

Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXV.

NEW YORK, SATURDAY, APRIL 16, 1910

No. 16

PUBLISHED WEEKLY BY THE

McGraw Publishing Company

239 WEST THIRTY-NINTH STREET, NEW YORK

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EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION:

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, \$3.00 per year; Canada, \$4.50 per year; all other countries, \$6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Tuesday noon of the week of issue.

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Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL 9,000 copies are printed.

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Posting the Prices

Posting the prices in force in connection with specific jobs in a repair shop on the piece-work basis saves much time and trouble. In the motor repair shop of one large company every operation in connection with an armature, field or commutator repair is numbered and priced on tables hung on the wall outside the foreman's office. In the office is a card system giving in detail the precise duties which must be performed in connection with each operation, each card being numbered according to the posted list, and signed by responsible officers of the motive power department. Any question arising as to the detailed work required must be settled at once by an appeal to the card, which is always dated, and which leaves no opening for dispute. Such a posted list, with the card supplements, is a great help to new men entering the shop, no less than a positive guide to the older men who may be in doubt as to their compensation at any given time, or who may be tempted to cut down the number of operations performed under stress of heavy work.

Dividends from Fire Protection

There is more than one good lesson to be drawn from the fire protection and insurance practice of the Metropolitan Street Railway as described in this number but the principal one is that money spent for fire-quelling equipment can yield as positive a dividend as a like sum invested say for new cars. The railway manager must not suppose that the underwriters will grant him the minimum rate for his structures just because they are built of slow-burning or "fire-proof" materials. A car house or shop with highly varnished wooden cars in the vicinity of live wires and oily waste is not adequately protected by water and sand pails, hand extinguishers or even by hose lines and standpipes. It is true that automatic sprinklers, chemical engines, fire alarm systems and the like cost a great deal of money; but those who install and maintain them properly will find that the interest on the investment will be more than covered by the reduction in fire premiums. Thus, in the case of the Metropolitan Street Railway Company, the dividend on the automatic sprinkler investment is estimated at approximately 10 per cent while that on the auxiliary fire-fighting apparatus and improvements in construction ranges as high as 20 per cent. How many street railway companies are receiving such returns from the money spent for traffic handling equipment?

Still a greater saving, and one which cannot be reckoned in percentage upon investment, is obtained by training the employees to fight incipient fires. The object should not be to encourage the men to act as a substitute for the regular city fire department. Any fire drill which tends to delay the transmissal of a regular alarm will in the long run probably do

more harm than good. But it is impossible to overemphasize the value of teaching the men what they should do in case of fire. This can only be accomplished, of course, by assigning a specific duty to each man and by drilling the entire corps frequently and intelligently in the work which they have to perform in case of an alarm of fire. While these drills may take the men occasionally away from their regular work, this loss is probably more than made up by the spirit of regular discipline and enthusiasm in the interest of the company which are inculcated, even if we disregard entirely the advantages gained in the protection of the property. Drills of this kind have formed an important feature of the fire-fighting system of the Metropolitan Street Railway Company during the last two years under the regime of the receivers.

Another important lesson presented by the Metropolitan company's practice is the necessity of placing the maintenance of the buildings and the fire protection apparatus in the care of one official who, preferably, should be the engineer of way and structures. When several departments are housed at one location, it is particularly necessary to have some individual with authority to prevent violations of fire rules. Some infractions would doubtless be forgiven by the department heads in their desire to dispose of their work most conveniently. The policy of boxing up out-of-the-way corners is an excellent precaution because nothing accumulates faster than rubbish in places where it does not directly interfere with anyone. It should hardly be necessary to add that unless the management secures the loyal vigilance and obedience of its employees, the best fire apparatus can no more protect the property than a block signal system can in itself prevent collisions on a railroad.

Excess Fare Regulations

In our issue of Feb. 5, 1910, we published a digest of the decision rendered on Jan. 30, by the Public Service Commission of the Second District of New York, upholding the Buffalo, Lockport & Rochester Railway in its practice of charging an excess fare of 5 cents where a passenger boards a car at a station where tickets are sold but pays his fare in cash to the conductor. This practice is, of course, common on steam railroads and the decision reached by the commission was based largely upon the same reasons which warrant its enforcement on that class of roads. The commission did not pass upon the question as to whether the larger number of stops made by an electric road would not require a larger number of ticket stations, whether these stations on the Buffalo, Lockport & Rochester Railway were sufficient in number, or whether the 5-cent excess fare charged might not in some cases make the total fare more than 3 cents per mile, but limited its decision to the case presented to it except that it instructed the company to increase the time limitation in which its receipts could be redeemed from one month to three months.

An entirely opposite decision as regards the right to collect such excess fare has recently been reached by the Railroad Commission of Indiana in the case of the Muncie & Portland Traction Company. In that instance, the opinion of the commission was based largely upon the distinction which has always been drawn in Indiana between the functions and legal status of steam railroads and interurban electric lines. This difference has been emphasized by the Supreme Court, which has taken the position that interurban railways are not an additional servitude upon the streets, while the contrary has been held in regard to

the steam railroads. Various statutes relating to steam railroads have also contained a proviso that they cannot be construed as applying to interurban lines, and corporations are forbidden by statute in Indiana to operate in both capacities. For this reason, the Indiana law which permits a steam railroad company to collect an excess fare from a passenger who has had opportunity for 30 minutes continuously before the departure of his train to secure a ticket and failed to do so, would not apply to an electric interurban line.

We think that all will agree with the action of both commissions in drawing a clear distinction between the services and scope of steam and electric interurban railways. The kinds of transportation which they provide are very different and many of the rules which apply to one should not be extended to the other. It seems to us, however, that where there is no difference in conditions and the question is one simply relating to the general efficiency of the service rendered, the privileges of one kind of road should be enjoyed by the other. In neither State is there any claim on the part of the electric railway companies that passengers should provide themselves with tickets when they board the train at stopping points where there is no ticket station. When, however, there is such a station open and convenient of access, it does not seem a hardship to require passengers to purchase their tickets there or else to go to the slight trouble of redeeming a receipt for the extra fare paid on the car. If it should be shown that railway companies were receiving a large income because of unredeemed receipts, the subject might possess a different aspect, but this point was carefully considered in the New York decision and it was found that nearly all of the passengers who were given duplex tickets on the Buffalo, Lockport & Rochester Railway collected their rebates, so that practically the only benefit to the railway company was that of having a check on the cash fares paid on its cars.

Recent No-Seat-No-Fare Ordinances

The news that "no-seat no-fare" ordinances have been introduced in the municipal councils of Norfolk, Va., and Trenton, N. J. will produce, we believe, a feeling among railway managers in other cities somewhat akin to that experienced by a man who has been abroad for a number of years and by chance runs across a former townsman. He may not have had a very high respect at home for his old acquaintance and probably would not there have crossed the street to have shaken him by the hand. But he has seen so many strange faces during his stay abroad and has had so few visible reminders of former days that the sight of his old friend, even if the latter was not very much of a friend, seems like a glimpse of home.

It is a number of years since "no-seat no-fare" ordinances were seriously discussed in city councils. That was before the days when Theodore Roosevelt was governor of New York State and caused the passage of the Ford franchise bill which perhaps can be considered as the beginning of the recent movement toward State regulation of street railway corporations. During the last five years the possibilities of a no-seat no-fare ordinance seem to have been forgotten by legislators. Every energy and every thought have been concentrated on devising variations of the theme of public service commission regulation. Less pretentious and comprehensive methods for disciplining companies passed from the category of available punitive measures and were allowed to lapse into desuetude. We

do not mean to say that any of the no-seat no-fare ordinances were ever enforced. We do not now recall any instance in which this threatened method of compelling railway companies by municipal enactment to give a seat to every passenger was carried to its logical conclusion. In fact it would not only be most difficult to enforce a strict interpretation of the no-seat no-fare idea but such a law would greatly aggravate the congestion which it is nominally designed to alleviate.

If fares should not be collected from standing passengers on a street car, many economical citizens would choose the crowded cars to take them to their homes. They would simply have to board a car in which all the seats were occupied and then enjoy all the privileges which would be possessed if they owned a pass on the line. So far, the administration of the law is simple, but complications would arise as passengers began to leave the car. If a person should have to stand for a certain distance and then had an opportunity to take a seat, should he pay half fare or full fare? Or could he decline to pay any fare, provided he was willing to stand for the rest of the distance? Again, what rebate, if any, would a man receive who gave a lady his seat? We believe that many companies would like to see a real no-seat no-fare ordinance enforced on some other line simply from curiosity to learn how these questions would be answered.

A modification of the no-seat no-fare ordinance which has been popular in cities which have not quite dared to go to the full extent of requiring companies to carry standing passengers without charge, is to limit the number of passengers on a car to those who can be seated, with perhaps an allowance of a few standing passengers. Those who advocate this measure believe in the old adage that the dividends of a company are earned from the straps and that when a few or no passengers are allowed to stand, the company, in self defense, will add more cars. It was this theory which induced the aldermen of New York a number of years ago to consider the passage of an ordinance of this kind and they expected that the railway companies would enter a vigorous protest at the hearing at which the ordinance was considered. To the great surprise of all, the manager of the principal road said that he would be willing to do his part to carry out the proposed measure but in the interest of the public peace, he would insist upon one proviso. This was that a policeman should be assigned to each car during the rush hours to keep people from boarding it after all the seats were occupied. It was not fair to ask the conductor to do this as considerable physical force would be required and the authority of a uniformed representative of the law would be necessary. The aldermen saw the force of the remark and the ordinance was never passed.

Still another modification of the no-seat, no-fare class of legislation is to limit the number of passengers on each car to those who can be seated and provide a penalty if persons desiring transportation are kept waiting for transportation longer than a certain time. This, at first glance, seems a little more logical or rather more workable than either of the preceding methods. A little thought, however, will show that it is not fair to either the railway company or the waiting passengers unless the latter form in line at each stopping place and fill the cars in regular order. This is practically the system adopted in certain European cities where such a plan is in vogue, although it is a great error to assume, as many do, that in most European cities, seats are given to all passengers. But

unless some system of this kind is adopted, the impatient and strenuous individual who has been waiting only a short time will push aside the less vigorous and secure the coveted ride to the exclusion of the others.

