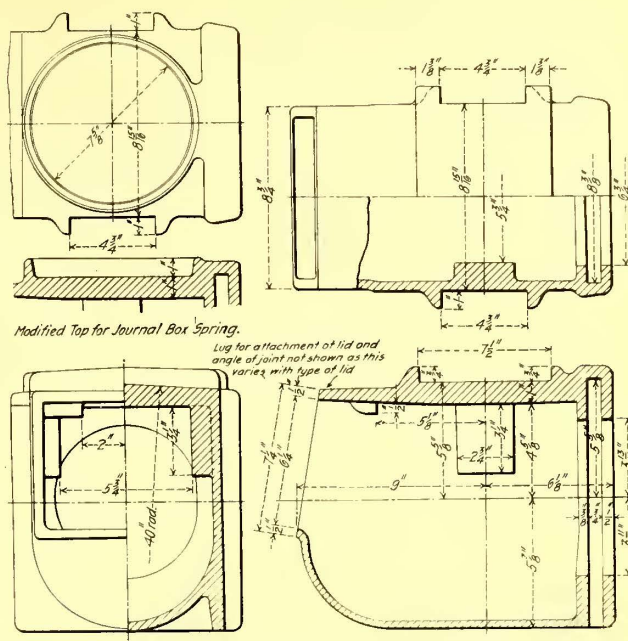


FIG. 6.—PROPOSED STANDARD, 5 IN. X 9 IN., JOURNAL BOX

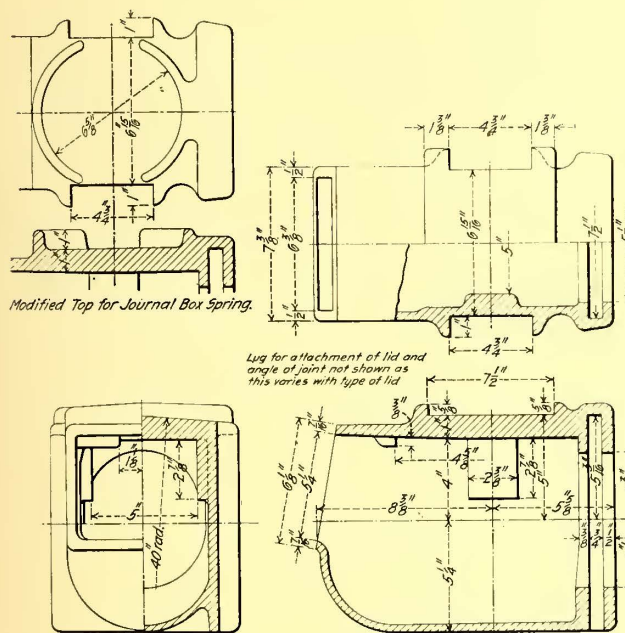


FIG. 5.—PROPOSED STANDARD, 4 1/4 IN. X 8 IN., JOURNAL BOX

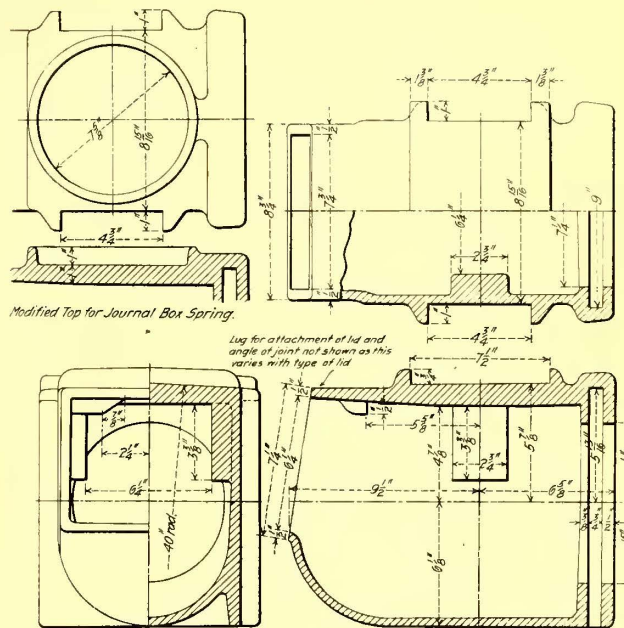


FIG. 7.—PROPOSED STANDARD, 5 1/2 IN. X 10 IN., JOURNAL BOX

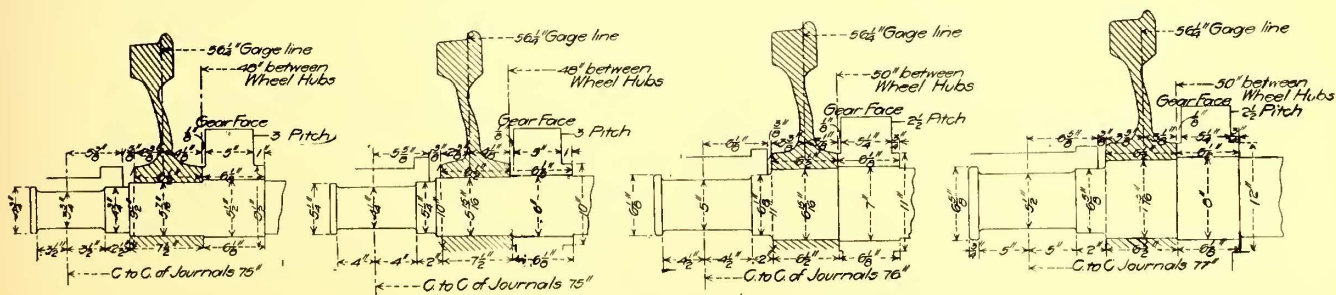


FIG. 8.—PROPOSED GEAR AND WHEEL HUB STANDARDS

E. A., 3 3/4 in. x 7 in. Journal; E. B., 4 1/4 in. x 8 in. Journal; E. C., 5 in. x 9 in. Journal; E. D., 5 1/2 in. x 10 in. Journal.

tice and has been successfully used in a great many of our largest cities.

dation on gears, gear hugs and wheel hubs. This supplements the committee's previous report, as it seems quite proper and

desirable that these dimensions should also be standardized. Special attention is directed to the fact that all wheel hubs are the same length and the distance from the gage line to back of the hub fixed for all standard axles, the diameter of the wheel hub has been designed to give 2 ins. of metal all around the wheel fit this design, having special reference to steel centers or rolled steel wheels which at present seems to be the preferred practice on heavy passenger equipment.

Referring to gear-hub dimensions: These have been made $6\frac{1}{8}$ ins. long for all axles. Our axles drawing shows 1-in. key 5 ins. long for all gears. The design of gear key seems to be undergoing at present a process of evolution and both of the motor manufacturers have signified their willingness to agree on the key dimensions. The committee, however, is unanimous in the opinion that with solid gears properly designed the gear key may be dispensed with entirely and with this fact in mind his proposed diameter of gear hub, allowing in each case 2 ins. thickness of metal around gear hub, so the gear may be pressed on with sufficient pressure to do the work without a key.

In making these recommendations your committee has been greatly assisted in reaching its conclusion by many of the members of this association as well as the representatives of the leading manufacturers of the country. It takes this opportunity of thanking all who have rendered their services for their invaluable co-operation in the work.

The committee also earnestly urges that final action may be taken on its recommendations by the association at this meeting, so the progress of its work in the future may not be impeded by uncertainty or indecision. There is still much work to be done by the standardization committee and its sub-committees and each member is encouraged to continue the work in the hope that as a result of this work some definite standards may be adopted which will give the very best results to the companies comprising this association.

ELECTRIC SERVICE ON THE DENVER & SOUTH PLATTE RAILWAY

The Denver & South Platte Railway Company, of Denver, Col., has started a half-hour service on the portion of its electric line which is completed from Englewood south. The new electric railway is not part of the Denver city tramway system, but it makes connections with every third Englewood car, and carries passengers to the first trestle on the Santa Fe line this side of Littleton. The line relegates to the background the old white horse which has been immortalized in story and picture, because he rides from Cherrylyn to Englewood on the rear platform of his car, after pulling it up the hill in the other direction. The Denver & South Platte road will be completed on south to Roxborough Park this winter, if the company's plans mature satisfactorily, and it is anticipated that the entire region lying south of Englewood will be materially benefited by being thus put in direct communication with Denver.

ANNUAL REPORT OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD

The annual report of the New York, New Haven & Hartford Railroad Company for the fiscal year ending June 30, shows gross earnings from operation of \$55,601,936, as compared with \$52,984,322 for the previous year; operating expenses, \$37,850,081, as compared with \$36,222,586, and net earnings from operation, \$17,751,854, as compared with \$17,761,735. The net income this year applicable to dividends is \$8,803,041, as compared with \$10,185,377 last year.

The surplus after dividends is \$1,988,053, as compared with \$3,718,285 last year. President Mellen says that while the gross earnings show an increase of about 5 per cent, the operating expenses increased about 7 per cent. In regard to the Boston & Maine merger, President Mellen says: "If the Boston & Maine can be acquired with the good will of the public it now serves it should prove a profitable business venture, but if there is to be only unfavorable criticism, misrepresentation and disparagement, it may be well to proceed no further." The reduction in the passenger rate to two cents a mile on the whole system resulted in a gain of passenger receipts, where a considerable loss was anticipated.

JOINT MEETING OF NEW YORK ELECTRIC RAILWAY, GAS AND ELECTRIC MEN

On Tuesday evening, Oct. 1, the Street Railway Association of the State of New York held a joint meeting with the Empire Gas and Electric Association in the Concert Hall of Madison Square Garden. Before this meeting President Wilson entertained the members of the Street Railway Association's executive committee at luncheon in the Waldorf-Astoria, after which there was a conference on business matters.

Addresses were delivered by Hon. Frank W. Stevens, chairman of the Public Service Commission of the Second District; Henry J. Pierce, president of the International Railway Company, of Buffalo; Dr. Alexander C. Humphreys, president of Stevens Institute of Technology, and E. W. Burdette, chairman of the Public Policy Committee of the National Electric Light Association.

ABSTRACT OF MR. STEVENS' ADDRESS

Mr. Stevens, who as the first speaker was scheduled to speak on the work and policy of the Public Service Commission for his district, said that he did not want it understood that his remarks should be taken as an expression of the opinions of the entire board. He was glad that the meeting of the evening had been arranged because the representatives of public service corporations were certainly entitled to a full enunciation of their views on a law that is so thorough reaching, and they also had the right to know the attitude of the commission. No man could honorably accept the office of commissioner unless he was thoroughly imbued with the spirit and purpose of the new law and impressed with the existence of evils which that law seeks to correct. His first duty should be to subject himself to a critical examination as to his attitude toward the corporations placed under his control and supervision. No commissioner should forget that the public service corporations are absolutely indispensable to the public, and he should bear in mind that any attempt to cripple them means a corresponding injury to the public. Even if the evils complained of are true it does not mean that the commission should disregard the rights of the corporations. It would not do to right one wrong by committing another. The great function of the commission should be to promote the efficiency of the public service corporations. He felt that the commission was entitled to the hearty support of the corporations; first of all, because it is the law of the state. He was glad that up to this time there had been no indication on the part of any of the public service companies in the Second District that they did not intend to obey the law.

There were many things, of course, which the commission was being called upon to examine, but there were several to

which he desired to call particular attention. The subject of accidents was one, for human life seemed to be held too cheaply. Investigations made by him only since the first of July had shown that five deaths in the state were directly attributable to the lack of proper care and attention to the rules on the part of the railways concerned. The second important work of the commission was the control of stock issues, bonds and other obligations. This was not so simple a duty as it would seem. It is true that in many cases it is easy to distinguish between just and fictitious capitalization, but there are plenty of instances where it is very hard to draw the line. The third duty of the commission was to find how much truth there was in the complaints of the public regarding poor freight and passenger service. Certainly there is some ground for such complaints, at least on steam railroads, as he knew from personal experience. The commission was determined to know how these evils could be corrected, and if the delays in freight handling were due to the fact that business had grown faster than the capacity of the railroads to handle it, it would be well to know it.

After the conclusion of Mr. Stevens' talk, Henry J. Pierce, president of the International Railway Company, made an address on the electric railway situation of to-day. The address follows in slightly abbreviated form:

THE ELECTRIC RAILWAY SITUATION OF TO-DAY

Nearly every public utility company in the state is represented here to-night. This gathering in open council and friendly spirit between the commissioners, in whose hands such great power has been placed, and representatives of the corporations, whose affairs they will in future control, should mark an era in business life.

It would be well for the country, for the welfare of its financial institutions, for its business prosperity, for the stability of the investments of people, both rich and poor, if, when those high in authority speak, they should not judge all corporations by the few who have done wrong, but also should bear in mind that the great majority of corporations are conducting their affairs honestly and in the interests of the people whom they serve.

Justice in public utterance is as essential as justice in private act. Fairness in official conduct is as necessary as honesty in daily business. In this practical age nothing should be done in the shadow of secrecy that cannot bear the light of day, and nothing should be done in the glare of publicity that cannot bear the close impartial scrutiny of honest private analysis.

The dual duty of a public utility corporation is to provide good service to the people from whom its franchise was obtained, and to return to its stockholders a reasonable profit on their investment. The electric street railway may not increase its fare, yet wages have increased, and the cost of material has advanced over 40 per cent in three years. The public are ever expecting greater facilities, which require heavier track, larger cars, increased power, more car houses, more efficient, and therefore, higher priced trainmen, better and more frequent renewal of pavements, extension of tracks into sparsely settled neighborhoods, while the state and municipalities are constantly increasing taxation.

Under this combination of circumstances, one of four things must inevitably occur:

Poorer service; price of labor and material reduced; rates of fare increased; taxation reduced.

The manufacturer or the private corporation may close their plant for a time when business is not profitable, or need not maintain their plant at a high state of efficiency;

but the public service corporation is always in the public eye—it must keep on, it must keep up the quality of its service to highest standard.

The business of an electric railway in fast growing communities is increasing to be sure, but not nearly in the ratio of increase of expense of operation, maintenance and necessary betterments. Of course, poorer service cannot be permitted under any circumstances; in fact, it should be constantly improved. No street railway man favors lower wages. I certainly do not. Labor earns its wage. Our men work faithfully, and their families are entitled to the comforts won by their toil. No thoughtful man favors reducing the price of materials at the expense of the prosperity of the country, for good prices for materials mean good prices for the makers of materials—the manufacturers and the men who work for them. The comfort and happiness of our people are more closely allied with prosperity than is realized by some. Adversity means idleness, poverty, and distress. Comforts are then no longer obtainable; necessities even are difficult to obtain; for when a workman's labor ceases, his income stops, and when money is lacking, misery takes its place with those who depend for the necessities of life upon the earning of their daily wage. Where there is no daily wage, there is apt to be no daily bread. Prosperity, therefore, is in itself the first necessity.