The Congestion Problem

We believe that in the summary just published, we have passed through the entire gamut of the no-seat no-fare variations. There is no use of disguising the fact that there is a congestion problem on electric railways, but it cannot be solved by any of the crude propositions just outlined. Under the business conditions which prevail in both large cities and small cities, where the hours of business begin or terminate at about the same hours, many people demand transportation either to or from their homes at about the same time, and the physical limitations of transportation methods will always cause some congestion. We believe, however, that the situation would be less tense if the public understood two things.

The first of these is that it costs every electric railway company considerably more to operate a car during the rush hours than at other times of the day and that consequently the profit per passenger is materially less than in the non-rush hours. The reason for this is evident to every railway man but perhaps is not so apparent to the public. Rolling stock and power equipment have to be provided to supply the maximum service and a considerable portion of the cars and of the power station which are used during the rush hours are idle during the rest of the day and are earning no money to pay for the interest on their investment and to care for depreciation. The question of providing the platform force to operate the cars would also be much simpler and platform expenses would be lower if all the men could be assigned straight runs.

The second truth with which the public should be acquainted is that the relief for congestion lies largely in the community itself. If a systematic plan could be devised by which the large stores and manufactories would arrange their working hours so that their employees would be released at different periods, the problem would be greatly simplified. An attempt was made by the railway company in Albany and Troy some time ago to bring about a change of this kind, but, according to the testimony of Mr. Fassett at the last meeting of the New York State Association, the employers would not listen to the suggestion of altering their working hours, even by a few minutes. Each individual can also often relieve conditions, so far as he is concerned, by waiting a few minutes instead of boarding the first car which passes him. But it seems to be a part of human nature, certainly in this country, to be in a hurry to reach one's destination and most people prefer to undergo a little discomfort rather than to be delayed in this purpose. If this is the case, we do not see that the railway companies can be held responsible for the situation. Any attempt made to limit the number of people on a car necessarily means that some people will have to wait for a following car. If they are disposed to do it voluntarily, well and good, but if compulsion has to be used it can be done only by following the precedent of certain foreign cities of attaching a penalty to those who attempt to board a car after its carrying capacity has been reached. We do not believe that the American public would consent to any rule of this kind which abroad often requires a person to wait for a period of 20 minutes to half an hour before he is allowed to take passage on a car.

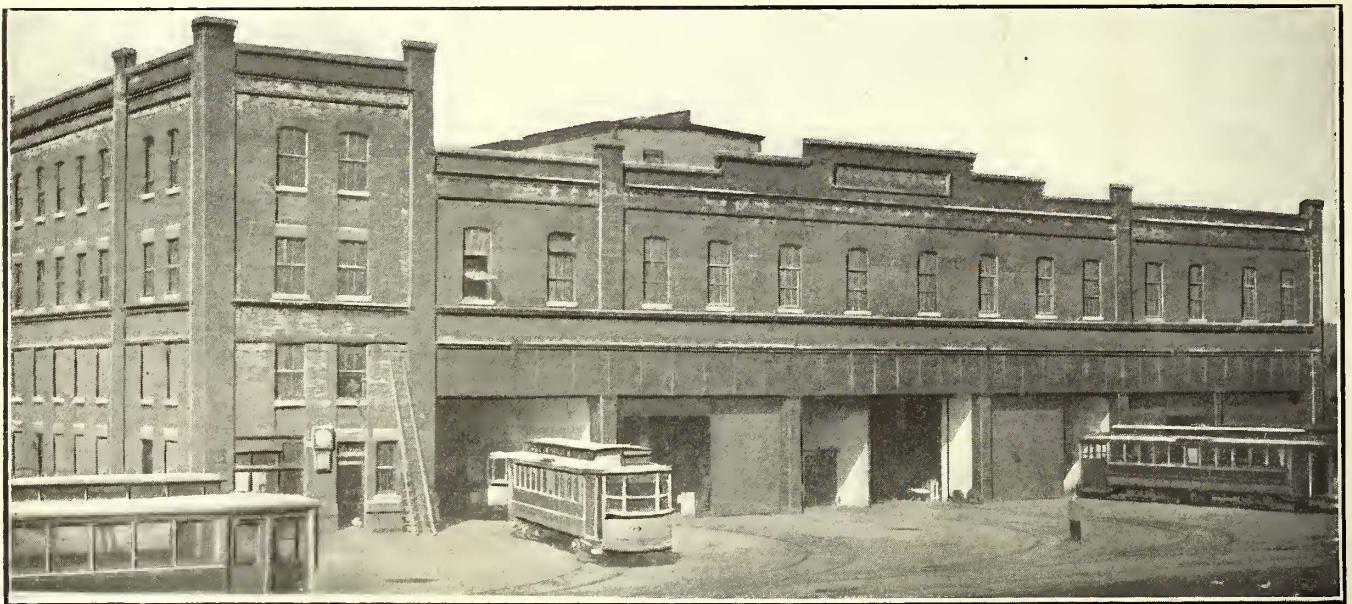
CONSTRUCTION OF NEW BUILDINGS, IMPROVEMENT OF EXISTING STRUCTURES, FIRE PROTECTION AND INSURANCE—METROPOLITAN STREET RAILWAY

Adrian H. Joline and Douglas Robinson were appointed as receivers of the Metropolitan Street Railway Company on October 1, 1907. During the few months preceding and subsequent to their appointment occurred the disastrous fires at 146th Street and Lenox Avenue, Eighty-sixth Street and Madison Avenue, Fourteenth Street and Avenue B and Ninety-sixth Street and Second Avenue. Seven hundred and thirty-one cars were destroyed. Nearly \$3,000,000 worth of property was consumed and the repair shop and operating car house facilities of the Metropolitan were reduced by one-half. This loss of buildings and equipment produced most serious complications. The management was handicapped in the operation of the Metropolitan lines because the destruction of so many cars left but a limited number available for service, and of the number so available the greater proportion was in such a physical condition that breakdowns on the road were of frequent occurrence. An immediate and thorough rehabilitation of the rolling stock therefore was imperative. Aside from the fact that the cars could ill be spared for the period

demanded the replacement of the facilities which had been destroyed, or the procurement of their equivalent at other points, with the utmost dispatch consistent with modern engineering practice, and in accordance with the latest accepted standards of fireproof construction.

CAR HOUSE RECONSTRUCTION

The reconstruction of the car house at 146th Street and Lenox Avenue was pushed forward with all possible speed, and on the site of the old building there was erected a modern two-story fireproof car house with steel frame, fireproofed with concrete, enclosed elevators, restricted areas in which a fire once started among the cars could be confined, a modern sprinkler system and all of the up-to-date fire prevention appliances which will be described later in this article. This car house has a storage capacity of about 500 cars and contains over 3 miles of tracks. In the meanwhile temporary facilities were provided for the storage of cars on the site of the Eighty-sixth Street car house, which had been destroyed by fire and which was converted into a car yard. The ramshackle buildings at Thirty-second Street and Fourth Avenue were also pulled down and a car yard there provided where almost no fire hazard exists at the present time.



Metropolitan Fire Protection—East Front of the 146th Street Car House

necessary for their rehabilitation, there were no adequate shop facilities in which this work could be performed; moreover, even sufficient car-house space for inspection and ordinary repair work was wanting. This combination of circumstances produced a situation with which it was most difficult to cope, and which required prompt and effective measures with the object of preventing further catastrophes and replacing as soon as possible the car-house and shop facilities which had been wiped out.

The Eighty-sixth Street and Madison Avenue building was originally constructed for horse car purposes many years ago and only the ground floor thereof had been remodeled to adapt it to electric car operation. The 146th Street and Lenox Avenue car-house was constructed about twelve years ago, and the Fourteenth Street and Avenue B and the Ninety-sixth Street and Second Avenue car houses, which had originally been properties used in horse car operation, were rebuilt about six years and 12 years ago respectively along lines which were supposed to constitute fireproof construction and with particular regard to electric car operation therein. The conflagrations which visited the Metropolitan properties, as referred to above, demonstrated forcibly the futility of reconstructing buildings in accordance with the ideas formerly conceived to be sound from a fireproof standpoint. The situa-

A careful study of the requirements of the system also demonstrated the desirability of constructing a modern two-story car house at Ninety-ninth Street and Lexington Avenue, fireproof and equipped with fire protection apparatus, in accordance with the same general plan of construction as was followed at 146th Street. The adjoining car house at One hundredth Street and Lexington Avenue was improved and, together with the Ninety-ninth Street house, provided the system with up-to-date car house facilities on the east side of Manhattan Island. There are more than 2 miles of track in the Ninety-ninth Street and One Hundredth Street car houses combined, and capacity for over 300 cars.

Lastly, the old structure at Fifty-fourth Street and Ninth Avenue was demolished and a new two-story fireproof car house of steel frame, fireproofed with concrete, is now nearing completion at that point capable of accommodating nearly 300 cars and containing almost 2 miles of track.

These three car houses, one in the northern section of Manhattan Island, another on the eastern side of the city and the other on the western side, constitute the nucleus of the new Metropolitan system of car houses and shops. They provide facilities far superior to those which the system has heretofore possessed and are located at convenient and strategic points, so far as operating purposes are concerned. The accompanying

half-tone engravings give an idea of the layout and appearance of the car houses in question.