A proposal to increase the rate of fare is not practicable.

Real estate may be developed and a building left for years without improvement, addition or even a coat of paint on its woodwork. Not so with a street railway. The public, not unnaturally, insists on the newest type of cars, on more cars, on better and still better service, on greater comfort, on perfect hygienic conditions. An unpainted or old-time battered car would no more dare to run on a modern city street railway system than a caravel of Columbus would dare venture to cross the bows of the "Lusitania" in defiance of the new queen of the seven seas. In Buffalo there are buildings on the foremost streets which are three and four and even five and more times as old as the oldest type of street cars in the entire system. And Buffalo is no eyesore in this respect—not at all. The same is true in other cities. The public is more exacting with street railways than with any other form of business.

Public officials reflect the attitude of the public in this regard. Municipalities yearly require more and more from street railways. Re-paving, re-tracking and new paving, new tracks, new cars, care of streets and other items, constantly increasing in number, heavily swell the total of expenditures. Added thereto are taxes; and all these requirements causing increased expenditures to the street railway are in turn used as a basis for increase in taxes. Here we find the one feasible and valid method of relieving the existing situation. The municipality or state can lighten the burden. In view of the heavy expenditure yearly required and the tremendous cost of operation and maintenance, resulting in greater conveniences and facilities to the public, and materially benefiting the municipality as a whole as well as each individual citizen thereof, this added load of taxes could or should be greatly lessened or removed. The street railway then could better fulfill the public demands and could turn to its owners for authority for further improvements, at the same time permitting a reasonable income on genuine investment.

When the Public Service Commission act was in process of passage, I opposed it for two fundamental reasons—the

bestowal of such vast powers for the regulation of the business affairs of corporate citizens, and because it denied the foundation principle of our Republic that every citizen should have the unrestricted right of appeal to the courts. But the Public Service Commission act has now become a law, and while in the hands of unjust or arbitrary commissioners it would bring hardship and perhaps ruin upon the corporations affected, yet the wise choice of commissioners by Governor Hughes insures that while the interests of the people will be looked after, the corporations, which are citizens of the state, will undoubtedly be treated fairly and no unjust demand be made upon them. I am confident that in requiring that betterments and changes be made in the plants of the corporations over which they have supervision, the Commission will take into consideration that it is almost impossible to raise money at this time, a condition largely brought about by unwise, cruel and sometimes unwarranted attacks made upon public utility corporations.

I believe that my fellow-members of the Street Railway Association of the State of New York will take the same position for their companies as I do, when I say for the corporations which I represent, that now the Public Service Commission act is law, we cheerfully obey it; that we will open our books to the commissioners, and will promptly furnish them with all information that they ask which it is in our power to give. If we have made mistakes, let us know it and correct them. If conditions can be bettered, let us co-operate to the utmost with the commissioners to make them so. I am certain that investigation will in some instances result to our benefit; that the commissioners will find the burdens of taxation placed upon us are too great to permit of our rendering the service to the people that we desire and which the commission would like to request of us.

Most street railways are no more over-capitalized than real estate is over-capitalized. I believe every fair and informed student of conditions will corroborate this. Whether it be a trolley line or a ten or twenty-story building, the method and proportionate extent of capitalization are the same. But there the similarity ceases, for after capitalization the building goes its way serenely, the initial cost being the final cost as well; but the street railway through the long period of construction encounters difficulties on every hand, not only labor but questions of consents and adjustments, and through each succeeding year the demands in service and maintenance and operation increase and multiply.

Capital requires and is entitled to a fair return on investment. It is estimated that fully 80 per cent of the street railways of the United States are not paying dividends. Capital invested in street railways finds the electric railway situation of to-day a problem requiring the most serious consideration. Any who would blindly heap further burdens of expense on the electric railways of the country either know little of or care less for the best interests of the people at large.

I am not croaking. This is no caw of a black crow. It is no sandwich-man placard reading "Pity us! Pity us!" I feel that every man present here who is familiar, fully familiar, with the electric railway situation of to-day realizes the truth of what I have said. It is no rumble to foretell disaster. It is no calamity cry. I have endeavored briefly to outline conditions as we who are in the street railway business know them to be. I believe that to-day, considered from the business standpoint as between the electric railway and the "value received" which they give to the people in return for their fare, in most communities the

people have the best of it; that it is the electric railways that are in need of the most help from their father (the state), their mother (the municipality); that they require the "first aid for the injured" from their doctors (The Public Service Commission) to keep them out of the ravenous clutches of their "uncle" (the money lender). The electric railway cannot sell its bonds, and the only money it can secure is what it can beg from its stockholders, borrow from the banks or coax from its conductors.

The future? Show me a man who does not believe in the future, and I will show you a man who has not believed in the past and who is not apt to be believed in the present. Ours is a business whose growth and success depend upon fair and broad-minded management from within, and upon fair and broad-minded treatment from without. It is a great business, devoted to the service and convenience of the people, to the everyday necessity of the public, to the development of outlying sections and open country; to the growth of cities, and to the knitting together of communities; it is a business where the investor and the patron, capital and the customer alike, can be faithfully served, and where the results achieved redound to the benefit of the entire State.

We have progressed steadily. From the bygone days of the horse-cars we have advanced in tremendous development to the commodious electric cars of to-day. Distances once requiring an hour, now are traversed in ten minutes. Country that was desolate, is populous and quick of access. Cities that were sprawled in remote sections are compactly united, with no neighborhood inaccessible. We have done it under difficulties. We have met obstacles seemingly unsurmountable; they have been overcome and the advance has gone on. We are entitled to help and not to hindrance. A vast work lies ahead of the electric railways—a work requiring official co-operation, a work requiring the confidence of investors and the support of capital.

The electric railway situation of to-day, summed up, shows existing systems beset by tremendous expenses, which make relief from heavy burdens of taxation imperative. It shows the great need for extension of electric railways, with capital hesitant to enter where the risks are so numerous and the financial burdens so heavy, and the dividend returns on the investment practically nothing. It shows the whole nation eager for the closer communication of localities. Where trolleys were fought bitterly a decade ago, the opening of new lines to-day is the occasion for a holiday and celebration, with congratulatory speeches, blowing of whistles, ringing of bells, music and cheers of welcome.

It is well for the community; it is well for the passenger; it is well for the employee. In all fairness, should it not be made well also for the man whose money makes all this possible? Is he also not entitled to a fair return on his investment—a fair return, a moderate dividend? The government of a state or city or town can far better afford to throw off the burden of taxation in such an instance as this of the electric railways. In the country the farmer is allowed to work out his road tax, and why not let the street railway perform its full duty to the state and municipality through furnishing every reasonable facility for the comfortable, rapid transit of all the people, instead of compelling it to cripple its resources by paying money into the public treasury for the benefit of other taxpayers who do not represent one-tenth of those who daily utilize the street cars, and whose constant comfort would be thus vastly improved. There is a prosperity of greater possibilities and importance than for the taxable purposes of the moment.

The broader and richer development, the greater growth, the revelation of larger commercial and social resources, all of which are allied with the existence and extension of electric railways, make it not only possible but proper for government to say, "We throw off the burden of taxation—you are of too much service to the state to be hampered by tithes in this time of vast demands and colossal requirements, when you are called upon to do more than is asked of any other form of private business or public service in the whole world."

When we look over this vast nation and see what has been accomplished by the pioneers in electric railway building, the men who have established transportation facilities surpassing those of any other land, we feel a thrill of pride and see the hand of enterprise bidding us on to greater things. Far out ahead looms the banner of the nation's need in electric railway transportation. It is not for us to cry, "Bring back that banner to the line of what has already been accomplished." Rather it is for us to hail it with acclaim and cry, "Let us bring up the line of our achievements to the banner of the nation's need."

We can picture the future day—the day of accomplished deeds, the day of satisfied needs—when that which waited to be done waits no longer. Between now and then lies an era of tremendous endeavor, of ceaseless labor—and through it all we will have no time for needless turmoil, we want no senseless strife. We do want earnest, honest co-operation, not alone with the private investor, but also with the public official—and the day of complete success will come when the investor, builder, operator and official, all act in harmony and unison, based on a common confidence that all are working together for the common good.

REMARKS OF MESSRS. HUMPHREYS AND BURDETTE.

The third speaker, Dr. Humphreys, reviewed the causes of recent agitation, investigation and legislation directed at corporations with such indiscriminate zeal, and expressed his belief that real reforms would be secured, although both labor and capital were likely to suffer from the loss of credit and confidence. He then spoke about the relations between the public service commission and the gas companies of the state.

The last speaker, E. W. Burdette, read a paper on public control from the corporate standpoint, under three heads, past, present and future. He showed how eager the public had been to foster modern corporation utilities until they had become adjuncts of daily life. It seemed natural and proper to suggest that one of the most important functions of the new public service commission of the State of New York should be to determine what a reasonable return is on capital invested in the public service corporations under their control. He hoped that the future attitude of corporations toward public supervision and control would be friendly and not hostile. If he were in charge of a large corporation in New York he would not if he could repeal the existing law, though he confessed he should favor some radical amendment. The greatest objection to it was that everything depended upon the men who administered it. It does not announce the principles upon which they shall act nor undertake to outline the policy which they shall adopt. The fears of disastrous results are dissipated, however, if one entertains a conviction, as he had no doubt the body of the commissioners did, that the true interests of both the corporations and the public are substantially alike. It is not for the interest of the public that the corporations should be crippled in their activities or unreasonably limited in their progress. On the other hand, it is not in the interests

of the corporations that the public should be subjected to exorbitant rates, poor service or contemptuous treatment. He hoped in the end there would be applied a device which, while successful abroad, has not yet had much attention in this country—namely, the so-called "sliding scale," under which, when a proper relation has once been established between a company and its customers, the profits of one are made directly dependent upon the economies to the other.

ENTERTAINMENTS AT ATLANTIC CITY AND OTHER INFORMATION

A. L. Whipple, chairman of the entertainment committee of the American Street & Interurban Railway Manufacturers' Association, has announced the following particulars in connection with the entertainment features of the Atlantic City Convention:

Roller chairs will be furnished to all delegates and guests of the convention wearing official badges for service between the hours of 8:30 a. m. and 9 p. m. from the following stations, to be maintained from Oct. 14 to 18, inclusive: Main entrance of Steel Pier and Marlborough-Blenheim Hotel. Additional stations will be established if found necessary. Arrangement also has been made whereby a special rate of 25 cents per person will be charged delegates and guests, wearing official badges, from any Shill or Reed roller chair station and direct to destination only. If any stop is made the regular rate will be charged. This service and rate will apply from 9 p. m. and up to midnight only. Private chairs at reduced rates can be secured through the committee upon application.

Bathing arrangements have been made with Adams' Baths (Boardwalk above Virginia Avenue), whereby all delegates and guests of the convention wearing official badges will be supplied with strictly first-class accommodations at a special price of twenty-five (25) cents each. This price includes all extras, such as ladies' stockings, rubber caps, straw hats, etc.

On Monday evening, Oct. 14, at 9 o'clock, Miss Kitty Cheatham will entertain for one hour at the Solarium in the Marlborough-Blenheim Hotel. This will be followed by informal dancing. Admission will be by official badge only.

For Tuesday afternoon, Oct. 15, at 2:30 o'clock, the committee will endeavor to arrange a roller chair parade for the ladies.

On Tuesday evening, at 9 o'clock, the annual reception in honor of the presidents and other officers of the associations with their ladies will be held in the Solarium of the Marlborough-Blenheim Hotel. At this reception there will be an orchestra, soloists and refreshments. Dancing will follow the reception.

On Wednesday between 2:30 and 5 p. m. there will be a Ladies' Afternoon at the Country Club of Atlantic City, where golf and tennis can be played. There will be music and an afternoon tea. Attention is called to the ladies' clock golf contest for which prizes will be given. Sight-seeing automobiles will leave the Marlborough-Blenheim Hotel at 2 o'clock sharp, stopping at the Chalfonte en route, and, if necessary, special trolley cars will leave from Boardwalk and Virginia Avenue at 2:30 p. m. sharp. Through the courtesy of the Country Club of Atlantic City, the official badge will secure all the privileges of the beautiful club and grounds, excepting the use of the links, for which the customary fee will be charged. A limited number of golf

clubs may be obtained from the steward, but if convenient the ladies should bring their own "putters."

The third annual Supply Men's amateur vaudeville and theatrical performance will be given at Young's Pier Theater Wednesday, 8:30 p. m. Admission will be by official badge only. The performance will be followed by informal dancing from 11 to 12:30 p. m. in the ballroom of the Marlborough-Blenheim Hotel.

On Thursday afternoon at 2:30 a trolley trip to Ocean City via Shore Fast Line, has been arranged for the ladies of the convention. Special cars will leave Board Walk and Virginia Avenue at 2:30 p. m. sharp, returning about 5:30 p. m.

For Thursday evening a theater party has been arranged for Young's Pier Theater and Savoy Theater. The committee has secured the entire house at both of the theaters, and there should be ample room for all who wish to attend. There will be no reserved seats (excepting for the officers of the Railway Association, who will occupy the boxes). Admission by theater ticket. Choice of seat secured by tender upon surrendering ticket at door. The committee will distribute the theater tickets for both the above attractions from the box office on Steel Pier, on Thursday from 11 a. m. to 1 p. m. The official badge must be presented to secure a theater ticket. If anyone wishes to obtain tickets for ladies or friends, in attendance at the convention, please present the official badge of such persons in each case. Informal dancing will follow, 11 to 12:30 p. m., in the ballroom, Marlborough-Blenheim Hotel.

On Friday afternoon a men's golf tournament will be held at the Country Club of Atlantic City, and on Friday evening an entertainment in the Solarium of the Marlborough-Blenheim Hotel at 9 o'clock by informal dancing.

The County Club of Atlantic City has kindly extended the privilege of its club house to all delegates and guests during their stay, and admission to the grounds will be by official badge. It also extends the privilege of its links for a charge of \$1 a day. Tickets may be obtained from the steward at the club. The club is located at Northfield, and may be reached by the Shore Fast Line electric cars, leaving from Board Walk and Virginia Avenue on the hour and half-hour, returning leave Northfield Station at twenty (20) and fifty (50) minutes past the hour, also by the Atlantic City & Suburban Traction Company's cars leaving from Florida Avenue and Board Walk at 15 and 45 minutes past the hour, returning leave Northfield 10 and 40 minutes past the hour. The running time is about twenty (20) minutes. Those who intend to play may find it well to bring their own golf sticks.