CONSTRUCTIONAL DETAILS

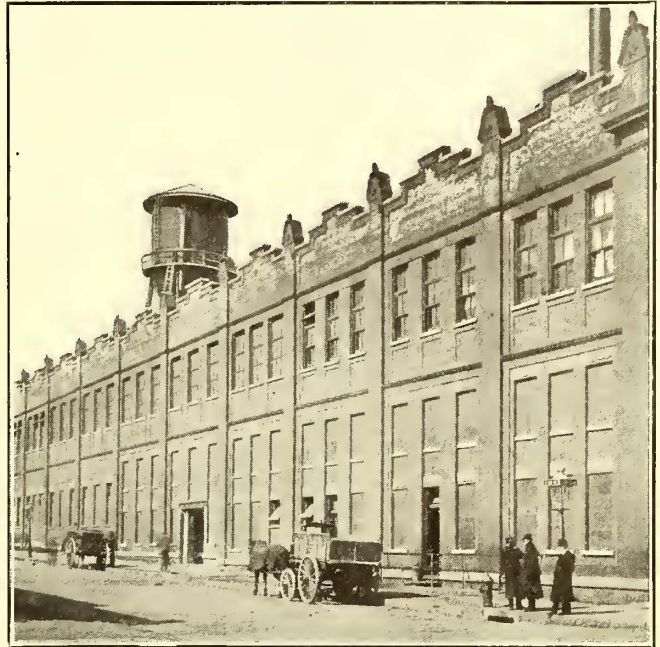
At Fifty-fourth Street and Ninth Avenue, the interior walls of the building are of brick, while the exterior walls are of brick and terra-cotta. The ground floor of this building, in the portion recently constructed, consists of concrete, the rail being supported on small piers, except along the front and adjacent to the transfer pit, where concrete floor is laid flush with the top of the rail and a slot installed. In the old portion of the car house which still remains, the floor is of concrete flush with the top of the rail, with the necessary repair pits sunk between tracks. The second floor consists of structural steel supporting brick arches, the same being filled in above the arches to the level with the top of the structural members with cinder concrete. The rail is supported above this floor on concrete piers spaced at suitable distances. A flush floor is laid along the transfer pit similar in type to that on the first floor. The fire doors installed at the Ninth Avenue car house are of an approved type. There are no shutters installed at this building, but all windows, except in the office portion, are of the hollow metal frame wire glass type.

At Ninety-ninth Street and Lexington Avenue, the interior walls are of brick and the exterior walls are of brick and terra-cotta. On the first floor the construction is fireproof, of concrete, all floors being flush with the top of the rail except where the necessary inspection and repair pits are sunk in the track. On the second floor, on the Ninety-ninth Street side, the construction is of reinforced concrete slabs on structural steel members. The rail of this second floor is supported above the floor level proper on small concrete piers, except along the transfer pit, and in a small portion of the south side in the rear of the offices, where the floor surface is flush with the top of the rail.

In the 100th Street car house, the second floor consists of structural steel members supporting terra-cotta arches, which are filled in over the steel-work with cinder concrete. The floor level is depressed between the rail on all tracks, making a shallow pit throughout this 100th Street car house on the

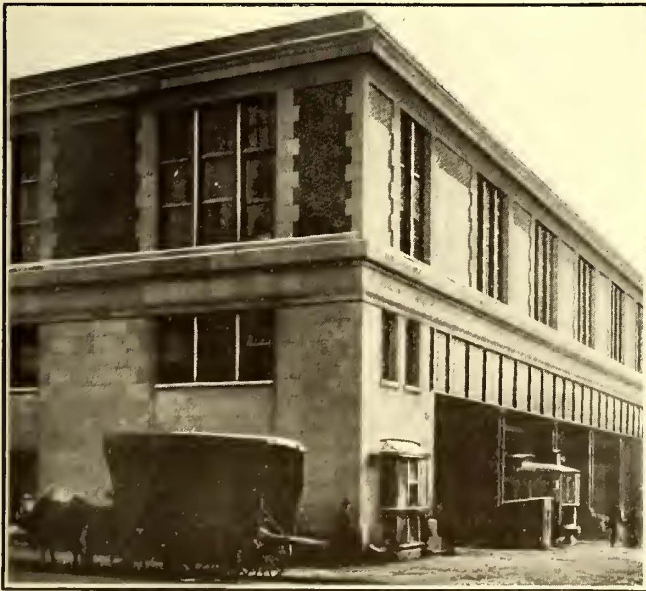
second floor of the 100th Street building are secured by monitor skylights of plain glass set in wood frames. Fire doors are also used. There are no fireproof shutters on these buildings but wired glass windows are installed throughout the Ninety-ninth Street building except in the office portion.

At 146th Street and Lenox Avenue, the interior walls are



Metropolitan Fire Protection—South Side of the Ninety-ninth Street Car House

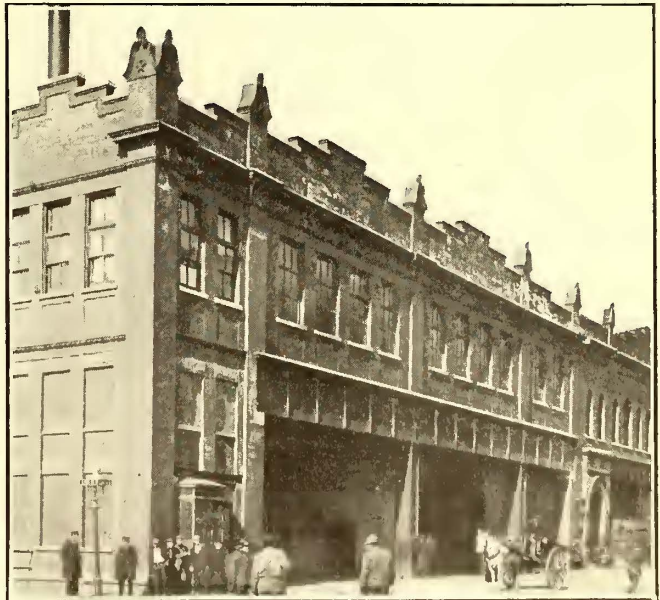
of brick, while the exterior walls are of brick and terra-cotta. The first floor is fireproof, of concrete, with the necessary pits of concrete. The second floor consists of structural steel with reinforced concrete floor supported thereby. The second floor is constructed with pits throughout, except along



Metropolitan Fire Protection—West Front of Fifty-fourth Street and Ninth Avenue Car House

second floor. The roof of the 100th Street building consists of structural steel trusses, supporting a terra-cotta block tile roof.

The Ninety-ninth Street roof is of reinforced concrete. The waterproofing on these roofs consists of standard tar and gravel roofing. Wire glass skylights are built in the roof at the Ninety-ninth Street building. Lighting and ventilation on the



Metropolitan Fire Protection—East Front of the Ninety-ninth Street Car House

the transfer pit. In the shops building, the new floor, known as the third, was installed in 1909 with structural steel members supporting a reinforced concrete slab floor. The fourth floor of the shops building consists of terra-cotta arches on structural steel, filled in with cinder concrete with the surface finished with cement.

The roof of the 146th Street car house proper is of rein-

forced concrete with tar and gravel waterproofing. Wire glass metal frame skylights are built in this roof wherever necessary. On the old shop building, the roof consists of terracotta blocks supported by structural steel trusses. The waterproofing is of tar and gravel. Fire doors are used. There are no shutters but all exterior window openings are protected by metal frame wire glass windows, with the exception of the office section, where plain glass is installed. The shops building is fitted throughout with plain glass windows set in wooden frames except on the rear, where there is danger of exposure from adjacent apartment houses. On these buildings wire glass windows with metal frames have been installed.

Particular attention has been given to the installation of lighting circuits in the new car houses. All wires are insulated with the best grade of rubber insulating compound and are installed in metal conduits, except the main feeders, which are paper insulated, lead covered and run in clay ducts in the ground floor. The conduit lamps and panel boards in the track pits are placed in grooves and recesses cut in the concrete walls of the pits in order to protect them from mechanical injury and from water which drips down from the cars along these walls. Fixtures in oil rooms, locations where there is an extra fire hazard and in damp places are of the marine type, having an outer globe with guard and made water-tight by means of gaskets and suspended by conduit.

The new lighting systems are so designed as to reduce the cost of maintenance to a minimum and also that the lights can be turned on when required to suit the working conditions without having lights burning when not required. This plan has effected a considerable saving in cost of current, and has facilitated the better handling and inspection of cars.

It is interesting to note that during the process of construction of each of these car houses the operation of cars was carried on without cessation. Every inch of track was utilized as fast as the building operations would permit, for the lack of car house room necessitated the storing of cars on the street and gave rise to repeated protests on the part of individuals and the city authorities. Thus every effort was made to minimize cause for complaint, and furthermore, the fact that during this period the management was engaged in extensive overhauling and rehabilitating the rolling stock served as an incentive to all concerned to put forth their best energies to overcome the difficulties, which, at first, seemed well-nigh insurmountable.

GENERAL POLICY

A sketch has now been given in this article of the results accomplished in new car house construction and the methods by which they were secured will be outlined in the following paragraphs:

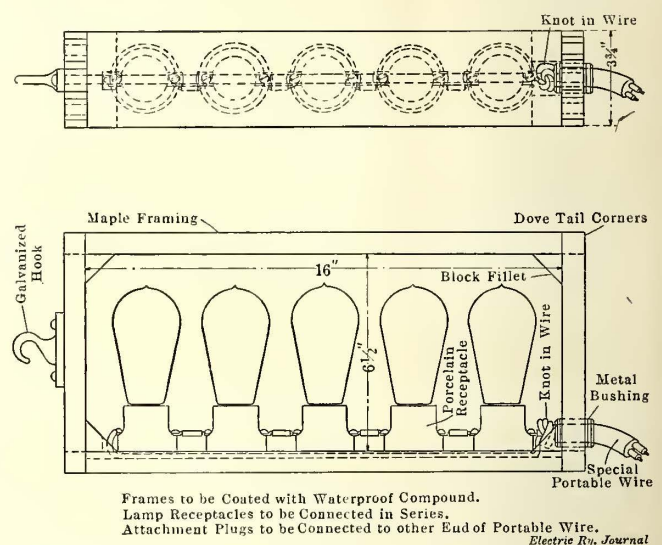
While the plans were being formed and carried out in connection with the construction of the three new car houses mentioned, the entire subject of fire protection was given the most careful study, together with possible plans of improving the remaining car houses of the system. The program received the personal attention of Oren Root, general manager for the receivers who followed up each phase of the question. He secured all of the latest information on the subject of fire protection, called conferences of his engineers and operating staff sometimes three and four or five times a week to consider the best methods of securing the results sought and outlined the policy to be followed, not only to secure the essential features of adequate fire protection but also to obtain this result in a manner consistent with the operating requirements of the railway. Recommendations offered at these meetings by the engineering staff and by outside fire protection experts whom Mr. Root had called in to assist in a solution of the problem were promptly considered and discussed and often a decision was made the same evening and work put on the way the next morning. All work save that of the running of cars was subordinated to that of fire protection.