POSTAL, TELEGRAPH, TELEPHONE, EXPRESS AND OTHER FACILITIES

The postal authorities have established a branch post-office in the entrance hall of the Steel Pier (at general information bureau), and all mail addressed to exhibitors on the Steel Pier, addressed in care of the convention, will be distributed. The Western Union and Postal Telegraph companies maintain a branch station on the Board Walk, directly across from the entrance to the Steel Pier (up stairs). This station is open from 9 a. m. to 7 p. m. Both the above companies will have messengers at the general information bureau and patrolling the Steel Pier, and their services may be obtained by telephone.

Through the courtesy of the Delaware & Atlantic Telephone Company, the Bell Telephone Company of Philadelphia, and the American Telephone & Telegraph Company free local exchange service will be given (day and night)

from all stations on Steel Pier only, and free toll line and long distance service, before 9 a. m. and after 6 p. m., to all the delegates and guests upon presentation of the various official badges to the attending operator at the following stations only, from Oct. 14 to 19, inclusive: Marlborough-Blenheim Hotel and Atlantic City Steel Pier.

Arrangements have been made with the Eldredge Express Company, of Atlantic City, to handle the exhibits at the following rates: For taking machinery, castings and cases weighing over 300 lbs. from the railroad station to the exhibit space on the Steel Pier and return, \$5 per ton. For taking consignments weighing less than 300 lbs. each as above described, \$1 per case for the round trip, or 50 cents for one way.

A number of exhibitors have installed private telephones in their booths, and may be reached through the local exchange station on Steel Pier.

The committee has arranged with Miss L. H. Marvel to maintain a stenography and typewriting office, for the convenience of the members of the convention. Her office is on the Board Walk, directly across from the Steel Pier (up stairs), and entrance through the drug store.

SPECIAL NOTICE CONCERNING RAILROAD RATES TO THE ATLANTIC CITY CONVENTION

As stated in Bulletin No. 4 of the American Street & Interurban Railway Association, and also in last week's issue of the STREET RAILWAY JOURNAL, those who desire to go to the convention from the Central Passenger Association territory or from western or southwestern points, must avail themselves of Central Passenger Association card orders if they desire to obtain the reduced rates from points in that territory.

To facilitate the distribution of these card orders among the street railway delegates who wish to avail themselves of the reduced rates, a limited number of these card orders have been sent to Robert McCulloch, general manager of the United Railways Company of St. Louis, St. Louis, Mo.; the Chicago office of the STREET RAILWAY JOURNAL, 590 Old Colony Building, Chicago; the Cleveland office of the STREET RAILWAY JOURNAL, Schofield Building, Cleveland; The Wilson Company, Publishers, 160 Harrison Street, Chicago, Ill.; the Electric Traction Weekly, Cleveland, Ohio, and H. A. Nicholl, president Central Electric Railway Association, Anderson, Ind. All of these card orders are numbered and the association has guaranteed that these orders shall only be used by convention delegates.

Card orders for street and interurban railway company representatives may be obtained upon application to Bernard V. Swenson, secretary, 29 West Thirty-Ninth Street, New York City. Representatives of manufacturing companies may obtain card orders upon application to George Keegan, secretary of the Manufacturers' Association, Park Row Building, New York City.

The Roberts & Abbott Company, engineer for the Washington, Baltimore & Annapolis Railway, states that it has been decided not to ground the brackets supporting the single-phase catenary construction, as illustrated on page 360 of the issue of this paper for Sept. 7. This plan was originally considered, but has since been abandoned. In addition to the overhead equipment mentioned in that article as being supplied by the Ohio Brass Company, the General Electric Company is furnishing the rest of the strain insulators, all of the bracket insulators, the messenger hangers and the section insulators.

THE MONTREAL STREET RAILWAY COMPANY'S FIRE DEPARTMENT

The policy of the Montreal Street Railway Company is to carry its own fire insurance, which is done by laying aside annually an amount equal to what the insurance premiums would be. This money is invested in interest bearing securities and now amounts to over \$341,000. Of course, the success of this practice depends upon an efficient fire department. This has evidently been secured in Montreal, for since the organization of the department in 1902 there has been no fire damage, although there were some 300

tions are so arranged that three or four streams can be played immediately on a fire at any point, and if more are required double the number can be played in three or four minutes. The accompanying cut is a fac-simile of a specimen 13-in. x 14-in. poster placed in the St. Denis Street car house and bearing information with regard to alarm calls, hydrants and general rules in case of fire.

Each shop is also protected by a watchman to guard against fire and theft. The buildings thus guarded are equipped with Acme time detectors, each having ten stations which are punched at five-minute intervals. These stations are placed so the watchman will pass diagonally through the shop several times an hour. Thus a man punches his first box on the hour, his second box five minutes past the hour and so on until the tenth box is reached at forty-five minutes past the hour. This leaves him fifteen minutes in which to examine cars for overheated resistances, burning insulation or other evidences of fire, and to see that all fire appliances are in good order. He then returns to the first station on the hour and begins his rounds again, remaining on duty from 7 p. m. to 7 a. m. Watchmen must know how to give all fire alarms, make themselves familiar with fire drills and all points whence fire calls can be sent in. In all cases of fire, either on the company's property or nearby property, the fire marshal must be telephoned at once.

The fire department as a whole is under the direction of one fire marshal, who is directly responsible to the manager. He has charge of all fire drills, which, as a rule, are held weekly, but oftener if the regular tests are unsatisfactory. Besides these schedule drills, the fire marshal is likely to call unexpectedly day or night to test the efficiency of different detachments. The fire marshal must see that all fire appliances throughout the system, such as

hose reels, hydrants, fire extinguishers, fire pails, etc., are kept in good order for immediate application; that all electric wires and connections are properly insulated, and protected in accordance with the Fire Underwriters' specifications; and that all buildings and yards are properly cleaned and no inflammable material exposed in dangerous places.

The watchmen are also directly under the charge of the fire marshal and it is his duty to see that they obey the rules laid down for protecting the buildings from all possibility of fire.

The Continental Tunnel Company has been organized by the Denver, Northwestern & Pacific Railroad to build a tunnel through James Peak.

MONTREAL STREET RAILWAY COMPANY.

CITY FIRE ALARM BOX.

ST. DENIS STREET, at the South end of the Subway, or Telephone Main 141.

PRIVATE CALLS.

ONE Ring front of Shop. **TWO** Rings rear of Shop. **THREE** Rings Office.
FOUR Rings Blacksmith. **CONTINUOUS RINGING**, Storage Shed.

HYDRANTS.

No. 1 Hydrant is at the front of the shop on the east wall. **No. 2** Hydrant is at the front of the shop on the west wall.
No. 3 Hydrant is at the rear of the shop on the east wall. **No. 4** Hydrant is at the rear of the shop on the west wall.
No. 5 Hydrant is on the centre of the east wall. **No. 6** Hydrant is on the centre of the west wall.
No. 7 Hydrant is on the Office.

The position of men for fire drills will be the same as at present. When it becomes necessary to make changes notices will be posted for your information.

SPECIAL INSTRUCTIONS FOR FIRE DEPARTMENT.

Every employee of the Company in any car shop, work shop, or power house, will attend to fire drills and interest themselves in the Company by doing all in their power to guard against fire. The men will form up for fire drills under instructions from the Fire Marshall or from their Engineer or Foreman in charge.

In guarding against fire, the most dangerous things around the shops or cars are cotton waste and paper, especially if there is any animal oil or lard on them. Never place these in a concealed place or allow any to be left in the pockets of your overalls when work is over. Painters using boiled linseed oil and turpentine thereon should not forget that it is liable to create spontaneous combustion if left in any place where there is heat,—where the direct rays of the sun strike, or around heated pipes. Paper with new printer's ink thereon is dangerous as regards fire. Sweepings of a machine shop should never be placed over iron or steel shavings; this mass of disintegrated iron is enough to incite heat and combustion. Iron and steel planings and turnings when mixed with oil are also dangerous.

Men handling fire apparatus must be careful not to damage the same, and remember not to strike the brass couplings or nozzle against any hard substance such as shop uprights or rails when crossing pits, car wheels, etc. When it is necessary to pass hose under or around cars great care must be taken to prevent cutting the hose against the wheels. In using fire extinguishers, I would call your attention to the small nozzle which is very easily broken. Do not allow any weight or undue strain to be placed on the weak point. Engineers or watchmen will call the attention of the Fire Marshal to any part of the appliance which is out of order, or has been used in case of fire in order that he may examine the same. If extinguishers are used, they will require re-charging. It will be the duty of any employee who discovers fire to first ring in an alarm at the Company's private fire bell and afterwards from the street box or by telephone to call the City Brigade. Any employee not attending to this will show unpardonable carelessness and lack of interest in the Company's affairs and may expect to be treated accordingly.

W. G. ROSS, *Managing Director.* **J. KERR,** *Fire Marshal.* **D. McDONALD,** *Manager.*

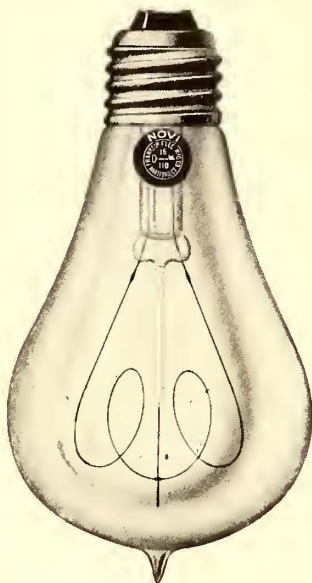
SPECIMEN OF THE POSTER USED BY THE MONTREAL STREET RAILWAY COMPANY'S FIRE DEPARTMENT, GIVING INFORMATION ON THE POSITION OF FIRE BOXES, HYDRANTS, ETC., TOGETHER WITH SPECIAL INSTRUCTIONS

instances when the lack of a fire department might have resulted seriously.

The fire department consists of both night and day companies in all power houses, car houses, shops and other buildings of the company. The men are divided into detachments, each under a captain and a nozzle man, who is second in command. In general there are six to eight men in such a company and three to five detachments at any one place according to the size of the structure. To each of these detachments is consigned the care of one line of hose and one reel. Axes and fire ladders are used only when the men receive instructions. In addition to the usual hose and hydrants, the buildings are furnished with chemical extinguishers and fire pails. The hose connec-

AN INCANDESCENT LAMP DESIGNED TO WITHSTAND HARD USAGE

An incandescent lamp designed and constructed to meet the demand for an incandescent lamp that will withstand more than the ordinary amount of hard usage is offered for street railway use by the Franklin Electric Manufacturing Company, of Hartford, Conn., under the name Novi. Owing to the shape of the filament utilized in this light the end-on or tip candle power is considerably in excess of that developed by the regular type of lamp containing the ordinary oval form of filament. As will be seen from the illustration, an efficient filament support is obtained with but one anchor, insuring a uniform product of high quality. This support is formed by a small glass column, extending from the platinum seal to a point a little below and between the upper portions of the filament coils, and from this point a metal wire extends to a similar distance below the lower portion of the center coil. Through this improved method of construction a



INCANDESCENT LAMP FOR HARD SERVICE

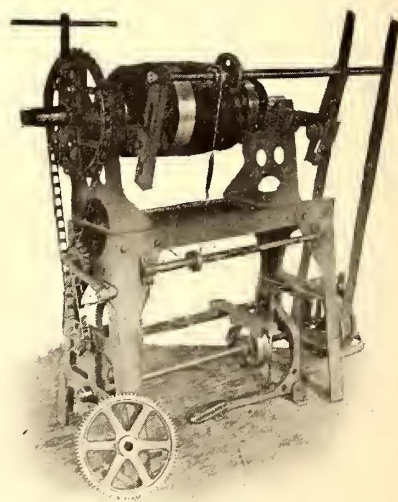
maximum distance between the leading-in wires and the point of support is secured and the greatest rigidity obtained. It is impossible for the filament to droop and touch the glass or for the coils to become entangled and short-circuit it. It is said that the vibration always present in street cars which proves so injurious to the life of the ordinary incandescent lamp has absolutely no effect on the Novi street railway type. The company proposes to exhibit the lamp at the convention of the American Street & Interurban Railway Association at Atlantic City by means of a vibration machine.

A NEW MACHINE FOR BANDING ARMATURES AND WINDING FIELD AND ARMATURE COILS

A machine designed along new lines for the exclusive purpose of banding armature and winding field and armature coils, which is easy to control, occupies a small amount of floor space and operates at high speed, is being built for railway use by the Device Improvement Company, of Hanover, Pa. The machine consists of two substantial cast-iron legs bolted to a steel bed, the legs containing the babbitted bearings for the shafts and belt shifter. The left hand head is bolted to the bed, but the right hand is adjustable to accommodate armatures of different length. The armature shaft revolves in each head on two soft brass rollers of wide face, thus preventing injury to the armature bearings. The outer bearing on each head is adjustable to accommodate the various diameters of shafts. Each head carries an inwardly projecting arm to which are fastened the slotted strips carrying the steel feed rod. The rod can thus be adjusted to the proper position to suit the operator for any diameter of armature. The feed rod is of steel one inch in diameter, threaded its entire length to receive the feed wheel which on its hub carries the inde-

pendently revolving grooved wheel for guiding the band wire. The armature is driven by the clutch sprocket wheel and a detachable link chain. The clutch jaws are self-centering on the shaft in one direction and the shaft need be only approximately centered by the eye in the other, as any discrepancy due to the sprocket not being centered is taken up by the slack in the chain and the idler. The jaws are brass lined, preventing any possible injury to the armature shaft in case sprocket should slip if not properly tightened. The faces of the jaws are wide and if properly set down on the shaft the sprocket will not slip on armatures of the largest diameter.

Power is transmitted to the machine direct from the line shaft by a 2¼-in. belt running over light and loose 10-in. pulleys. It is therefore not necessary to put up a countershaft, and the machine can easily be adapted for individual motor drive. A yoke bolted to the legs supplies the outboard bearing for the shaft, and as a support for the belt shifter rod on the opposite end of this shaft are two pinions of different diameters. Meshing with these pinions are the corresponding gears, the two ratios being 4 to 1 and 2 1/3 to 1. The speed of the armature may be increased or reduced by changing the speed of the driving shaft to suit the convenience of the operator. This speed change can be made in about a minute by removing one gear and putting on the other. On the outside of the shaft carrying the gears is pinned the small sprocket, which in turn transmits the power to the clutch sprocket through the chain, the adjustable idler keeping the chain always tight. The stopping and starting of the machine is entirely controlled by the foot lever, which when depressed applies the brake, locks the driving shaft and shifts the belt to the loose pulley. To start the machine the foot lever is disengaged from the dog, which is screwed to the floor, and the spring on the outside of belt shifting rod automatically pulls the belt to the tight pulley and releases the brake. This method of control is quick, positive and sensitive, it being possible to move the armature one-half inch or less. It also leaves



ARMATURE BANDING AND WINDING MACHINE

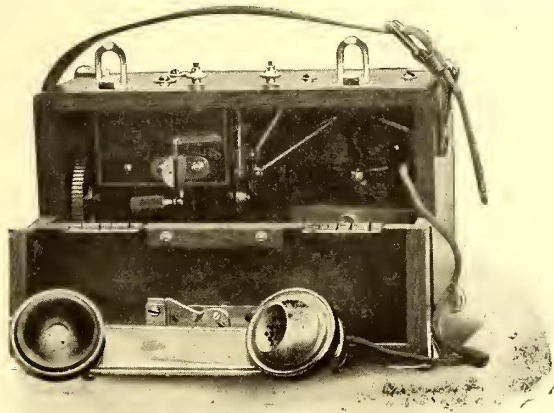
the hands of the operator free to perform the operation of banding, putting in clips and soldering, etc. The banding and winding machine may be used with the company's band wire tension machine, in which case it forms the combined machine. It may also be used with any other tension device. A simple attachment is furnished extra with this machine for field coil winding, which can be put on in a few minutes.