ORGANIZATION OF THE MEN FOR FIRE DEFENSE

Obviously, one of the first steps to be taken was to restore confidence among the employees, to create an *esprit de corps*

and to secure the active co-operation of every individual to attain the end sought. It is but just to the men to say that the rank and file grasped the situation and arose to the emergency. All employees engaged in work about the buildings have been taught not only the necessity of cleanliness in keeping refuse swept up and deposited in metal rubbish receptacles, but have learned also how to perform their duties in a manner less likely to give a chance for fire to start. All rubbish is removed from the car houses daily and particular care is taken to prevent combustible material from remaining in a car house over night. The aisles and pits in all car houses and shops are swept out daily. The whitewashing of all of the interiors of the buildings, besides constituting a mild form of fire protection, has bettered the light inside the structures and made the surroundings more pleasing to those working there.

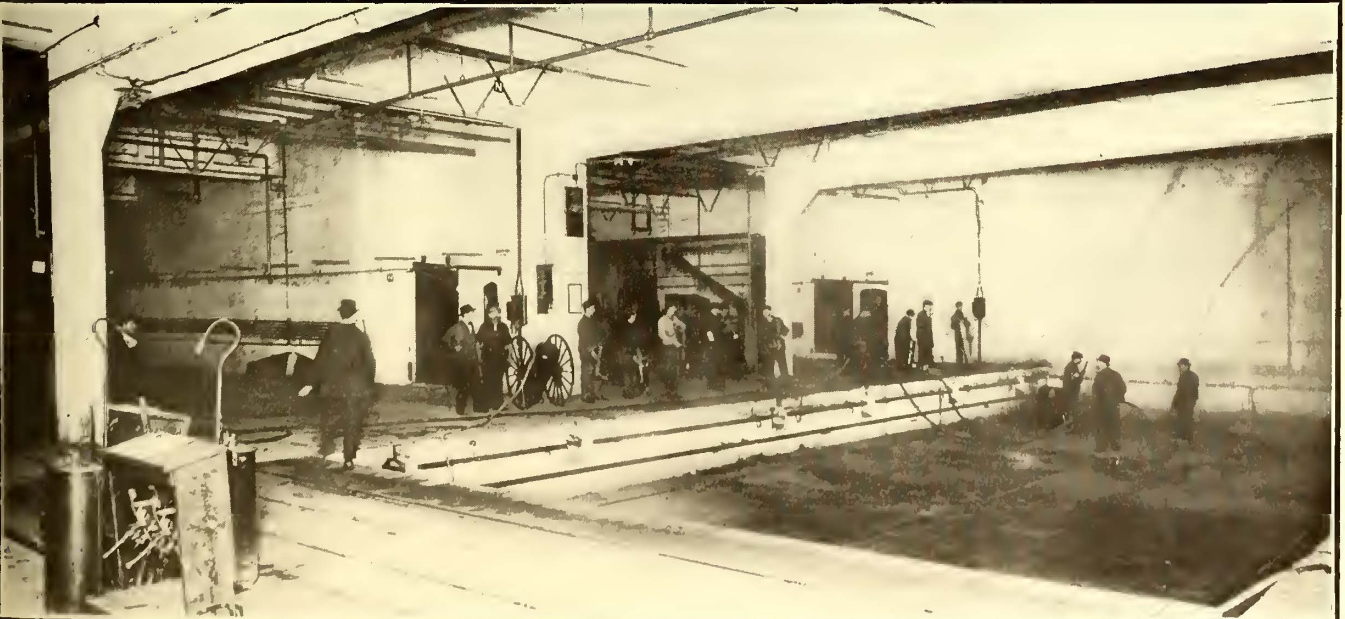
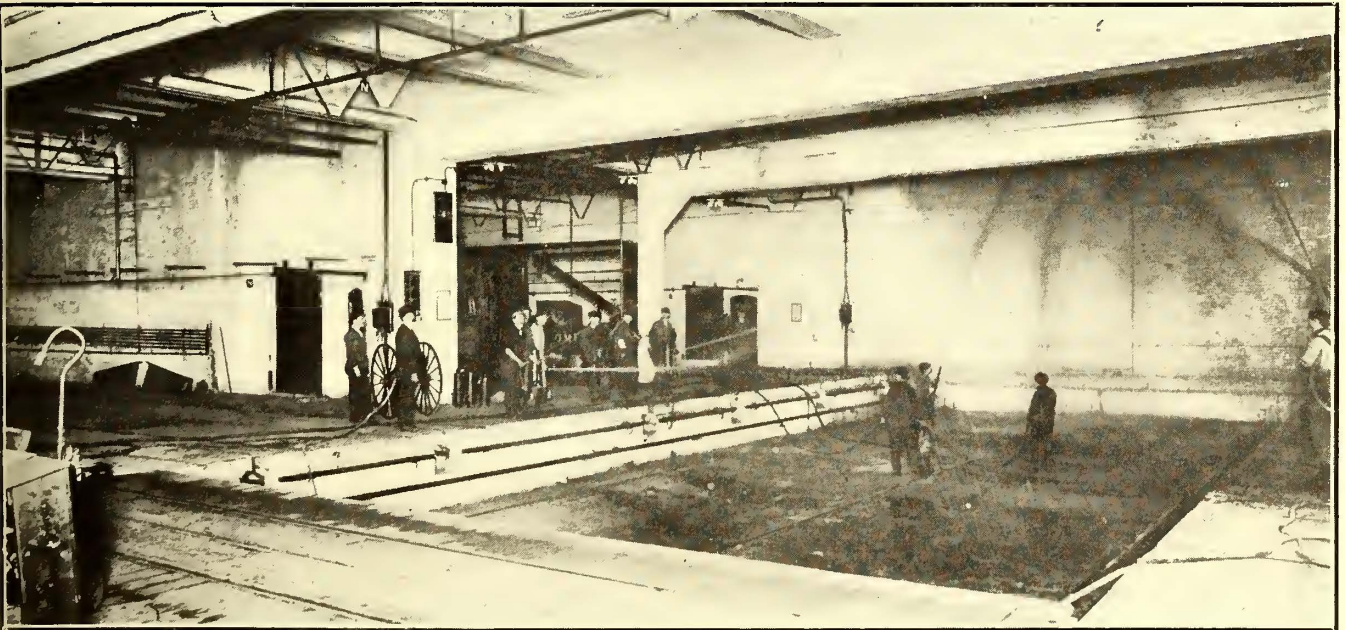
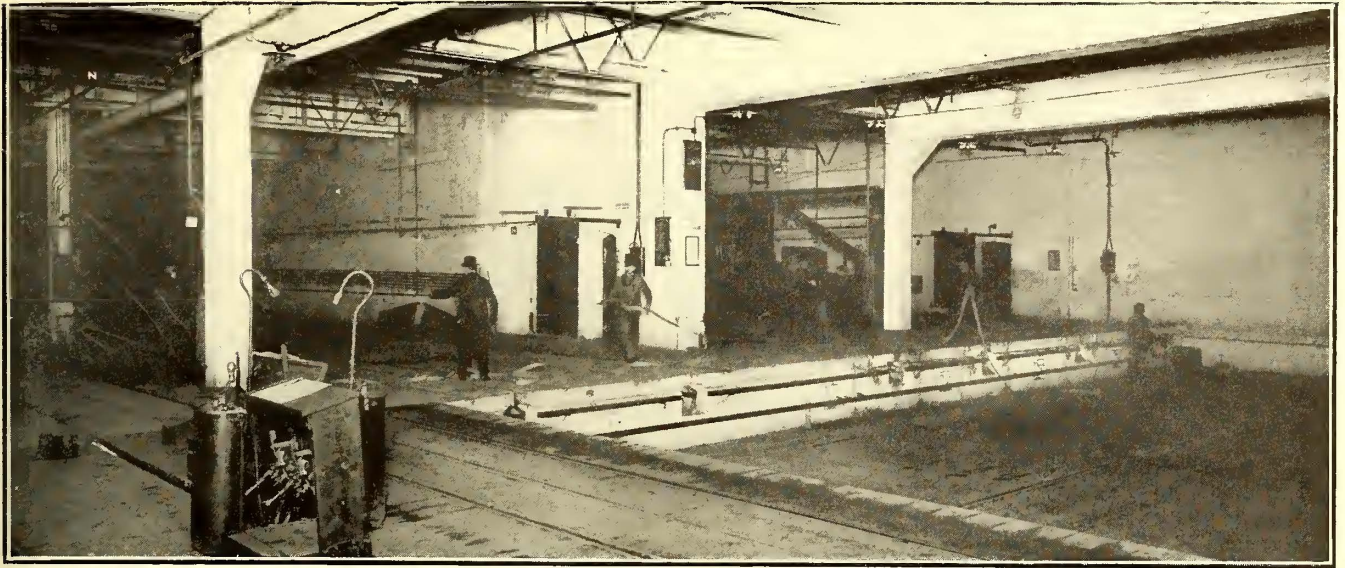
Early in the fire campaign, the men began to take a personal pride in keeping the premises neat and tidy. The old wooden lockers which had become dangerous rubbish receptacles, have been replaced by standard metal lockers, which are preferred by the men and decidedly more satisfactory to the underwriters. Out-of-the-way corners have been cleaned out and boxed up to prevent the collection of rubbish therein but better still the men have come to realize that their personal interests and comfort are in a measure identical with the



Metropolitan Fire Protection—Standard Five-Light Portable Set

fire protection policy of the management. Devices which are less dangerous from the fire standpoint than those which were previously used have been substituted for the latter; for instance, in place of the old portable lamps a portable five-light cluster has been designed, as shown on the accompanying drawing. This cluster consists of five lamps placed inside of a four-sided hardwood frame attached to a 40-ft. special heavy portable cord. It constitutes a device much more efficient and convenient than that which it superseded.

Within 20 days after the Ninety-sixth Street fire all employees were furnished with a brief printed pamphlet in which was outlined in simple language a statement of accepted precautions to be observed against dangers from fire. Subsequently these instructions were supplemented by an indexed publication entitled, "Description of Certain Precautions Against Fires," in which the subject was treated first in a general way and then under the four headings: "Fire Cause," "Fire Spread," "Fire Extinguishing," and finally "Alarms, Brigades, Etc." These regulations are in the hands of all employees whose duties require their working in and about the buildings of the Metropolitan company. A copy of this pamphlet was printed in the ELECTRIC RAILWAY JOURNAL of Aug. 15, 1908. At each property the men have been organized into fire brigades, there being a number of such brigades

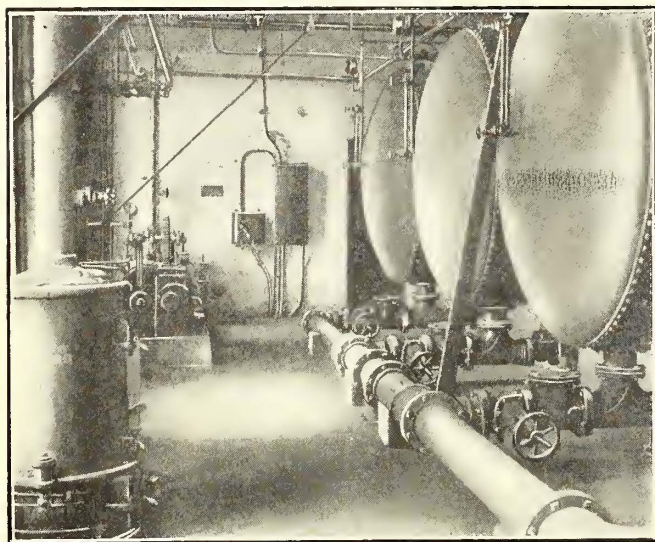


Metropolitan Fire Protection—Fire-Fighting Forces Available Within 30 Seconds, 1 Minute and 1 1/4 Minutes After Sounding an Alarm

at each property according to the extent of the premises. The men are thoroughly drilled, local alarms being sounded at unexpected times until each member of the brigade knows precisely what is expected of him in an emergency and how to perform his duties promptly and efficiently.

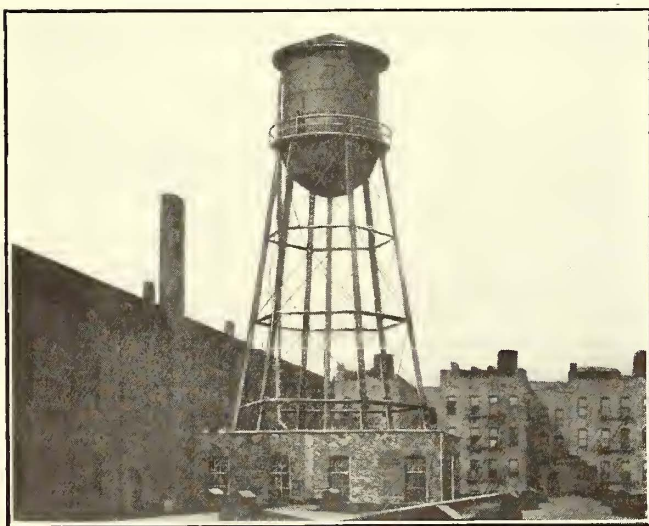
FIRE-FIGHTING EQUIPMENTS

Standpipe systems have been installed in the various properties with hose reels attached thereto. Pails filled with sand or water, according to the season of the year, are distributed over the premises in accordance with the standard procedure of the fire underwriters. Chemical fire extinguishers also are located at points easy of access. Local alarms have



Metropolitan Fire Protection—Battery of Pressure Tanks at 146th Street Car House

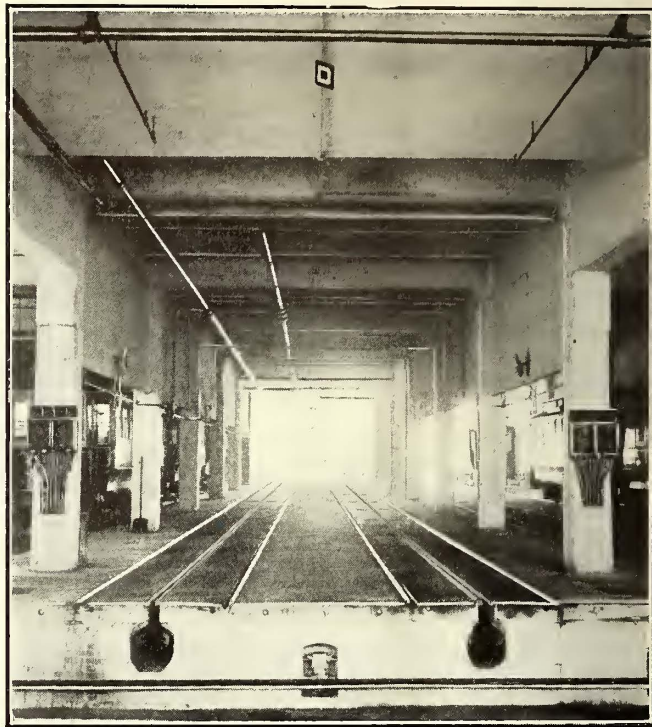
been placed at different points in the buildings and the men taught to respond upon the hearing of the signal. Furthermore, auxiliary fire alarm boxes connected with the city fire-alarm service have been placed in the different properties and notices posted for the information of employees as to their location. These notices are supplemented by oral instructions.



Metropolitan Fire Protection—Gravity Tank at the 146th Street Car House

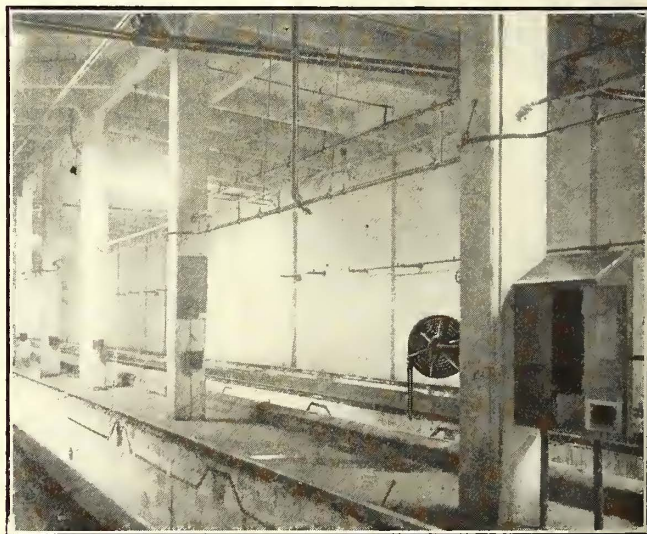
For the further guidance of the men there has been installed at each property a system of red indicating electric lights, each of which burns throughout the 24 hours of the day and is a visual reminder of the fact that in its immediate vicinity are situated an auxiliary fire-alarm box, hose reels, extinguishers, etc. These lights are on a circuit separate from the main light-

ing circuit and power system of the car house, so that if the general lighting or power circuits are cut off in an emergency, the indicating lights will continue to burn. These lights are placed about 3 ft. below the ceiling and 4 ft. from the apparatus, the location of which they are intended to indicate.



Metropolitan Fire Protection—Fire Curtains at the Forty-second Street Car House

Small chemical engines have been located at some of the properties. These have been of material assistance upon several occasions when the efficiency of the fire brigades in extinguishing incipient blazes has been clearly demonstrated as in the case of cars which have caught fire on the street near the car house, due to grounded plows. In this connection the



Metropolitan Fire Protection—Fire Extinguisher in Case, Hose Reel, Fire Pails, Etc.

half-tones on page 691 illustrate respectively the conditions existing at the 146th Street car house within 30 seconds, one minute, and a minute and a quarter after the unexpected sounding of an alarm for fire drill purposes. The lines of hose in active operation and the number of fire extinguishers brought into play give evidence that a fire of even moderately large

proportions is likely to be extinguished promptly or at any rate confined to a very small area pending the arrival of the City Department. An illustration on page 692 shows a chemical extinguisher in its cabinet; two lines of hose reels, half a dozen fire pails; a fire-alarm box; aisle line and overhead sprinklers and standpipe connections. This view is typical of the way in which fire protection apparatus is installed at every car house. All of the premises are equipped with modern sprinkler apparatus.

On page 692 a view is given of a gravity tank, at 146th Street, which has been erected directly over the room containing the battery of pressure tanks illustrated on the same page. In this room are seen the automatically controlled compressors, the motor-driven water pump and the emergency heater for keeping the water from freezing. A view is also reproduced of the feature of curtain board protection. The system of fire protection shown in these illustrations is typical of that used in all of the car houses.

In many of the older buildings the area in which a fire might rage was great. This condition has been remedied by the erection of division fire walls and the cutting down of the area in which a fire may be confined when once started. Standard fire doors have been hung at openings in the walls which are necessary for operating purposes, unnecessary openings have been bricked up and metal frame and wire glass windows have also been installed.

MAINTENANCE AND INSPECTION SERVICE

The standpipe and automatic sprinkler systems in the various properties are visited daily by a sprinkler inspector who reports to the engineer of maintenance of way. It is the duty of this inspector to care for the prompt correction of

ADRIAN H. JOLINE, DOUGLAS ROBINSON, RECEIVERS. METROPOLITAN STREET RAILWAY COMPANY	
Void after	COUNTERSIGNED
Admit	
To	
Purpose	
No.	
Eng. Maint. of Way.	
THIS PERMIT WILL BE HONORED ONLY WHEN WORN PROMINENTLY DISPLAYED ON THE HAT OF THE PERSON TO WHOM IT IS ISSUED.	

Metropolitan Fire Protection—Form of Building Pass

any defects which may develop, notwithstanding the fact that the systems are practically automatic in maintenance.