A COMPACT TELEPHONE TESTING SET FOR USE UNDER HIGH POTENTIAL INFLUENCES

The necessity for developing a durable and compact testing telephone for the use of linemen which was created by the practice of installing telephone circuits parallel to high tension power circuits has resulted in the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., designing a testing set possessing several unusual mechanical features. As shown in the accompanying illustration, the apparatus is arranged in a well constructed heavy oak box, reinforced and protected at each of the eight exterior corners by heavy cast brass knobs. All hinges and snap catches are especially designed for this instrument, and a heavy carrying strap of sole leather supports the test set evenly.

The apparatus in the talking and signalling circuit is thoroughly insulated and well protected from injury. One of the special features is a one-half micro-farad condenser in the receiver circuit, to eliminate a switch hook on the box, for the purpose of breaking the line circuit. With this arrangement the instrument may be rung any time when on the line. The ringer is not across the line when ringing out. The generator shunt cuts out the bell, putting the full voltage of the generator on the line when ringing with the generator, thus giving the greatest power.

The all-metal combination telephone shown in the view of the open set embodies many features which make it an especially good instrument for use as a lineman's testing telephone. Like the complete telephone cabinet, it is designed to withstand rough handling, and the manufacturers claim that it has no parts which are perishable. The frame is made of seamless brass tubing especially drawn. The regular solid back transmitter electrodes are enclosed in a



GENERAL VIEW OF TESTING SET

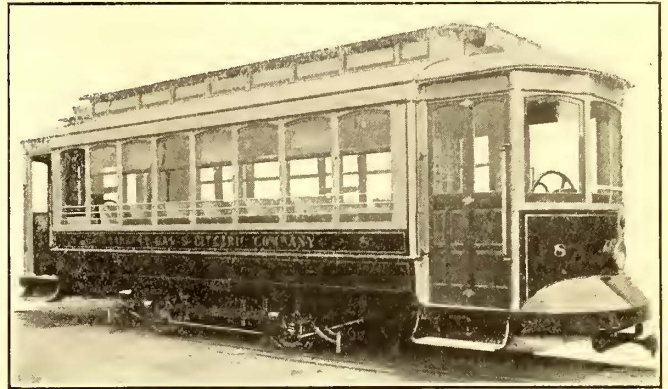
case consisting of three pieces mounted directly on the frame by large screws. Perforated cast-brass mouthpiece and clamping ring hold the diaphragm and diaphragm spring in place.

The receiver is the regular operator's type in a specially designed case, having all exterior sides and edges made of metal in order to prevent breaking the ear cap, which is enclosed as much as is practicable. The microphone is provided with a battery push button that cuts in the battery when necessary or only when talking. This button also prevents the annoyance of side tones taken up by the transmitter when listening in on the line in a noisy place. Both transmitter and receiver interior parts are accessible by unscrewing the clamping rings. This form of complete testing telephone, known as No. 841 3-bar, No. 842 4-bar and No. 843 5-bar generator call linemen's test set, has been

given a severe test by some of the leading high-tension power companies operating telephone lines, and has proved entirely satisfactory for unusually hard service.

SEMI-CONVERTIBLE CARS FOR TEXARKANA, ARK.

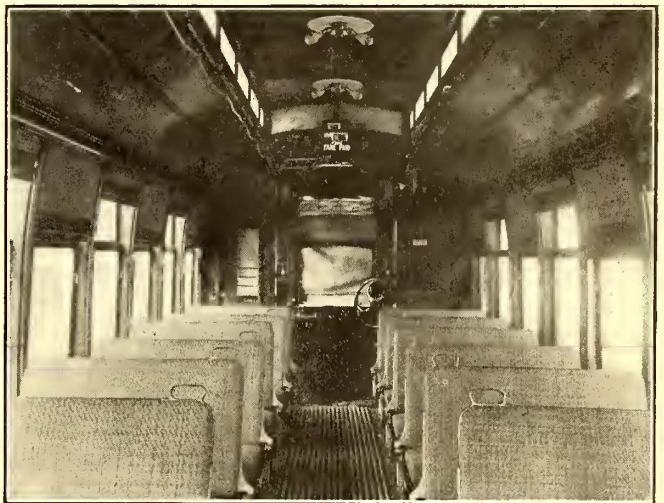
One of the many roads to adopt the semi-convertible car last summer was the Texarkana Gas & Electric Company, successor to the Texarkana Light & Traction Company, which absorbed the Texarkana Traction Company, of Texarkana, Ark. The cars were built by the American Car Company and it was found expedient to order them of dif-



EXTERIOR OF TEXARKANA CAR

ferent lengths, those measuring 20 ft. 8 ins. over the bodies (one of which is illustrated) being intended for service in the city proper and the larger car—28 ft. over the body—for park and suburban service.

The semi-convertible car illustrated is generally similar to other cars of the type illustrated in these pages, and the suitability of the window system for excursion service especially has been touched upon in these columns. The smaller cars are mounted on the No. 21-E single truck with 7 ft. 6 ins. wheel base; the larger cars take the No. 27-G1, with 4 ft. 6 ins. wheel base. The chief dimensions of the

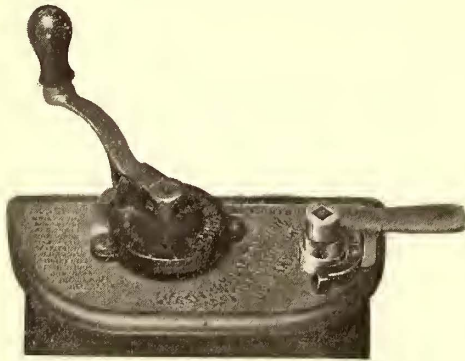


INTERIOR OF TEXARKANA CAR

single-truck cars follow: Length over end panels, 20 ft. 8 ins.; over crown pieces, 30 ft. 1 in.; width over sills, including panels, 7 ft. 9½ ins.; over posts at belt, 8 ft.; height from floor to ceiling, 8 ft. 4¾ ins.; from track to under side of sills, 26¾ ins.; size of side sills, 5 ins. x 3¾ ins.; end sills, 3½ ins. x 6¾ ins. All the cars are finished in cherry, with birch veneer ceilings. The single-truck cars are each equipped with two 25-hp motors and the double-truck cars with four.

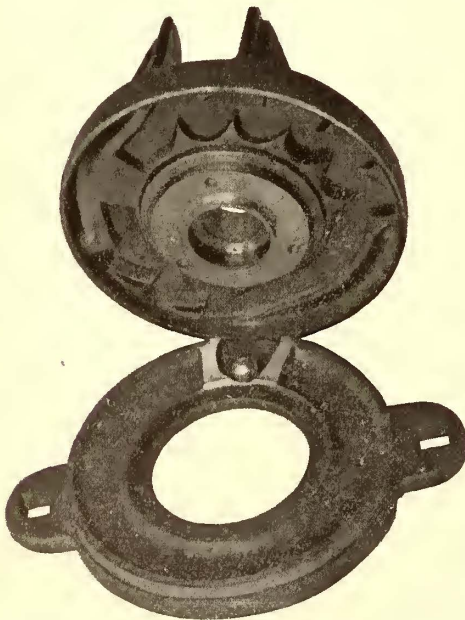
A SIMPLE REGULATOR OF FEED.

The Durkin Controller Handle Company, of Philadelphia, has recently still further simplified its controller regulator, a fact that warrants the recording at this time of the details of the apparatus. Essentially the device consists of a circular box with a stationary base bolted to the controller and a revolving top. Between the two is a chilled steel ball confined in a cup which allows it a limited movement. As the cover is turned the ball follows the irregularities of



CONTROLLER REGULATOR ATTACHED TO CONTROLLER

the route laid out for it on the inside of the lid and, no matter how slowly or how quickly the handle is turned, there is a full stop at each feeding point. This stop is not prolonged, however, for the ball drops at once and moves freely to the next point. The power can be turned off from any point instantly without hindrance. The accompanying illustration shows plainly the manner in which the ball is penned up and does its work. The complete regulator leaves the factory permanently riveted together, and the



VIEW OF REGULATOR SHOWING HOW BALL IS PENNED UP

entire box is simply bolted to the dial of the controller with two bolts and is then ready for use, no change being required in the controller. The ordinary handle is used in connection with the regulator, slipping on and off as required. The wear on the steel ball inside is trifling as the bearing on which the cover turns is brass against iron.

Some figures giving results of exhaustive tests of the regulator—tests which led to large installations of the device—show how great the saving is in the single item of armatures. The official who made the test prepared a statement showing a remarkable saving in the first year over the cost of equipping the cars. In the same barn, with the same mileage and general conditions, twenty cars fitted with regulators were compared during four months with twenty cars not so equipped. At the end of the test the cars without regulators had lost twenty-nine armatures; those with regulators had lost seven armatures. The expense for armatures for the cars not equipped was \$1,160, a cost per car per year of \$174. The expense for armatures for the cars controlled by the regulator was \$280, a cost per car per year of \$42. Adding the cost of the regulator, \$12.50, gives \$54.50 per car against \$174, showing a saving on each car per year of \$119.50.

Besides the usefulness of the regulator in the avoidance of electrical troubles due to fast and irregular feeding and reversing, it saves current at starting, avoids costly "peaks" in the power load, and increases the comfort and safety of passengers. Details of the results obtained in actual running, as well as of prolonged tests, of the regulator can be obtained by corresponding with the company direct.

NEW CARBON BRUSHES

The Speer Carbon Company, of St. Marys, Pa., whose carbon brushes for different classes of service have long been in use, has designed a reinforced brush in three grades which retains all the essentials that have made for the success of the company's other carbon brush products. The different grades are known No. 1 R, No. 2 R and No. 27 R, and each possesses some virtue peculiarly its own. No. 1 R, for instance, is a medium hard, fine, close-grained carbon and wears slowly and uniformly. It has given entire satisfaction both as regards efficiency and in preservation of the commutator. Grade No. 2 R is what the company calls its "high grade" re-enforced brush. It possesses all the properties which have made the "high grade" so much appreciated, and like the latter it can be used for current densities greatly in excess of those permissible with ordinary carbon. It presents a very soft frictional surface. Grade No. 27 R presents from an electrical point of view very remarkable properties, its average conductivity being three or four times greater than that of the ordinary carbon. This carbon acquires a very dense and uniform texture and is of low resistance. It is specially adapted for single-phase work.

The directors of the New Orleans Railway & Light Company, after considering the questions of transfers and half-fares for school children, have decided to recommend the inauguration by the various companies making up the New Orleans railways of a system of transfers for cash fares between certain lines. The board, however, could not see its way to granting half-fares. A consideration controlling the board is that the trust deed securing the 4½ per cent bonds of the company binds the company to preserve in their integrity franchises of the various companies whose stocks it controls, and deprives it of the power of agreeing to the reduction of the 5-cent franchise fare, even if it could otherwise see its way to making such a recommendation.

LONDON LETTER.

(From Our Regular Correspondent.)

Some interesting reading matter has been published during the past month regarding the various tube railways operated by the Underground Electric Railways Company, as the half-yearly meetings of three of those tubes were held during the past month. At the meeting of the Bakerloo Tube, the chairman stated that this was the second half-year of full working since the opening of the line, and that the number of passengers carried was 9,936,955, the passenger receipts amounting to £61,501, and the operating expenses to £42,128. The net result of the half-year's working was a credit balance of £6,744, which had been carried forward. He also stated that during the year two new stations had been opened, the one at the Great Central Railway Station, and the other at Edgware Road, but that it had been decided for the present not to extend the tube as far as Paddington. No doubt this extension would be an advantage, so that connection could be made with the Great Western Railway Company, but, for various reasons, it was thought better to postpone the work for the present, and as their powers did not expire until 1911, there was plenty of time. At the meeting of the Piccadilly & Brompton Tube they had now had the experience of a full half-year's working. They had carried 11,953,795 passengers, and the passenger receipts had been £102,836, the operating expenses amounting to £75,794, and, after paying the necessary interest on the Debentures, etc., the result showed a deficit of £5,270. The directors considered this very satisfactory, as the best results could not be expected immediately, and the opening of the Hampstead Tube would undoubtedly bring them further business. At the meeting of the Hampstead & Highgate Tube, there was little to say, as this tube had been opened so recently, and no figures were available except those of capital account, and the figure for this tube amounted to £5,539,446. The work, however, was now completed and it represented the very latest improvements in tube construction. While there is yet room for a great improvement in the traffics upon these tubes, the whole tone of the meetings was one of optimism, as the directors seem to think there is no doubt that they will do much better in a year or two when Londoners get better educated as to the advantages to be derived by traveling on these tubes and more familiar with their ramifications and the facilities offered for inter-communication.

The London County Council are face to face with the prospects of a severe struggle with their men, who are up in arms against them for different reasons. As was intimated in this column a month or two ago, the men have objected very seriously to the medical examination, but since organizing and holding many meetings they have developed a series of complaints, all of which will have to be settled sooner or later. One of the chief demands made by the men is the appointment of a board of conciliation to consider any disputes or differences which may arise, and the men are also extremely anxious to get a working day of eight hours and slight increases of wages. The whole matter will probably come before the Highways Committee at its first meeting in October. Meanwhile the work of electrification in different portions of London is being actively carried on. The electrification on the conduit system of the route from Highbury to the Archway Tavern at Highgate is now almost completed, and the whole of the intricate work of the Highgate terminus is ready for traffic. The work of electrification of the system between Vauxhall, Brixton, Loughborough Junction, Camberwell and Tulse Hill is also proceeding apace, and this section ought to be ready for immediate service. A service of trams will then be run between Stratham and Victoria, via Brixton Road, Stockwell, Clapham and Vauxhall, crossing the new Vauxhall Bridge. The electrification of the tramways which have for years started at Holborn and gone by way of Gray's Inn Road to King's Cross, and then northward by way of Pentonville Road, York Road and Caledonian Road, has brought up an interesting and important question, which will require decision in the near future, as to a great improvement which is possible in the vicinity of King's Cross Station of the Metropolitan Railway. As the route of tramways is at present, the cars have to go round the end of Pentonville Road, turning a very sharp corner, and coming back towards the foot of Caledonian Road. This means that the whole of this traffic has to go round a very sharp peninsular made by the King's Cross Station and the Metropolitan Railway, and it is now suggested that if a bridge were built through the

station and across the tracks of the Metropolitan Railway Company this sharp angle would be prevented. No doubt the building of a new bridge would be a vast improvement to the vicinity, as there is a great congestion of traffic at this point. The question of expense, however, is one that would have to be settled between the County Council and the Borough of St. Pancras, and compensation would also have to be given to the railway company. The bridge, however, would undoubtedly improve the property in the vicinity, and little difficulty would be incurred from the property holders if the Council and Borough of St. Pancras could come to some agreement.

The contract which the London County Council awarded to Dick, Kerr & Company for the electrification of the tramways on Bow Road by means of the G. B. surface contact system has led to altercation between the County Council and the Boroughs of Stepney, West Ham and Leyton, and it would look as if the arbitration of the Board of Trade would have to be resorted to. The situation has, of course, arisen on account of the hostility of the Borough of Stepney to have overhead wires which the London County Council were desirous of using on this system. As Stepney would not give way in this matter and as the ordinary underground system, not only being extremely expensive but impracticable in the Bow Road, owing to the underground railway, the G. B. surface contact system was adopted. As it is intended, however, to have through running trams from West Ham and Leyton and as these routes are equipped on the overhead system it is pointed out now by these boroughs that the complications which would ensue would be preventative of all satisfactory working, as it would be necessary for the West Ham cars to be equipped not only with trolleys for their own system but with the necessary skates for the G. B. surface contact system, and also with plows so as to traverse a conduit section of the tramways near Aldgate. Such complications are necessarily undesirable as well as expensive, and the whole question is one which could easily be avoided if the Borough of Stepney would only take a reasonable view of the situation and allow the construction of overhead wires along Bow Road, the beauty of which could not possibly be spoiled in the opinion of anyone with even the most vivid imagination.

There has just been opened at Olympia in London, by Sir Alexander Kennedy, an Engineering and Machinery Exhibition. A similar exhibition was held last year or the year before and was a great success, and this year's exhibition promises to be even more successful. There are exhibits to the value of about £100,000 and weighing between 2500 and 3000 tons. Most of the exhibits show labor-saving devices in machinery and are operated electrically.

The Municipal Tramways Association held its Sixth Annual Conference during the past month in the Town Hall, Manchester. In the usual way the delegates were received by the Lord Mayor and the Chairman and Members of the Manchester Tramways Committee, after which J. M. McElroy, president of the association and general manager of the Manchester Corporation Tramways, read his presidential address. R. L. Acland followed with a paper on "Long Wheel-Base Trucks," and afterwards A. Baker, general manager of the Birmingham Corporation Tramways, gave a paper on "Employees' Hours of Labor, Rates of Pay and Methods of Computing Same." Luncheon was served at the Town Hall at the invitation of the Manchester Tramways Committee, after which special cars were provided for the ladies of the party who were conveyed to Heaton Park, where tea was provided. The delegates were furnished with special cars which took them to the Hyde Road car repair works and the Stuart Street generating station. In the evening there was a reception by the Lord Mayor at the Town Hall which was well attended by the delegates and their ladies. The following day, after the business of the association, a paper was delivered by J. Dalrymple, general manager of the Glasgow Corporation Tramways, on "Staff Organization," after which luncheon was provided at the Town Hall, Pendleton, at the invitation of the Salford Tramways Committee. In the evening a dinner was extended to the delegates by J. Calvin Brown, managing director of the "White City," special tickets of admission to the various side shows being provided for everyone attending. On the following day, a paper was given by A. L. C. Fell, chief officer of the London County Council Tramways, on "Rail Corrugations," and communications from F. Spencer, general manager of the West Ham Corporation Tramways, on the subject of the statutory obligation to maintain the pavement between the rails and for 18 ins. on the outer side of the tramway tracks. In the afternoon, an excursion was arranged to Tatton Park.

Knutsford, special cars leaving the vicinity of the Midland Hotel for Altrincham. From Altrincham the party was conveyed by motor buses to Knutsford, where, by the kind permission of the Earl of Egerton, it was conducted through the grounds and gardens of Tatton Park. Tea was provided at the Royal George Hotel, Knutsford, and the party arrived back in Manchester shortly after 7 o'clock in the evening.

The London United Tramways, Ltd., has incurred the severe displeasure of many districts through which its tramways run, on account of the noise accompanying the operation of its cars. In certain portions this noise has gradually got to be an intolerable nuisance, caused largely by the rail corrugations, but, according to various authorities, also owing to the defective condition of the machinery and trucks connected with the cars. The districts of Hammersmith, Twickenham, Ealing, Hampton Wick, Hanwell and Teddington have now determined to apply for an injunction to restrain the company from running cars, unless it complies with a request to make some effort to abate this nuisance. Teddington is taking the lead in the matter at present, as it estimates that it has lost in depreciation of house property at least the sum of £30,000 and another £30,000 for loss on empty houses.

A year's working has now been completed by the Wemyss Tramway Company, and all concerned are to be congratulated on the success of the undertaking. Sellon, C. E., estimated that the population would be carried thirty-three times over, a modest estimate, exceeded in reality by about half, seeing that 2,000,000 passengers have been booked. Starting with nine cars, the company has now thirteen and a claim on four large workmen's cars. A new shed is in course of completion, new offices are to be built shortly, and tramway tea-rooms and shelter are being erected.

Sir Colin Scott Moncrieff has made his award to the Accrington Steam Tramway Company in the suit with the Haslingden and Rawtenstall corporations. For so much of its undertaking as belonged to the borough the company asked from Haslingden £24,203. It has been awarded £14,203, which includes the depot and its land. From Rawtenstall the company asked £7,375. It is awarded £4,252. The corporations bear the costs. Haslingden is arranging with the company to continue its running of the cars until the end of the year. It proposes to commence electrifying the system as early after Christmas as the weather permits, and meanwhile is negotiating with Accrington and Rawtenstall corporations as to through running powers.

Leeds Corporation has submitted a draft agreement to Pudsey, in which it agrees to take over the tramway powers of the Pudsey Corporation, and proposes to construct a line from their terminus at Stanningley to Chapeltown, Dudsey. Leeds agrees to pay Pudsey the expenses of obtaining the Order, and agrees, upon the expiration of thirty-five years, or upon the expiration of any subsequent five years, to Pudsey purchasing from it the tramways, upon paying a sum equivalent to the fair market value of the cars, etc., and permanent way; but without any allowance for goodwill or loss of profits.

We recently made a remark in this column that at the last annual meeting of the British Electric Traction Company, Sir Charles Rivers Wilson made the statement that tramway fares all over the country were too low and would have to be raised, and that in their particular case, in connection with their various enterprises, an early attempt would be made to do so. This attempt has been made, but, as far as is visible at present, not entirely successfully. In the vicinity of Birmingham, when the fares were raised, a large number of people who used to employ the tramway in question found other methods of transportation, some even preferring to walk rather than submit to the increased fare. The Yorkshire Electric Tramway Company has also endeavored to increase its fares in Dewsbury, and has been met with a boycott of its system by the workpeople in the district, many of whom are now to be seen walking long distances to and from their work. Increase of fares, therefore, is not such a simple operation as one would imagine, and it would appear that some other method would have to be adopted for increasing profits.

Few of the electrical construction companies have such a satisfactory record as Dick Kerr & Company, whose annual report appeared a few days ago. The company has managed to maintain for the past eight years an excellent average level of profit, and it has never paid less than 10 per cent on its ordinary capital. The total issued share and mortgage capital is divided into £305,000 6 per cent preference shares, £250,000 ordinary shares and £276,000 4½ per cent debenture

stock. The gross profit has averaged £84,100 per annum and the net profit, which is struck after allowing for debenture and all other charges, £74,400 per annum. In 1907, the gross profits were £80,476 and the net profits £67,364. The ordinary or common stock received 10 per cent dividends.

The company has carried out many contracts of importance in all parts of the world. It electrified the Liverpool and Southport section of the Lancashire & Yorkshire Railway, has been responsible for much of the equipment of the London County Council's tramway system and has conducted successful electrical installations in Hong Kong, Burmah, Japan, the Straits Settlements, Siam, New South Wales, India and other countries. It holds the lease of the Edinburgh Corporation tramways, which it has sublet to the Edinburgh & District Tramways Company.

A. C. S.

CONVENTION OF SIGNAL APPLIANCE ASSOCIATION

Arrangements have been completed for the exhibits and entertainment at the convention of the Signal Appliance Ass'n, to be held in Milwaukee Oct. 8, 9, 10, the scheme of arrangements being very similar to that which was carried out so satisfactorily last year at Washington. A draft is appended of the programme contemplated, which will be adhered to as closely as possible.

PROGRAMME "BUSINESS."

- Tuesday, October 8, 10 a. m. to 1 p. m.—Meeting
2 p. m. to 4:30 p. m.—Meeting.
Wednesday, October 9, 9 a. m. to 12 noon.—Meeting.
1 p. m. to 3 p. m.—Meeting.
3 p. m. to 5 p. m.—View Exhibits.
Thursday, October 10, 10 a. m. to 1 p. m.—Meeting.
2 p. m. and thereafter.—Indefinite.
Tuesday, 1 p. m. to 2 p. m., and Wednesday, 12 noon to 1 p. m., luncheon will be served at the place of meetings.

PROGRAMME "ENTERTAINMENT."

- Tuesday, October 8, 2 p. m.—Ladies, Trolley Ride to Waukesha.
8 p. m.—Theater Party.
Wednesday, October 9, 10 a. m.—Ladies, Art Gallery and Museum.
2 p. m.—Auto Ride to Whitefish Bay or Tally Ho (optional).
7:20 p. m.—Banquet.

The speakers at Banquet will be as follows:

C. R. Peck, General Counsel, Chicago, Minneapolis and Saint Paul Railway Company, "Attitude of Railroads to Safe Transportation of Persons and Freight."

W. R. Gardner, Vice-President, Chicago & Northwestern Railway, "Relation of Signaling to Railway Operation."

John I. Beggs, General Manager, Milwaukee Electric Railway & Light Company, "Signaling for Trolley Lines."

E. Morse, President, Simplex Electric Company (for the Signal Appliance Association), "Relation of the People to the Railroads."

Azel Ames, Signal Engineer, New York Central & Hudson River Railroad (for the Railway Signal Association), "What the Signal Engineer Is Doing."

MUSIC.

Thursday, 10 a. m.—Indefinite.

Hotel Pfister will be headquarters of the association, the meetings being held in the Public Service Building. Room No. 435 of this building has been assigned for exhibition purposes. The treasurer of the association is H. M. Sperry, resident manager of the General Railway Signal Company, New York.

The association is only a little more than a year old, but has prospered in that short time beyond expectation. It numbers among its members some fifty signal companies and others along lines closely identified with signaling, and the meeting in Washington last year was very successful. Mr. Sperry's report as treasurer of the association was made simultaneously with the announcement of the coming meeting, and serves as a good index to what the association has already done in the line of organization. A list of both members and associate members in attendance at Washington is given, also the constitution and by-laws.

The financial report shows gross receipts of \$2,573 and a balance of \$1,052, after deducting Washington expenses and the expenses for the year.

EIGHTH ANNUAL REPORT OF THE AMERICAN RAILWAYS COMPANY

The report of the American Railways Company for the year ended June 30, 1907, has just been made public. The gross earnings of the subsidiary companies were \$2,855,320.48, showing an increase over 1906 of \$245,043.16, or 9.4 per cent. The total number of passengers carried was 67, 624, 731, showing an increase of 6,517,323, or 10.66 per cent. After paying all fixed charges, interest and taxes, the net income is \$384,558.63. There was paid in dividends to stockholders of the American Railways Company \$304,392, showing an increase over the amount paid in the previous year of \$53,007 (due to the increase of the capital stock during the previous year), leaving a balance to the credit of surplus account \$80,166.63, which, after adjustments herein-after noted, leaves a balance to the credit of surplus on June 30, 1907, of \$478,273.72. There has been charged off during the year against surplus account the sum of \$8,981.21, being the final settlement of the old claims of the Economy Light & Power Company, of Joliet, Ill.

In presenting the report J. J. Sullivan, president of the company, said in part: While the growth of the different companies owned and operated has been eminently satisfactory to us, the increased cost of operating and maintaining the properties at the high standard that we have established has amounted to almost 18 per cent. This increased cost was caused by the increase of the very high prices of electrical machinery and all other supplies required in the maintenance and operation of the properties of the company and the advance of the wages of conductors, motormen and other employees.

In December, 1906, we paid \$975,000 with interest, being the balance remaining unpaid when we bought the Scranton Railway Company in December, 1905. We borrowed the money on time to enable us to make this payment and close the transaction, which has turned out to the best interests of this company. The result of the operation of the company so far gives ample evidence of the wisdom shown by the board of directors in making the purchase. In April, 1907, we arranged to issue a collateral trust loan of \$2,500,000, at 5 per cent interest, running for ten years, redeemable at any interest period at 102½ per cent and interest. We pledged 39,500 shares of the common stock of the Scranton Railway Company, and 29,500 shares of the stock of the Altoona & Logan Valley Electric Railway Company as collateral for that purpose. These bonds are now being sold, and will provide the funds to enable us to pay off the floating debt referred to above, also to build three large car barns, make some extensions and purchase additional cars and equipments. During the year we bought and paid for in Scranton, Pa., nine acres of land costing \$31,500, on which we will erect a fire-proof car barn. In Joliet, Ill., we bought and paid for a tract of land having a valuable water supply running through the property. At Tipton, Pa., we bought 4.45 acres for right of way, having in view the straightening of our tracks at some future time.

During the year the fire insurance fund of the company has been continued with success. This fund shows an increase for the year of \$16,068.75, and the par value of the securities held for fire protection on June 30, 1907, is \$146,500.