Stringent measures have been adopted to exclude from the buildings persons having no business therein. A pass system has been established under the operation of which everyone not em-

ADRIAN H. JOLINE, DOUGLAS ROBINSON, RECEIVERS. METROPOLITAN STREET RAILWAY COMPANY.	
Badge No.	WATCHMAN'S DAILY REPORT
For Night, Day Shift Ending 19	
Property at	Section
Suspicious characters	
Rubbish	
Trouble	
Doors and parts of building requiring repairs	
Is all fire apparatus handy and ready for use?	
Other matters requiring attention	
Signed,	
Watchman	
Above noted and attended to by	

Metropolitan Fire Protection—Watchman's Daily Report

ployed on the premises is required to present a pass properly signed indicating the name of the bearer, the character of his business, the name of the official issuing the pass and the period of its validity. All passes are numbered for the greater facility of identification. These passes are of two forms, one being good for one day only and the other valid for a longer

period as may be specified thereon. The color of the daily passes is changed every week for four consecutive weeks, the color used during the fifth week being the same as the color used the first week, etc. The passes which are good for more than one day are of two forms—one of a given color being used for employees and the other being issued to outside parties having business on the premises.

The entire watchman service of the properties has been completely reorganized, this being placed under the supervision of

METROPOLITAN STREET RAILWAY COMPANY.		ROUNDSMAN'S DAILY REPORT		ADRIAN H. JOLINE DOUGLAS ROBINSON RECEIVERS	
FOR DAY NIGHT SHIFT ENDING 19					
<small>NOTICE—Report matters for special attention on reverse side of this sheet</small>					
PROPERTIES	Hour Watched	NAMES OF WATCHMEN ON DUTY	Number	NAMES OF GUARDS ON DUTY	Number
215th St. Carhouse					
152d St. Yard					
146th and Lenox					
142d and Lenox					
TOTAL				TOTAL	
Give on reverse side names of men who did not report for duty and cause.					
				Correct,	
Roundsman					

Metropolitan Fire Protection—Roundsman's Daily Report

the engineer of maintenance of way. Each watchman carries a standard watchman's clock which he rings up at the key stations throughout the property. The route of the watchman and the locality of the key stations are so arranged as to insure a complete inspection each hour of the property to which the watchman is assigned. A system of weekly inspections has

ADRIAN H. JOLINE, DOUGLAS ROBINSON, RECEIVERS. METROPOLITAN STREET RAILWAY COMPANY.		Examined by
FIRE REPORT.		
Property		
TO ENGINEER, MAINTENANCE OF WAY.		
Reported that at M. on 19, fire was discovered by in		
Private Alarm sent in at A. M. P. M. By whom?		
Public Alarm sent in at A. M. P. M. By whom?		
Private Brigade responded at A. M. P. M.		
Public Department responded at A. M. P. M.		
Cause of fire		
Number of sprinklers opened?		
Effect of sprinklers?		
How long did water flow?		
Did sprinkler alarm operate?		
At what time was sprinkler system restored to its normal condition?		
By whom?		
Number of extinguishers used?		
Number of pails used?		
Number of standpipe lines used?		
Number of chemical engines used?		
How soon after discovery was fire extinguished?		
By whom?		
What property was damaged by fire, and to what extent?		
Remarks: (Note—Give brief description of origin and cause of fire and any suggestions to prevent its recurrence.) (Names of men whose efforts to extinguish fire were worthy of special mention.)		
Signed		

Metropolitan Fire Protection—Report on a Fire

also been instituted. This covers all phases of fire protection at each property, particular attention being given to house-keeping conditions, fire-fighting apparatus, fire doors, sprinkler and standpipe systems, etc. Any defects or irregularities noted are promptly reported to the engineer of maintenance-of-way and immediately corrected.

SPRINKLER ALARM SYSTEMS

In connection with the equipment of sprinkler systems there have been installed certain sprinkler alarm devices which automatically give notice of the existence of conditions which should be corrected. The following is a description of the details:

Gongs ring and an annunciator indicates the location affected when the pressure falls and when the water starts to flow in the sprinkler system; also when the water in the gravity tank reaches the low or high limit. The installation consists of a 10-inch gong, relay and local battery and an annunciator with main battery, all located in the foreman's or main office, and a second 10-in. gong located centrally near the transfer pit in the car houses and connected in parallel with the one in the foreman's office, so that both bells ring at the same time. Connections are made to the annunciator from dry valve fire alarms, dry valve pressure gages, pressure tank gages and the high-low tell-tale on the gravity tank. A 4-in. gong in the pump room is connected to the circuit of the high-low tell-tale, but the operation of this bell is independent of the operation of the annunciator and the 10-in. gongs. A typical wiring diagram of this system is shown in the accompanying drawing on this page.

The 10-in. gongs are connected in a local circuit to the

Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm
A	B	C	D	E	F
1	1	2	2	2	2
Pressure	Pressure	Pressure	Pressure	Pressure	Pressure
A	B	C	D	E	F
1	1	2	2	2	2
Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm	Fire Alarm
G	H	I	J	K	L
3	3	4	4	4	4
Pressure	Pressure	Pressure	Pressure	Pressure	Pressure
G	H	I	J	K	L
3	3	4	4	4	4
Pressure	Pressure	Pressure	Pressure	Pressure	Fire Alarm
1	2	3	4	Stand Pipe	Stand Pipe
Gravity Tank High-Low	V	W	X	Y	Z

Marking on Annunciator Drops

Metropolitan Fire Protection—Wiring Diagram and Annunciator Drops for Sprinkler Alarm Service

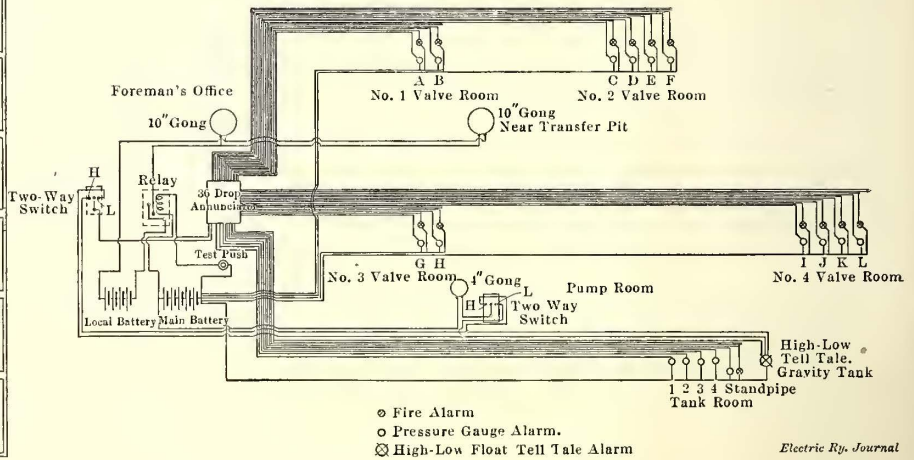
armature side of the relay with the local battery, and the coils of the relay are connected to the annunciator and main battery. When any of the annunciator circuits are closed, the annunciator indicates and current passes through the coils of the relay causing its armature to close the local circuit and ring the 10-in. gongs. When the armature closes the local circuit, it remains closed and the bells continue to ring until someone releases the armature and thereby opens the local circuit. The two-way switch in the foreman's office is connected in the circuit of the high-low tell-tale so that one drop of the annunciator indicates "high" when the switch is set one way, and the same drop indicates "low" when the switch is set the other way. This switch is normally set to indicate "low." A similar two-way switch is connected to the 4-in. gong in the pump room, but this switch is normally kept open and is independent of the operation of the annunciator and 10-in. gongs. Common return wires are run to each valve room, tank room and gravity tank and two spare wires are also run to each of these locations.

All wires are insulated with the best grade of rubber insulation and braid and are run in metal conduits. All apparatus is of waterproof marine types. The relay was specially designed to meet the requirements and is of special heavy and reliable construction. It is provided with a latch so that the contact which is closed by the armature remains closed until the latch is raised by hand, as referred to above. The an-

nunciator drops are marked as indicated on the drawing; the large letters and figures correspond to those assigned to the different dry valves and pressure tanks while the small figures at the bottom of some of the drops indicate the valve room in which the valves are located. The five drops marked on the drawing v, w, x, y, z, are spare. The letters and figures are in white enamel, the background on the fire alarm drops in vermilion, and on the other drops is black enamel. The 10-in. gong, annunciator, relay, two-point switch and test-push are neatly mounted on an oak panel in the foreman's office, and the main and local batteries are placed in separate boxes.

POWER CUT-OFF METHODS

The general manager has issued stringent instructions to all employees that under no circumstances is the power to be kept on any track of a car house at times other than when it is necessary to use the power for the shifting of cars or for the burning of the lamps therein while repairs are being made or the cars are being cleaned. Not content with these precautionary measures, tests and experiments have been made with certain devices for the automatic cutting off of the power from tracks to eliminate the hazard due to the contact of the car plows in the houses with live channel rails which would render possible the occurrence of a fire through plow grounding or other electrical defects. These devices also effect economy in



- Fire Alarm
- Pressure Gauge Alarm.
- ⊗ High-Low Float Tell Tale Alarm

Electric Ry. Journal

the use of current, as they prevent the liability of lamps burning and heaters operating on the cars in case the switches controlling them are left turned on. This is especially true of the heaters, there being nothing to indicate if they are turned on or off except by the inspection of the switches inside of the cars.

To accomplish these ends, several systems of the overhead trolley, contact shoe, and circuit-breaker types have been installed in various car houses to observe their efficiency under actual operating conditions. A description of the three principal systems follows:

OVERHEAD TROLLEY SYSTEM

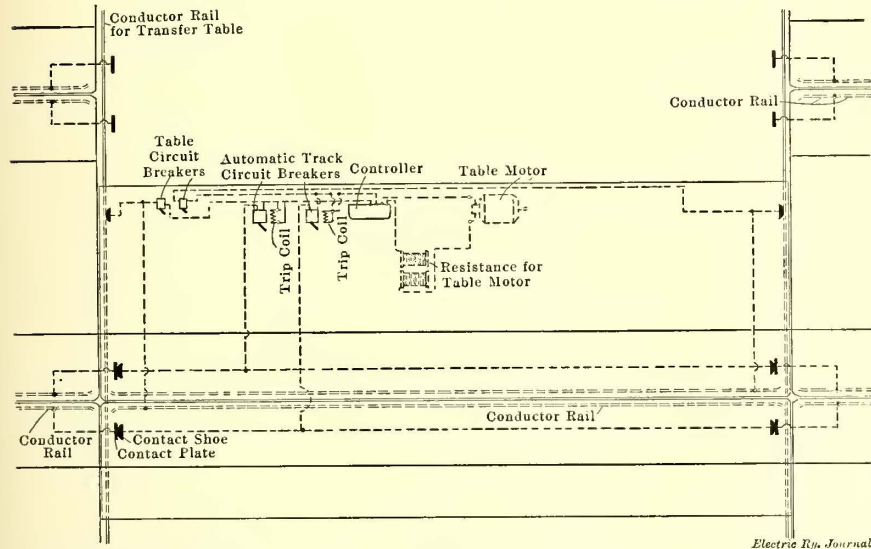
At the 146th Street and Lenox Avenue car house overhead wires have been installed and the cars have been equipped with a body plug attachment, which is connected to the overhead trolley wires by a portable pole with leads and plugs. While this system has been in operation but a short time, it is found that a saving of three men out of eight can be made in the shifting requirements of one-half of the lower floor. This scheme appears to be particularly well adapted to such a car house as the 146th Street property, where there is much pit construction, and consequently the operation of cars by the underground system requires the use of a number of leads in the pits, thereby creating conditions not altogether desirable.

SECTIONAL CONTACT SHOE SYSTEM

The sectional contact shoe system is particularly well adapted

for car houses which have short lengths of track accommodating three to four cars. This method of feeding the tracks is a very simple and safe one, as the first cost is comparatively small and there is very little apparatus to maintain. The parts are so designed that the track on which the cars are to move can be made alive after the transfer table is brought opposite the track, and a pair of circuit-breakers on the table closed by

contact shoes on the table, these shoes in turn being controlled by automatic circuit-breakers also located on the table. These circuit-breakers are in the same circuit which supplies power to the transfer-table motor. This motor circuit is fed from conductor rails which are supported on the walls of the transfer pit.



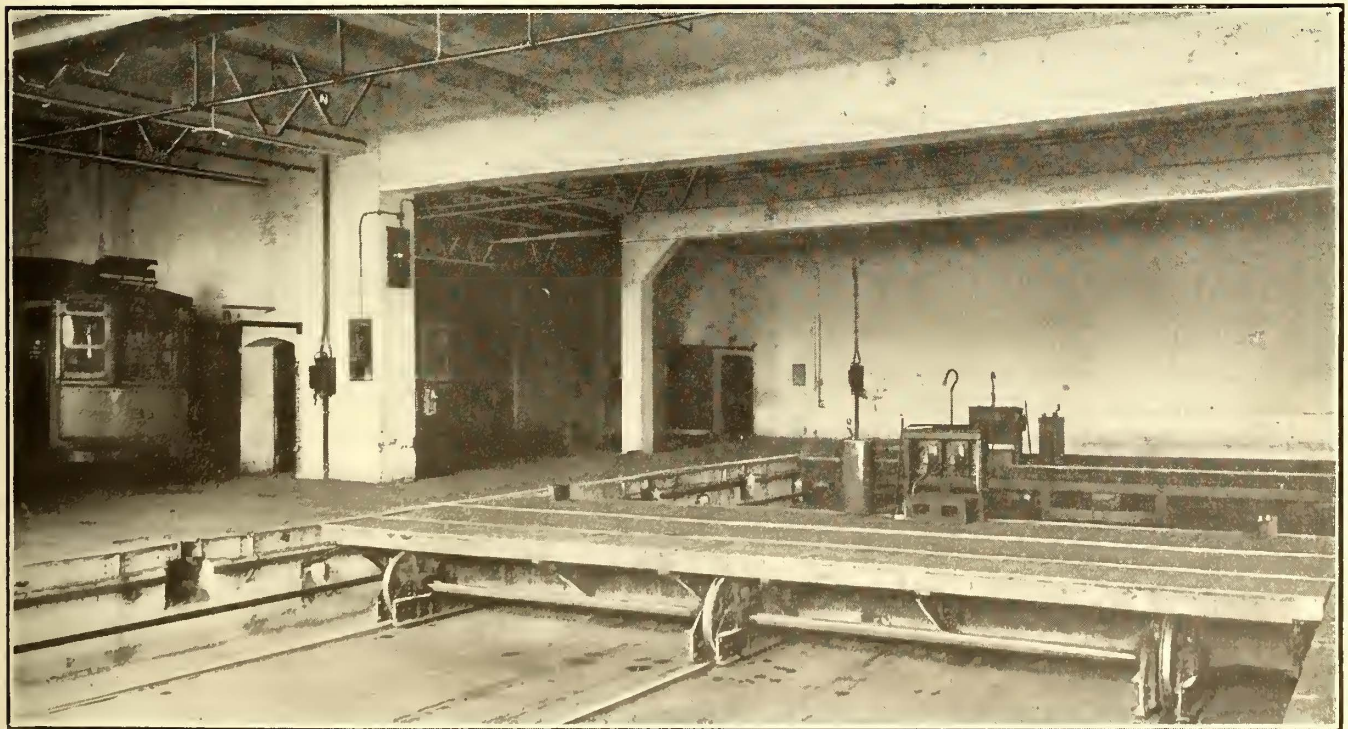
Metropolitan Fire Protection—Wiring Diagram for Transfer Table

hand. All other tracks remain dead, as it is impossible for the conductor bars to be made alive on a track leading from a transfer pit until the transfer table is placed opposite the track, and the breakers are closed on the table. The arrangement of the circuits for this purpose is shown in one of the accom-

panying drawings, while a half-tone also on this page shows the installation on the ground floor of the 146th Street car house.

TIME-LIMIT CIRCUIT-BREAKERS

The time-limit circuit-breaker method, which is the third means used to keep the circuits dead when not in use, is especially

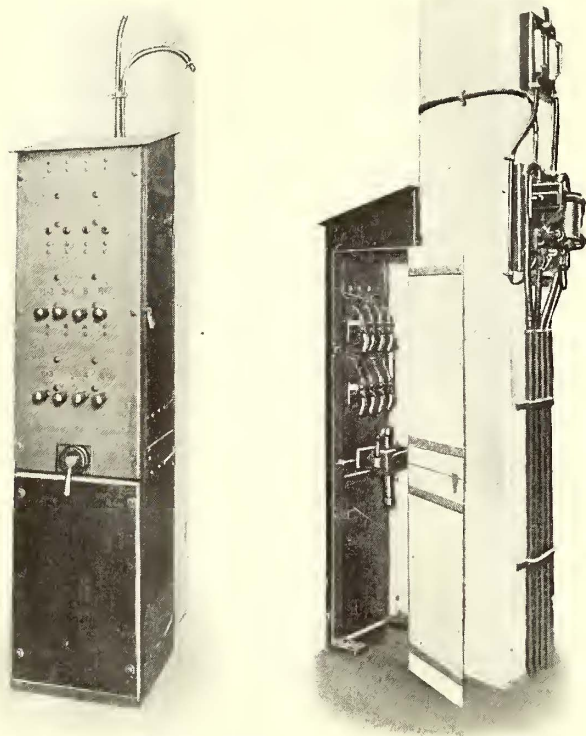


Metropolitan Fire Protection—Transfer Table and Pit with Contact Shoe System at the 146th Street Car House

applicable to car houses having long lengths of track, where the use of contact shoes would not permit sufficient rapidity in handling the cars, where it is often desirable to put power on a track for a short time without having to move the transfer tables opposite the track in question, or where a transfer table is not installed. This system consists of a group of switches

which trip them open when the motor starts to move the transfer table. This is accomplished by having the motor current pass through the solenoids. A short-circuiting switch is provided so that when the circuit-breakers are open, the current cannot pass through the solenoids to cause them to operate. In the half-tone previously mentioned, the conductor rail which feeds the transfer table is clearly shown on the walls of the transfer pit supported by insulators. Above this rail may be seen the contact plates on one of the tracks and also the wooden stringer which runs from one contact plate on a track to the near contact plate of an adjacent track. The purpose of this stringer is to make a continuous path from track to track for the contact shoe on the table, thus simplifying the action of the shoe. The point at which the wood stringer meets the metal contact plate does not show very clearly in the illustration, as the stringer and plate appear as one continuous piece. The circuit-breakers shown on the transfer table are protected by a wooden housing which is completely lined with asbestos building lumber.

which are mounted on a board and control the current supply to different tracks. Each track circuit is protected by a circuit-breaker and also by a time-limit device which will automatically trip open the circuit-breakers after they have been closed for a predetermined period like 5 or 10 minutes. One time limit device only is required for each control board. This method is one which has been lately developed and is very positive in its action. Front and back views are reproduced of



Metropolitan Fire Protection—Circuit-Breaker with Exterior and Interior of Time-Limit Device

the control board on the ground floor of the Ninety-ninth Street and Lexington Avenue car house. The latter cut also shows a pair of circuit-breakers mounted on the face of the column and their wiring arrangement.

The eight handles on the face of the board operate the switches in the back which control eight pairs of circuit-breakers affecting respective tracks. The rod below the switch handles operates the same tripper which is actuated by the time-limit device which opens the control switches. This arrangement makes it possible to trip the circuit-breakers by hand at this board when desired. All wires from these control switches to the respective circuit-breakers are run in conduit. In the rush hours when the circuit-breakers have to be repeatedly closed on the individual tracks, time may be saved in getting out the cars by having a boy operate the control board.