We have spent during the year for new construction and equipment and also in the purchase of real estate needed on account of the continual growth and development of the different properties the sum of \$918,913.06, divided among the different properties as follows:

Altoona & Logan Valley Electric Railway Company.....	\$200,465.50
Chicago & Joliet System.....	95,114.84
The Peoples Railway Company.....	88,395.53
The Springfield Railway Company.....	60,145.65
Bridgeton & Millville Traction Company.....	5,576.06
Bridgeton Electric Company.....	19,724.16
Home Electric Light & Steam Heating Company.....	13,327.46
Franklin Real Estate Company.....	41,264.52
Dellwood Park Company.....	154,123.29
Scranton Railway Company.....	240,776.95
Total	\$918,913.96

TREASURER'S REPORT FOR FISCAL YEAR, ENDING JUNE 30, 1907

INCOME	
Income from sub-companies.....	\$502,758.35
Miscellaneous income.....	24,304.17
Gross income	\$527,062.52

DEDUCTIONS FROM INCOME

General expenses	\$930.69
Printing and registration of stocks and bonds..	3,651.22
Legal expense	1,615.00
Taxes	13,000.00
Interest on funded debt.....	122,535.42
Depreciation of office furniture and of engineering department instruments.....	771.56
Total deductions from income.....	142,503.89
Net income	\$384,558.63
Dividends paid	304,392.00
Surplus	\$80,166.63
Surplus June 30, 1906.....	\$407,088.30
Adjustment of the Economy Light & Power Company's disputed accounts for the year 1902-1903, against the Chicago & Joliet Electric Railway Company and Chicago & Desplaines Valley Electric Railway Company.....	8,981.21
.....	398,107.09
Surplus June 30, 1907.....	\$478,273.72

WALTER W. PERKINS,

E. & O. E.

Treasurer.

GENERAL BALANCE SHEET FOR FISCAL YEAR ENDING JUNE 30, 1907

	ASSETS		
	Total issue.	Owned by The A. R. Co.	Value on A. R. Co. Books.
The Springfield Railway Company 1st mortgage bonds: 6 per cent.....	\$500,000.00	\$500,000.00	\$500,000.00
The Springfield Railway Company capital stock.....	1,000,000.00	994,400.00	39,959.16
Bridgeton Electric Company capital stock	25,000.00	25,000.00	17,270.44
Bridgeton & Millville Traction Company capital stock.....	200,000.00	200,000.00	159,364.32
The Peoples Railway Company capital stock	1,100,000.00	1,100,000.00	1,334,228.50
The Springfield Light & Power Company capital stock.....	700.00	700.00	700.00
Altoona & Logan Valley Electric Railway Company capital stock	1,500,000.00	1,500,000.00	403,750.00
Du Page Construction Company capital stock.....	25,000.00	25,000.00	25,000.00
Dellwood Park Company capital stock	150,000.00	150,000.00	150,000.00
The Franklin Real Estate Company capital stock.....	10,000.00	10,000.00	10,000.00
Chicago Union Traction Company capital stock.....	1,000,000.00	1,000,000.00	75,000.00
Scranton Railway Company capital stock, preferred....	1,500,000.00	1,499,100.00	1,499,090.50
Scranton Railway Company capital stock, common.....	2,000,000.00	1,997,500.00	2,001,025.13
Total cost of stocks and bonds			\$6,215,388.05
*Bills receivable, accounts receivable, etc.....			\$4,847,480.94
Office furniture and fixtures.....			5,901.03
Engineering department instruments.....			1,043.02
Fire Insurance Fund investments.....			142,548.75
Interest on bonds owned, accrued but not due.....			15,251.03
Cash on hand.....			148,065.42
Collateral Trust Gold 5 per cent. Bonds, 1917, in treasury..			2,185,000.00
.....			\$13,560,678.24

*Chiefly advances to Subsidiary Companies.

LIABILITIES

Capital stock	\$5,095,100.00
Collateral Trust Convertible Gold 5 per cent bonds, due 1911	2,435,500.00
Collateral Trust Gold 5 per cent bonds, due 1917.....	2,500,000.00
New York Trust Company, trustee Scranton Railway Company preferred stock.....	1,499,000.00
Bills payable	1,265,000.00
Vouchers payable	73,874.78
Bills audited, but not paid.....	5,548.31
Accident insurance fund.....	25,495.17
Fire insurance fund.....	146,074.59
Taxes accrued, but not due.....	22,226.26
Interest accrued, but not due on funded debt.....	14,085.41
Profit and loss, surplus as per operating report.....	478,273.72
.....	\$13,560,678.24
Par Value.....	

FIRE INSURANCE FUND INVESTMENT ACCOUNT OF THE AMERICAN RAILWAYS COMPANY, JUNE 30, 1907

Altoona & Logan Valley Electric Railway Company Consolidated Mortgage Gold 4½s.....	\$94,000.00
Bridgeton & Millville Traction Company 1st Mortgage Gold 5s.	16,000.00
Scranton Railway preferred stock 5 per cent Gold Trust certificates	24,000.00
Philadelphia Electric Company 4 per cent Gold Trust Certificates	5,000.00
Union Traction Company of Philadelphia, 150 shares.....	7,500.00
.....	\$146,500.00

THE CLEVELAND SITUATION

Judge Lawrence refused to dismiss the suits of the Cleveland Electric as a taxpayer and as a property owner against the Low Fare Railway Company, which was included as a defendant in the attack made on the curative ordinance. The decision to hold the company was made because of its occupancy of East Fourteenth Street. The attorneys for the Forest City Railway Company undertook, by motion, to induce the court to find for the Low Fare Company before the evidence was all in, in order that it might be released from any responsibility in the matter.

Harry Rickey, editor of the Scripps-McRea string of newspapers, told on the stand what he knew of the Cleveland *Press* guaranteeing that stock of the Forest City Railway Company, sold through it, would receive a dividend of 6 per cent, and of the connection of Mayor Johnson with the plan. He and E. W. Scripps signed an agreement that made the *Press* safe in making the guarantee, but Mr. Rickey said that all but four of these guarantees have been taken up and exchanged for others, with which the mayor had nothing to do.

The deposition of Ben T. Cable, one of the men to whom Johnson claims to have delivered stock he received from Secretary Alber, showed that he had exchanged securities for the shares which he received, with the understanding that the mayor would convert them into cash when the company needed the money. He claimed that he had not been influenced to purchase the stock and that he had received no guarantees. This transaction, the Forest City Company's attorneys claim, disposes of the mystery surrounding the \$80,000 which the mayor is supposed to have furnished the company.

The first payment made by C. M. Bates was \$6,100, given shortly after John B. Hoefgen withdrew from the proposition. He said that he went into the company because he believed that it would pay. Further, he said the mayor had told him that he thought the company would secure a franchise.

Mayor Johnson's testimony was to the effect that he promised, when first a candidate for office, to sign no street railway franchises for a higher rate of fare than three cents and universal transfers, and further that he had promised to secure the formation of a company, or companies, that would operate on those conditions. He said that he induced John B. Hoefgen to go to work on the proposition, but that he withdrew when his franchises were declared worthless by the courts. At that time Hoefgen had spent about \$6,000, but he paid him no money. When Hoefgen left, he said he induced C. M. Bates, his former secretary, to come and take his place. Mr. Bates put in \$6,200 and took up the vouchers of Mr. Hoefgen. Mr. Johnson told of taking the securities given him by Mr. Cable and converting them into money, for which he secured stock certificates and turned them over to Mr. Cable. He said he never expected to make any money out of the enterprise. None of the debts of the Forest City Railway Company have been paid by him, he said, although he admitted taking up the note given by Mr. Schwab and Mr. Salen, but this had been done with the money received from Mr. Cable, he said.

President Horace E. Andrews, of the Cleveland Electric, has written Congressman Burton a letter, denying that a profit of 6 per cent was made on a valuation of \$79,000 a mile on the Quincy Street and Central Avenue lines while they were being operated on a fare of three cents, as has been asserted by A. B. DuPont, who endeavored to prove that this rate of fare would pay by the figures of the Cleveland Electric itself. Mr. Andrews said that Mr. DuPont had taken the time of operation at that fare as Feb. 1 to Apr. 23, when as a matter of fact it was from Jan. 12 to Apr. 23. He further stated that the figures used were evidently taken from a partial examination made of the books by Peter Witt and not from the complete records which could have been secured if desired. Mr. Andrews said that these lines had attracted business from other nearby and parallel lines until they showed a loss of \$15,190,000, which, deducted from the gross receipts of the Central Avenue route, \$70,251.82, make the earnings \$58,341.38. Deducting operating expenses, \$60,607.89, and a deficit of \$2,266.51 would be shown. These figures have been revised since this statement was made, showing a much larger deficit than here stated. Mr. Andrews states that the company made no money operating at three cents, although a willingness had been shown to pay the city for the use of the streets for the time, as the supreme court had declared the franchises on this route had expired and the council failed to renew them at the offer the company made.

REORGANIZATION OF THE WINNEBAGO TRACTION

The Winnebago Traction Company, which some time ago went into the hands of a receiver, has taken steps for a reorganization. This plan contemplates improvements in Oshkosh and vicinity amounting to \$300,000. The company is sending to each bondholder and stockholder a proposed agreement which will result in the formation of an organization committee. This committee will agree to carry out the proposed plan inside of a year. It is proposed to spend \$100,000 on the Oshkosh plant and on cars, and \$200,000 will be spent in building an extension to Berlin of the Oshkosh-Omro Interurban Line. In order to make these improvements, the company, upon reorganizing, will sell bonds and will place a first mortgage on its property of not less than \$1,250,000, and a new second mortgage of not over \$400,000.

GRANTING FREIGHT RIGHTS IN THE BERKSHIRES

In granting local freight and express rights for the Berkshire Street Railway, selectmen of the town of Great Barrington, Mass., have undertaken to impose novel conditions as to transportation of parcels and baggage, and although the company, in routine procedure under Massachusetts law, has petitioned the Railroad Commission for approval of the local grants, it is possible that the commissioners may see fit to strike out the novel features. The commission has heretofore negated numerous attempts on the part of small towns and cities to impose onerous conditions when the companies found themselves obliged to ask rights for trolley express service.

Great Barrington's demands include what amounts to a 5-cent rate for all parcels of express or baggage weighing less than 25 lbs., carried within the limits of the town. The selectmen also reserve the right, on complaint of ten different shippers, after due notice and public hearing, to regulate the company's charges. This last would certainly be negated by the state board if it were not put in with a saving clause, "provided these are approved by the Railroad Commission." The town's stipulation as to baggage is as follows: "The company shall receive and convey on all its passenger cars that are equipped for carrying baggage, trunks and other baggage of passengers actually riding and traveling on the cars, at all points along the line of the tracks within said town, where passengers owning such trunks or baggage are taken on for transportation; and such trunks and other baggage shall be transported and delivered to the same point where the passenger owning or having charge of such trunks or baggage leaves the car, or to any intermediate point to which the passenger shall desire to have the same transported. Until combination cars for express and passengers are used, express cars shall stop at any white pole where signalled, and deliver baggage to persons presenting check."

The town of Lee, adjoining Great Barrington, has also granted freight and express rights to the Berkshire Company, for which the company now asks the Railroad Commission's approval. Lee stipulates that only closed cars shall be used for this new service, that they shall be fitted with "safety brakes," that cars shall always be in charge of "trained" employees, and that not more than two cars shall be run "together or in connection" without a special permit from the town. Both towns require that no freight or express cars shall be operated between midnight and 5 a. m.

The Berkshire Street Railway is one of the New York, New Haven & Hartford Railroad's properties, operating in Pittsfield, Mass., and the towns south of there. It has just filed a petition with the Railroad Commission that indicates an intent to go ahead with the long-contemplated connection with the Western Massachusetts Street Railway, another New Haven property. It asks for approval of a location through the town of Lee to the boundary between Lee and Becket, a location formerly obtained by the Western Massachusetts, but never built upon. If this location is granted, it would be necessary only to get a continuance of the line through Becket and Chester in order to join the completed line of the Western Massachusetts, over which cars from the Berkshire might be run easterly through Huntington, Russell and Westfield, and so over the old Woronoco Street Railway line into Springfield. All the properties concerned are controlled by New Haven interests, which would thus become possessed of a trunk line joining their groups in the Springfield and Pittsfield districts.

THE TRANSIT INQUIRY IN NEW YORK

Judge Lacombe, of the United States Circuit Court, who appointed receivers for the New York City Railway last week, has directed Adrian H. Joline and Douglas Robinson, the receivers, not to seek an appearance before the Public Service Commission in its investigation of street railway affairs, but to leave the presentation of the company's side of the case in the hands of the "owners," to use the term applied by the court. Incidentally Judge Lacombe remarked that the receivership presumably would not extend for operation beyond a year and might end before that.

Judge Lacombe's opinion says:

"Application is made by the receivers for instructions of the court as to whether they should appear and participate in the investigation now being conducted by the Public Service Commission touching improvements to be made on the property and in the methods of its operation. It would seem unnecessary for them to do so. Their occupancy of the leased property is but temporary; presumably it will not extend—at least for operation—beyond a year, and it is to be hoped that it may be ended sooner.

"They are not practical street railroad men, have had only a few days' experience with this property, and could contribute nothing to the solution of the problem before the Commission. The former operators and owners of the roads are the persons from whom the information as to existing conditions and the probable results of proposed changes is to be obtained.

"All books in the custody of the receivers and all persons in their employ, who may be called as witnesses, will of course be at the service of the Commission, and it is to be supposed that the owners will continue to be represented at the hearing and to conduct their side of the investigation, because, to whatever extent the income of the property may enable the receivers to carry out the improvements called for by the Commission, the ultimate burden of them all will fall upon the property."

William M. Ivins, in response to a question by Chairman Willcox, read at the hearing on Wednesday, Oct. 2, a letter he had written to the receivers of the Metropolitan & New York City Railway expressing his dissatisfaction with the explanations advanced by Secretary-Treasurer Moorehead as to the disposition of the books and certain other papers of the company and asking the receivers to act under the circumstances. Other matters under consideration related to the use made of certain moneys entered as construction account which properly should have been charged to certain other service.

A Wall Street committee of the holders of the refunding 4 per cent bonds of the Metropolitan Street Railroad was announced Wednesday, Oct. 2, as being prepared to act for the protection of investors in this class of traction securities. At the same time a similar committee of Third Avenue bondholders was announced. The committee for the Metropolitan bonds consists of E. S. Marston, president of the Farmers' Loan & Trust Company, chairman; E. M. Bulkley, of Spencer Trask & Company; Dumont Clarke, president of the American Exchange National Bank; E. Y. Hebden, of the Bank of Montreal, and Otto H. Kahn, of Kuhn, Loeb & Company. The committee for the Third Avenue bonds consists of J. N. Wallace, president of the Central Trust Company, who is chairman; Adrian Iselin, Jr., of Iselin & Company; E. D. Randolph, treasurer of the New York Life Insurance Company; Mortimer L. Schiff, of Kuhn, Loeb & Company; James Timpson, vice-president of the Mutual Life Insurance Company, and H. Winterfeldt, of Hallgarten & Company.

By a resolution passed at its open meeting Wednesday, Oct. 2, the Public Service Commission made the Brooklyn Subway a certainty. The vote on the resolution stood three to two for adoption. Those who voted against the resolution were Commissioners Bassett and Maltbie, the former of Brooklyn, the latter of Manhattan. Both issued statements as to the reasons for their action, as did the other members of the commission who voted the other way. In a statement which he made in casting the deciding vote, Chairman Willcox said that it seemed to him that the whole matter had been duly passed upon, and that the action taken by these two boards (Estimate and Rapid Transit), if not legally, is morally binding upon the commission. While it is doubtless true that this commission could refuse to proceed with the advertising of contracts now before it, he was of the opinion that such a step should not be taken, except for the most weighty reasons and for causes which were not properly considered by the Board of Rapid Transit Commissioners and the Board of Estimate and Apportionment. The action of the board winds up the matter so far as the pre-

liminaries are concerned. The work will be done by sections as quickly as possible. Advertisements for bids will probably appear next week and the contract will be awarded some time next month. Then work will begin within sixty days. The route of the line is from the Manhattan terminal of the Manhattan Bridge, over the Bridge and under the extension of Flatbush Avenue, thence under Fourth Avenue to Fortieth Street. This is the part that will be contracted for almost immediately, the line to be four tracked. Eventually two tracks will be extended from Fortieth Street to Fort Hamilton, and the other two tracks will be carried from Fortieth Street to Coney Island.

DECISION IN FAVOR OF MEMPHIS STREET RAILWAY COMPANY

The Tennessee Supreme Court has rendered a decision declaring the ordinance passed by the Council of the City of Memphis, attempting to reduce the fares of the Memphis Street Railway Company, invalid and unconstitutional. This decision reverses the opinion of Judge Pittman, of the State Circuit Court, who had decided that such an ordinance was valid.

OHIO FIXES RAILWAY VALUATIONS

The Ohio state board of equalization has fixed the valuation of interurban roads in that state at \$12,685,896, an increase of \$1,021,755 over last year. Reductions from the appraisements made by the board of county auditors have been made on the following roads:

Scioto Valley	\$46,214
Lake Shore	36,122
Northern Ohio Traction & Light	50,064
Indiana, Columbus & Eastern (Dayton-Columbus Division)	40,035
Columbus, Urbana & Western	28,925
Total	\$201,360

Valuations were increased on the following roads over the figures fixed by the county auditors:

Cincinnati, Dayton & Toledo	\$33,713
Mahoning Valley Electric	36,060
Fort Wayne, Van Wert & Lima	9,863
Lima & Toledo	23,984
Lake Erie, Bowling Green & Napoleon	5,550
Steubenville & East Liverpool Traction	10,315
Wheeling Traction	23,399
Youngstown & Sharon and Sharon & Newcastle	7,408
East Liverpool Traction & Light	18,600
Steubenville & Wheeling	5,850
Ohio River Electric	3,005
Cambridge Power & Light	6,877
Camden Interstate	7,269
Youngstown Park & Falls	5,097
Victory Park	1,100
Mansfield Railway, Light & Power	3,375
Total	\$201,456

AFFAIRS IN CHICAGO

Attorney Calhoun says that the cross bill filed by the West and North Chicago companies in the Guaranty Trust Company suit will not seriously affect the traction settlement. He says that they want the properties sold as a unit. The defendants to these suits must answer within twenty days after service. The petitioners ask that all assets and equities of the Union Traction Company and its subsidiaries be ascertained and established.

The Chicago City Railway Company's report for the six months ended July 31, 1907, compares with the years ended Dec. 31, 1906, 1905, and 1904, as follows:

	Six Months 1907.	Year 1906.
Gross receipts	\$4,057,336	\$7,871,126
Operating expenses	2,840,135	6,146,304
Net earnings	\$1,217,201	\$1,724,822
Fixed charges	713,635	1,620,000
Surplus	\$503,566	\$104,822
Paid to city	278,218	.....
Surplus	\$225,348	.....

The share of the city of Chicago in the net profits of the Chicago City Railway Company for the first six months ending July 31 will be \$278,218. This is according to the official statement of the financial results of the operation of the traction settlement ordinance, made by President T. E. Mitten, of the railway company. The report shows the total net profit for the period is \$503,550, and the company's share is \$225,348.

These figures are based on the city getting 55 per cent and the company getting 45 per cent of the net profits, as provided in the ordinance.

A new plan of reorganization for the Chicago Union Traction properties offered by Messrs. Burry & Beitler represents merely the views of counsel acting for one trustee, the Fidelity Insurance, Trust & Safe Deposit Company of Philadelphia. It is not understood that any other trustees have concurred therein. It is not an official plan and stands solely on its merits as a suggestion.

There is not likely to be any important development in the Chicago Traction situation for ten or fifteen days, or until the receiver makes a move to default on the underlying bonds, as he has threatened to do. The trustees of the mortgage on which interests will next come due and on which an attempt will be made to default, will take steps to thwart that design, and then, it is hoped, all the trustees may be able to come together and agree upon a plan satisfactory alike to themselves and the bondholders.

STEAM AND ELECTRIC ROADS IN INDIANA MUST INTERCHANGE TRAFFIC

That steam and electric roads in Indiana must interchange traffic is the substance of a ruling by the Indiana Railroad Commission in disposing of the case of the Farmland Stone Company vs. the Chicago, Cincinnati, Cleveland & St. Louis Railroad and the Indiana Union Traction Company to compel an interchange of coal traffic at Winchester, Ind. The petition alleges that the traction company has for some time past been unable to deliver cars of coal to the stone company, which is located in Farmland, six miles from Winchester, whereas formerly the steam lines brought the coal to Winchester and delivered it to the traction company in car-load lots and the traction company hauled it to Farmland and delivered it to the stone company. It was set out that notwithstanding the traction company has been ready and willing to deliver the coal in car-load lots to the stone company for some time past, the railroad company has refused to deliver the cars to the traction lines. The petition asks that the steam lines be compelled to resume the interchange of the said coal traffic. The attorneys for the steam lines attacked the constitutionality of the law passed by the last Legislature, giving the commission jurisdiction in cases of this kind, and insisted that the stone company was not entitled to the relief demanded and that the railroad commission had no jurisdiction in the matter. Upon the evidence being heard the commission ordered that the interchange of the traffic be resumed not later than Oct. 20, 1907. The commission held that both the steam and electric roads were common carriers, belonging to the same class and amenable to the same general rules and regulations. However, the commission said that this ruling was applicable only to the present case and that all cases would have to be determined on their merits after considering the physical condition and capacity of the traction line successfully to carry out interchange of traffic in car-load lots. As to the constitutionality of the statutes the commission leaves the question open to the courts.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED SEPT. 24, 1907

866,646. Contact Device; Clarence J. Harter, Iilon, N. Y. App. filed Dec. 3, 1906. Patentee provides special attachments to the trolley wire at intervals thereon with depending shoes to engage contact devices on the car for operating sign indicators, etc.

866,659. Amusement Apparatus; Carl V. Johnson, Goldfield, Nev. App. filed March 14, 1907. An amusement apparatus of a character somewhat analogous to the ordinary "Loop-the-Loop" device except that the track swings into a different form after the car has passed partly through the loop.

866,675. Car Brake; William Q. Olden, Chicago, Ill. App. filed Dec. 12, 1906. Construction of lever system for operating the brakes of a railway car from a single air cylinder on the upper side of the car floor.

866,680. Amusement Apparatus; Albert L. Plotner, Dorchester, Mass. App. filed June 1, 1907. Amusement device of the class in which passengers slide down an inclined track in a tub or bucket having gear teeth on its periphery to impart a rotary movement.

866,729. Trolley; William Moeckel, Jersey City, N. J. App. filed June 12, 1907. The trolley harp has rigid U-shaped extensions projecting upward therefrom which carry grooved rollers on vertical axes to engage the trolley conductor laterally on both sides thereof.

866,743. Metal and Concrete Railway Tie and Rail Fastening; Moses Stoner, Warsaw, Ind. App. filed March 20, 1907. Means for securing the rails upon the ties comprising plates having overhanging lips or flanges and movable endwise with a wedging movement upon the rail.

866,780. Snow Plow; John W. Flynn, Bordentown, N. J. App. filed May 23, 1907. A snow plow adapted for use on locomotives having a plurality of vanes or blades by which the snow is guided against an interior inclined plane.

866,781. Trolley; George R. Forster, Fithian, Ill. App. filed April 27, 1907. The trolley pole has a spring impelled piston in a pneumatic cylinder for normally raising it, and means for admitting air to the cylinder to retrieve the pole.

866,846. Electric Locomotive Controller; Charles O. Dayton, Washington, Ia. App. filed Oct. 8, 1906. A block signal system for single track trolley roads having turnouts. Provides step-by-step actuated devices for registering and indicating the number of cars which enter a block in either direction.

866,945. Electric Signaling on Railways; William J. MacKenzie, Dunmurry, Ireland. App. filed Dec. 13, 1905. A device for signaling between trains including special trolleys between the usual track rails and which are engaged by grooved rollers depending from the locomotives.

866,983. Railway Switch; Guy M. Thompson, Seattle, Wash. App. filed Nov. 26, 1906. Details of construction of an electrical track switch. The switch point has rigid curved extensions therefrom to the ends of which are fastened the cores of separate solenoid magnets which respectively impel the switch point in opposite directions.

866,998. Switch Structure; Victor Angerer, Ridley Park, Pa. App. filed March 19, 1907. A bearing for the pivoted end of a switch point including curved surfaces which are held in engagement by force closure, supplied by tension springs.

867,007. System of Railroads and Appliances Pertaining Thereto; William H. Boyes and Erwin F. VonWilmowsky, New York, N. Y. App. filed July 23, 1900. In a railroad car consisting of short sections having a length of about 9 ft., elastic linking means between sections, oblique section ends joined by a flexible material for enabling the car to round the curves of the track.

867,021. Electric Contact Rail and Shoe; George Drawert, Chicago, Ill. App. filed May 14, 1906. The contact rail is specially constructed with a groove on its under side having underhanging lips, and the collector shoe runs in this groove so as to be positively guided against displacement in all directions.

867,085. Fare Register Attachment; John R. Scott, Oakland, Cal. App. filed Dec. 12, 1906. In place of the usual bell, patentee has an arrangement by which the lights are momentarily extinguished in a car to indicate the register of the fares.

867,125. Trolley Wheel Support; George W. Grisdale, Jr., Philadelphia, Pa. App. filed March 5, 1906. The trolley harp is swiveled on a vertical axis at the end of the trolley pole and is further yieldable rearwardly by an independent swinging movement.

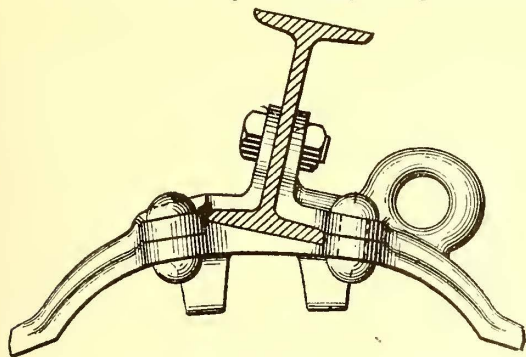
867,147. Rail Magnetic Brake; Victor L. Ochoa, New York, N. Y. App. filed Jan. 5, 1907. A large triangular magnet is hung by links between the wheels of the truck so as to act upon their peripheries and also on the track rail.

867,150. Railway Signaling Apparatus; Vincent L. Raven, Darlington, Eng. App. filed April 18, 1907. A complete system for permitting locomotives to communicate in foggy weather, including spaced contact plates between track rails engaged by brushes depending from the locomotive cab or cabs.

867,151. Railway Signaling Apparatus; Vincent L. Raven, Darlington, Eng. App. filed April 23, 1907. Relates to modifications of the above.

867,152. Railway Signaling Apparatus; Vincent L. Raven, Darlington, Eng. App. filed April 23, 1907. Covers additional modifications.

867,183. Brake Shoe Head; James H. Baker, Allegheny, Pa. App. filed Nov. 12, 1906. A construction of brake head having an open or frame-like body consisting of spaced side rails,



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angular strips extending across the space or opening between the side rails and forming ears or lugs for holding the shoes and brake beam lugs or ears on the rear of the head.

867,197. Block Signal System for Electric Railways; Clayton W. Hamm, York, Pa. App. filed Dec. 19, 1906. Details of recording or registering mechanism for single-track trolley roads having turn-outs, including a pair of adjacent ratchet wheels with oppositely directed teeth and mechanism acting thereon to move a contact disc in opposite directions for the cars entering the single-track section from opposite sides.

WASHINGTON STREET SUBWAY WORK IN BOSTON

The Boston Transit Commission will receive bids for the widening of the Tremont Street subway near Haymarket Square, on Oct. 4. The merging of the Washington Street tunnel and the subway at this point will make it necessary to spread the mouth of the subway sufficiently to take care of the six tracks which will ascend the incline, and the first work to be done will be the construction of 270 ft. of wall from 10 to 30 ft. outside of and intended to take the place of the present westerly wall of the subway beneath the square. The bids will be required to cover the construction of the wall, excavation and the roofing of the intervening space. About 50 ft. of sewer will be built in connection with the new wall.

The Commission will shortly be obliged to decide how to build the new Riverbank subway, under the new Charles River embankment on the water side of Beacon Street. Some time ago the Charles River Basin Commission, which is building the embankment, located the marginal conduit in the middle of the embankment. This conduit is to be used for sewage purposes. If the subway is located on the land side of the conduit, the subway level must be high enough to carry it over the cross sewers, and this will mean 4 or 5 ft. of subway above ground, or at best covered by an artificial ridge of grass and flowers. Property owners object to this method and an alternative solution is to locate the subway on the water side of the conduit, in which case it would be wholly below the level of the embankment, with a filling of earth and masonry and a concrete sea wall between it and the water of the river. A public hearing will probably be held soon for the purpose of securing public sentiment as to the best place for the westerly portal to be brought forth.

NEW PUBLICATIONS

MODERN STEAM ENGINEERING IN THEORY AND PRACTICE, by Gardner D. Hiscock. New York, Norman W. Henley Publishing Company, 487 pages, illust. Price \$3.

The author is a well known writer on technical subjects. His latest work has a broad field, taking up as it does much of the apparatus and many of the appliances used in steam engineering. The book contains several chapters on electrical engineering contributed by Newton Harrison.

THE ENGINEERING INDEX ANNUAL FOR 1906. New York, *The Engineering Magazine*. 412 pages. Price \$2.

This annual finds a regular place in the library of those engineers who require to be kept in touch with the achievements of all fields of engineering.

PERSONAL MENTION

MR. A. C. HARRINGTON having resigned as the resident engineer of the Buffalo, Lockport & Rochester Railway Company, has been appointed chief engineer of the American Engineering Company, of Indianapolis, Ind.

MR. FRANK BURTON, who for many years was connected with the Yonkers lines of the Union Railway Company, of New York, has been appointed superintendent of transportation of the Montgomery Traction Company under General Superintendent Royster.

MR. ALBERT CARR has resigned his position as Chief Engineer of the United Railroads of San Francisco, to take the position of Superintendent of Construction on the water power developments of the Central Colorado Power Company. His new headquarters will be Colorado Springs.

MR. J. C. HUFFMAN, who recently resigned from the position of electrical engineer of the Oneonta & Mohawk Valley Railroad, has accepted a sales position with the Canadian Westinghouse Company, Limited, with the Winnipeg office. He will travel out of Calgary, having the territory of Alberta, Saskatchewan and Eastern British Columbia.

MR. W. H. FORSE, JR., secretary and treasurer of the Indiana Union Traction Company, with headquarters at Anderson, Ind., has been appointed by the president of the American Street & Interurban Railway Accountants' Association one of a committee to represent the association at the convention of the National Association of Railway Commissioners, to be held in Washington in October.

MR. C. P. ORTH has been appointed master mechanic in charge of the city and interurban lines of the Galesburg & Kewanee Electric Railway Company, as well as the overhead work of that company. Mr. Orth has been connected with the electric railway business for several years, his original connection in this field having been with the old Brush Electric Company, of Cleveland. Since that time he has been identified with the Cleveland Electric Railway Company, the Lorain Street Railway Company and the New York & Long Island Traction Company.

MR. BENJAMIN J. WEEKS, for the past seventeen months general manager of the Pacific Traction Company, of Tacoma, Wash., has resigned from the company. Mr. Weeks states that this step is the result of his determination to devote his entire attention to private interests. Mr. Weeks has been engaged in street railway enterprises in Washington for the past six years. During the first two and one-half years of this period he was general superintendent of the Tacoma Railway & Power Company's lines. A portion of this time the lines were the property of the General Electric Company and shortly before Mr. Weeks severed his connection with the road they were purchased by Stone & Webster, of Boston. From the time he left the Tacoma Railway & Power Company until seventeen months ago, when he entered the service of the Pacific Traction Company, Mr. Weeks was general manager of the Spokane Electric Company. It is understood that no successor to Mr. Weeks will be selected at present, and that the duties of the general manager of the Pacific Traction Company will be temporarily attended to by Mr. E. J. Felt, vice-president of the company.

MR. ELMER H. LITTLEFIELD, superintendent of the ninth division of the Boston Elevated Railway Company, is dead. He was fifty-nine years old and had been identified with the street railway business nearly forty years. Mr. Littlefield was born in Georgetown, and spent the larger portion of his early life in Salem, where his parents moved when he was but three years old. In 1870 he came to Boston, and in the same year began his street railway career as a conductor on the Union Street Railway under the administration of Supt. Richard Haggood. For a number of years he filled the positions of driver and conductor on the Union & Cambridge Street Railways, and was later placed in charge of the River Street stables. This position he held until the present head of the elevated company, General Bancroft, became superintendent of the road, when Mr. Littlefield was appointed assistant superintendent. In 1888 Mr. Littlefield resigned and went to Topeka, Kan., where he became superintendent of a street railway company. In 1898, after living in Oklahoma for several years, he came back to Boston and entered the service of the West End Company, and in 1899 was appointed as superintendent of division 9. This position he held until his death.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments" which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit. ‡ Including Rapid Railway system, Sandwich, Windsor & Amherstburg Railway, and Detroit, Monroe & Toledo Short Line Railway.

COMPANY.	Period.	Total Gross Earnings.	Operating Expenses.	Net Earnings.	Deductions From Income.	Net Income, Amount Avail-able for Dividends.	COMPANY.	Period.	Total Gross Earnings.	Operating Expenses.	Net Earnings.	Deductions From Income.	Net Income, Amount Avail-able for Dividends.
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Aug. '07	216,146	112,860	103,286	43,522	59,764	HOUGHTON, MICH. Houghton County St. Ry. Co.	1m., July, '07	26,330	*13,146	13,184	3,972	9,212
	1 " " '06	194,379	96,181	98,198	40,589	57,609		1 " " '06	22,901	*12,913	9,988	3,909	6,078
	8 " " '07	1,274,443	736,414	538,029	339,881	198,148		12 " " '07	246,749	*151,354	95,395	47,231	48,164
	8 " " '06	1,130,064	677,206	452,858	321,002	131,856		12 " " '06	212,707	*144,455	68,252	46,123	22,129
CHAMPAIGN ILL. Illinois Traction Co.	1m., July, '07	329,601	*183,318	146,283	.....	.....	HOUSTON, TEX. Houston Electric Co.	1m., July, '07	59,950	*36,559	23,391	11,043	12,347
	1 " " '06	262,725	*136,708	126,017	.....	.....		1 " " '06	51,166	*32,489	18,677	10,066	8,611
	7 " " '07	2,035,918	*1,158,200	877,718	.....	.....		12 " " '07	643,305	*417,300	226,005	127,959	98,046
	7 " " '06	1,625,595	*913,151	712,444	.....	.....		12 " " '06	561,563	*352,312	209,251	127,759	81,492
CHARLESTON, S. C. Charleston Consoli- dated Ry., Gas and Elec. Co.	1m., July, '07	67,298	38,619	28,679	13,517	15,162	KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., July, '07	513,445	265,512	247,933	154,599	92,334
	1 " " '06	61,727	34,564	27,163	13,017	14,147		1 " " '06	469,973	233,562	236,414	143,460	93,953
	5 " " '07	302,942	185,667	117,274	67,583	49,691		2 " " '07	1,029,261	546,787	482,474	307,828	174,646
	5 " " '06	272,214	162,708	109,506	64,933	44,573		2 " " '06	927,763	478,664	449,099	285,486	163,613
CHICAGO, ILL. Aurora Elgin & Chi- cago Ry. Co.	1m., July, '07	152,252	74,909	77,344	27,508	49,835	LEXINGTON, KY. Lexington & Inter- urban Rys. Co. ...	1m., July, '07	52,807	32,742	20,064	.....	.....
	1 " " '06	135,798	64,971	70,826	24,939	45,887		1 " " '06	50,186	30,931	19,254	.....	.....
Chicago & Milwau- kee Elec. R. R. Co.	1m., Aug. '07	122,679	45,732	76,947	.....	.....	MILWAUKEE, WIS. Milwaukee Elec. Ry & Lt. Co.	1m., July, '07	337,649	166,125	171,524	103,158	68,366
	1 " " '06	107,089	35,615	71,474	.....	.....		1 " " '06	305,681	146,217	158,864	90,191	68,673
	8 " " '07	674,284	282,646	391,638	.....	.....		7 " " '07	2,199,576	1,102,428	1,097,148	671,851	425,297
	8 " " '06	536,387	212,894	323,493	.....	.....		7 " " '06	1,977,341	987,029	990,312	604,596	385,716
CLEVELAND, O. Cleveland, Paines- ville & Eastern R.R. Co.	1m., July, '07	34,401	*15,893	18,508	6,796	11,712	Milwaukee Lt., Ht. & Tr. Co.	1m., July, '07	97,179	35,488	61,692	60,020	1,672
	1 " " '06	32,631	*15,774	16,856	7,108	9,748		1 " " '06	81,679	26,784	54,895	30,709	24,186
	7 " " '07	157,587	*84,225	73,362	50,072	23,290		7 " " '07	441,715	194,199	247,516	269,942	†22,425
	7 " " '06	146,518	*81,876	64,642	48,314	16,328		7 " " '06	374,920	149,830	225,090	176,671	48,419
COLUMBUS, GA. Columbus Elec. Co.	1m., July, '07	30,845	*20,468	10,377	10,150	227	MINNEAPOLIS, MINN. Twin City R. T. Co.	1m., July, '07	571,986	271,236	300,749	115,142	185,607
	1 " " '06	24,594	*13,280	11,314	8,762	2,551		7 " " '06	522,950	236,118	286,832	114,619	172,213
	12 " " '07	340,955	*195,167	145,788	113,894	31,894		7 " " '06	3,420,600	1,668,378	1,752,221	806,458	945,763
DALLAS, TEX. Dallas Elec. Corp'n	1m., July, '07	91,861	*64,485	27,375	18,940	8,436	MONTREAL, CAN. Montreal St. Ry. Co.	1m., Aug. '07	329,755	184,844	144,911	67,208	77,703
	1 " " '06	83,598	*51,422	32,176	15,125	17,051		11 " " '06	300,278	158,415	141,863	59,430	82,433
	12 " " '07	1,070,319	*793,408	276,910	202,287	74,624		11 " " '06	3,164,399	1,996,389	1,218,010	524,555	693,455
	12 " " '06	1,010,910	*627,418	383,492	183,129	200,363		11 " " '06	2,794,948	1,686,679	1,108,179	434,240	673,939
DETROIT, MICH. Detroit, Jackson & Chicago Ry.	1m., Aug. '07	41,834	*30,882	10,952	16,575	†5,623	NEW ORLEANS, LA. New Orleans Ry. & Lt. Co.	1m., July, '07	443,831	264,685	179,146	161,450	17,696
	7 " " '07	245,047	*192,168	52,879	106,650	†53,771		1 " " '06	466,748	287,710	179,038	169,909	9,129
	7 " " '06	.....	.....	.....	.....	.....		7 " " '07	3,342,920	1,805,153	1,537,767	1,077,736	460,030
† Detroit United Ry. Co.	1m., Aug. '07	690,213	*396,885	293,328	116,537	176,791	7 " " '06	3,532,903	1,864,881	1,668,022	1,170,472	497,551	
	1 " " '06	618,386	*349,617	268,769	106,850	161,919	NORFOLK, VA. Norfolk & Ports= mouth Tr. Co.	1m., July, '07	274,018	166,722	107,296	.....	.....
	8 " " '07	4,481,466	*2,726,651	1,754,815	912,549	842,266		1 " " '06	162,586	108,394	54,192	.....	.....
8 " " '06	3,999,447	*2,365,263	1,634,184	817,056	817,128	7 " " '07		1,374,198	867,204	506,994	.....	.....
DULUTH, MINN. Duluth St. Ry. Co.	1m., July, '07	83,921	36,073	47,847	17,991	29,857	PEEKSKILL, N. Y. Peekskill Lt. & R. R. Co.	1m., Aug. '07	16,760	*7,800	8,960	.....	.....
	1 " " '06	75,470	32,990	42,480	17,876	24,603		1 " " '06	14,831	*6,612	8,219	.....	.....
	7 " " '07	470,042	237,126	232,916	123,922	108,993		8 " " '07	108,973	*59,228	49,745	.....	.....
	7 " " '06	431,708	224,466	207,242	122,930	84,313		8 " " '06	95,265	*49,324	45,941	.....	.....
EAST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., July, '07	186,101	97,865	88,235	.....	.....	PHIL., PA. American Rys. Co.	1m., Aug. '07	294,037	.....	.....	.....	.....
	1 " " '06	173,676	78,795	94,880	.....	.....		1 " " '06	274,167	.....	.....	.....	.....
	7 " " '07	1,183,918	640,817	543,100	.....	.....		2 " " '07	596,191	.....	.....	.....	.....
EL PASO, TEX. El Paso Cos.	1m., July, '07	41,637	*32,073	9,564	5,035	4,529	PLYMOUTH, MASS. Brockton & Plym- outh St. Ry. Co. ...	1m., July, '07	17,451	*8,358	9,093	1,731	7,363
	1 " " '06	31,002	*22,116	8,886	3,911	4,975		1 " " '06	15,477	*7,013	8,464	1,797	6,667
	12 " " '07	455,142	*349,085	106,056	54,392	51,664		12 " " '07	118,393	*76,377	42,016	21,574	20,442
FT. WAYNE, IND. Ft. Wayne & Wa- bash Valley Tr. Co.	1m., July, '07	117,494	67,985	49,509	.....	.....	12 " " '06	104,869	*71,005	33,864	12,114	12,223	
	1 " " '06	101,074	61,286	39,788	.....	.....	ROCHESTER, N. Y. Rochester & East- ern Rapid Ry. ...	12m., June, '07	258,982	168,963	90,019	120,114	†30,093
	7 " " '07	686,772	416,981	269,791	.....	.....		12 " " '06	237,903	144,946	92,057	85,009	7,048
	7 " " '06	592,960	368,377	224,583		ST. LOUIS, MO. United Railways Co. of St. Louis ...	1m., Aug. '07	956,240	*610,161	346,079	232,506	113,573
1 " " '06	101,074	61,286	39,788	.....	.....	1 " " '06			897,651	*568,400	329,251	231,732	97,519
7 " " '07	686,772	416,981	269,791	.....	.....	8 " " '07	7,185,731		*4,710,133	2,475,598	1,851,327	624,271	
7 " " '06	592,960	368,377	224,583	.....	.....	8 " " '06	6,748,837		*4,254,758	2,494,079	1,854,345	639,734	
FT. WORTH, TEX. Northern Texas Tr. Co.	1m., July, '07	96,933	*54,207	42,726	11,001	31,725	SAVANNAH, GA. Savannah Electric Co.	1m., July, '07	55,452	*36,601	18,851	12,024	6,826
	1 " " '06	81,758	*48,210	33,549	9,942	23,607		1 " " '06	60,528	*33,678	26,850	11,523	15,527
	12 " " '07	982,280	*613,523	368,757	123,079	245,677		12 " " '07	585,767	*387,907	197,860	139,537	58,323
GALVESTON, TEX. Galveston Elec. Co.	1m., July, '07	38,818	*20,032	18,786	4,166	14,620	SCHENECTADY, N. Y. Schenectady Ry. ...	12 " " '06	618,897	*373,330	245,567	131,311	114,256
	1 " " '06	33,441	*17,473	15,968	4,166	11,802		3m., June, '07	270,041	174,756	95,285	32,449	62,839
	12 " " '07	351,356	*208,572	142,784	50,000	92,748		3 " " '06	192,802	140,925	51,877	55,056	13,176
GLEN FALLS, N.Y. Hudson Valley Ry.	1m., July, '07	618,614	415,641	202,973	202,248	725	TACOMA, WASH. Puget Sound El. Ry. Co.	1m., July, '07	171,146	*101,549	69,597	32,735	36,862
	12 " " '06	570,689	327,354	243,335	265,975	†22,640		1 " " '06	138,152	*84,407	53,745	25,585	28,159
							12 " " '07	1,553,902	*1,008,396	545,506	352,711	192,795	
							12 " " '06	1,249,329	*835,574	413,755	274,358	139,397	