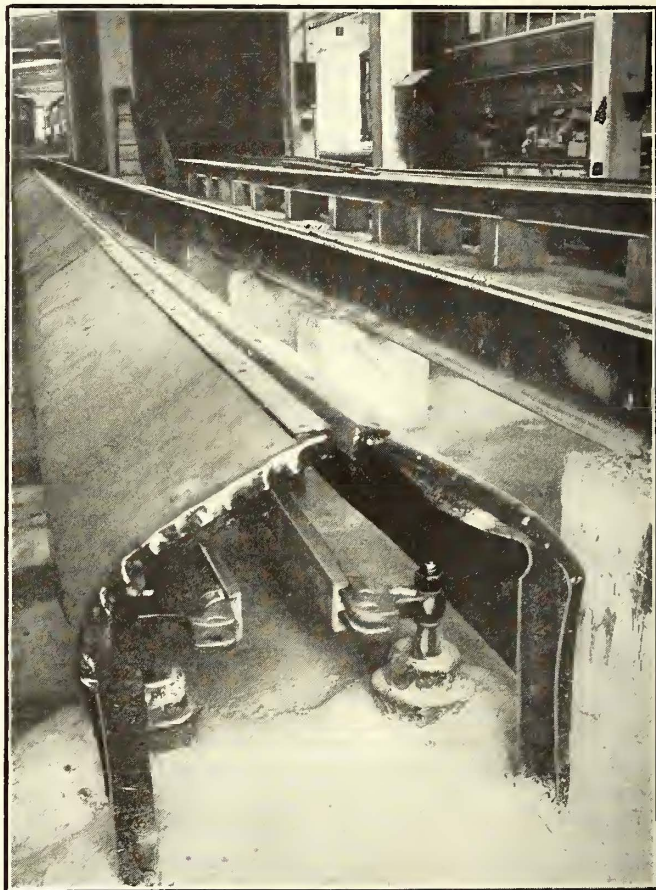
CONSTRUCTION AND RECONSTRUCTION OF POWER SYSTEMS IN CAR HOUSES

New power installations, equipment and wiring have been put in several of the car houses and considerable overhauling has been done in the old installations. The car houses in which the installations have been made are given below, with short descriptions of the character of each.

Ninety-ninth Street and Lexington Avenue.—This building has been furnished with new power systems and wiring throughout. The time-limit circuit-breakers, installed on the ground floor, control all the tracks except those which go out to the street, these in- and outgoing tracks being controlled by overload track circuit-breakers. The contact shoe method has been installed on the second floor. The power service is supplied by incoming feeders which are connected to the entrance panel. All the power is controlled by a pair of circuit-breakers on this entrance panel independently of the lighting

circuits. A recording wattmeter on this panel measures the power consumed in this car house and also in the adjoining 100th Street car house. Two circuit-breakers on the second floor control the power circuits on that level.

One Hundred and Forty-sixth Street and Lenox Avenue.—New power systems and wiring have been installed on the ground floor of this car house. Contact shoes control all the slotted portions of tracks adjacent to the transfer pit, except the tracks going out to the street, which are equipped with overload track circuit-breakers. On the west side of the transfer pit, or the side toward the rear of the car house, the tracks are slotted for 50 ft. from the transfer pit. The remaining portions of these tracks have pits 5 ft. deep, over which there has been placed a double overhead trolley. In order to operate the cars over the track sections equipped with this overhead trolley, all the cars in this building have side receptacles for attachment plugs so as to connect flexible leads from a trolley hand pole. They have also a double-pole, double-throw switch to disconnect the plow, from which all cars on this system are normally operated, and to connect the hand pole to the railway motor circuits. The trolley wires over the respective tracks are controlled by knife switches. The feeders which supply power to this building are carried directly from the substation to the main circuit-breaker panels, which are located on the two halves of the ground floor respectively, and separately control the power in each half of the car house.



Metropolitan Fire Protection—Supporting and Protecting Power Rails in Ninety-ninth Street Car House

Fourteenth Street and Avenue B.—A contact shoe system has been installed in this car house.

Fiftieth Street and Seventh Avenue.—A time-limit circuit-breaker system has been installed in this car house.

Fifty-fourth Street and Ninth Avenue.—Power feeders and an entrance panel are being installed, including only the feeders from the street to the entrance panel, from the entrance panel to the transfer pit and parallel to the transfer pits. The present temporary switches controlling some of the tracks are

being connected to these permanent feeders pending the time when it is decided what power system shall be put in for moving the cars in this car house. This building is in process of construction.

Thirty-second Street and Fourth Avenue Car Yard.—A double overhead trolley system and new wiring have been installed at this property.

PROTECTED CONDUCTOR RAIL CONSTRUCTION

A new type of conduit construction has been recently installed on the second floor of the Ninety-ninth Street and Lexington Avenue car house, which may be referred to as the protected conductor rail construction. This design was necessary to meet the requirements of the raised track construction on this floor. A general view of this construction is shown on page 696. It consists of yokes spaced approximately 5 ft. apart which support slot angles and sheet-steel aprons. The yokes are made up of old conductor rail bent to the desired form and secured to the floor by bolts and also imbedded in concrete. One of these yokes is seen at the end of the construction shown in this half-tone. The sheet-iron apron extends approximately to within 8 in. of the floor, being low enough to prevent anything touching the live portions of the conductor rails or their supports. At the same time a good clear space is given so that no dirt is liable to collect and the floor can be easily cleaned. The insulators supporting the conductor rail are inverted and securely held by means of bolts and imbedded in concrete. This construction is simple and inexpensive and combines the desirable features of operating convenience as well as possessing certain advantageous fire protective elements.

INSURANCE

The heavy loss involved in the 146th Street fire caused the insurance companies to look askance at the Metropolitan risk and some of them cancelled their policies. The Madison Avenue fire served to increase the feeling of uneasiness among the underwriters, which was correspondingly heightened by the partial destruction of the Fourteenth Street car house in the fall of 1907. The disastrous conflagration which destroyed the Ninety-sixth Street car house was the last straw. Every mail brought letters to the Metropolitan from insurance companies cancelling their policies, until, toward the latter part of March, 1908, practically the entire insurance schedule had been cancelled; that is, less than 5 per cent of the insurance desired had not been affected by cancellation. This was the situation when the fire protection campaign mentioned above was begun. The prejudice against the Metropolitan risk was general among the underwriters, many of whose local representatives had been severely criticised by their home offices because they continued any insurance upon the Metropolitan risks after the first two or three fires had taken place.

Briefly, then, two years ago the Metropolitan risk was regarded as one of the worst in the country and almost no insurance company would have anything to do with it. Now the best companies are willing and anxious to get the business, and the Metropolitan properties are considered among the finest street railway risks in the world. Further than this, the insurance authorities are expressing a willingness to make lower rates of insurance than the last rate quoted. This means that further reductions in premiums are in course of preparation.

During the two years prior to March 23, 1908, there had been fires in the Metropolitan properties aggregating a loss of nearly \$3,000,000; in the two years since March 23, 1908, there has been no conflagration and no claim has been made upon the insurance companies. Had there been another fire equal in proportions to either the 146th Street or the Ninety-sixth Street fires, the Metropolitan lines would have been so badly crippled for lack of cars that before new equipment could have been procured the resulting fare losses would undoubtedly have been much greater than the actual value of the cars destroyed.

The following table indicates the insurance cost on an annual basis as of several dates beginning March 23, 1908, using the

amount of insurance in force as of Jan. 11, 1910, at the various locations in the Metropolitan system. The table shows the average rate covering all such properties as of the dates indicated and the total premium cost as of such dates on the amount of insurance specified:

Date.	Insurance.	Premium.	Average rate.
March 23, 1908.....	\$14,045,600	\$192,755	1.372
March 23, 1909.....	14,045,600	93,415	.665
July 3, 1909.....	14,045,600	61,917	.441
Jan. 11, 1910.....	14,045,600	50,209	.357

Of the amount of premium saving, which is in round figures about \$142,000, approximately \$43,000 was due to improved housekeeping, organized effort to prevent fires and careful attention to details—a saving resulting from a very nominal expenditure. Of the balance, about \$26,000 was due to the installation of automatic sprinkler systems, being a return of approximately 10 per cent on the investment, and \$20,000 was due to auxiliary fire apparatus and improvements in construction, being, in round figures, a return of from 10 per cent to 20 per cent on the investment. The remainder of the premium saving resulted from other improvements made in the property, the inter-relation of which, so far as insurance rates are concerned, renders it impracticable to analyze the potency of each particular factor which has entered into the general result.

It is of interest to note that the improvements which were made in the Metropolitan risk were from the very beginning of such a character as ultimately to bear fruit in the way of rate reduction, thereby netting the Metropolitan a very handsome return on its expenditure, and at the same time placing its properties in such a condition as to minimize the possibility of interruption to the service because of the destruction of rolling stock or building facilities.

The insurance companies made inspections of their own, and, becoming satisfied that the situation warranted such a course, they acquiesced in propositions involving the reductions in rates which have taken place from time to time.

The entire operating staff of the Metropolitan Street Railway system has labored loyally and efficiently to carry out the fire protection program of the general manager, and the great reduction in the insurance rates symbolizes the success which has attended the efforts of all concerned.

OTHER ARTICLES.

In the next article on the rehabilitation of the Metropolitan property the method of fighting snow will be described.

RAPID CAR PAINTING IN RICHMOND

The Virginia Railway & Power Company, Richmond, Va., uses the following painting schedule for turning cars out within eight days:

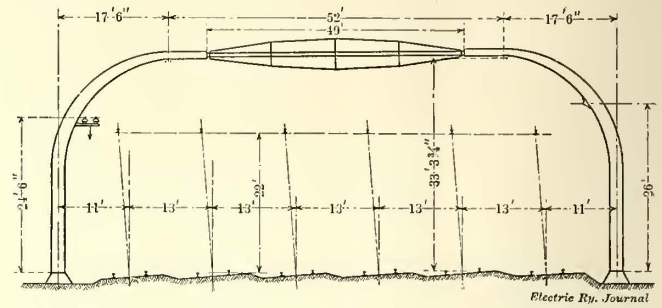
- First day—One coat of primer.
- Second day—Puttying up.
- Third day—One coat of surfacer.
- Fourth day—Leveling coat.
- Fifth day—Rubbing down and one coat of flat color.
- Sixth day—One coat of varnish color and plain striping.
- Seventh day—Varnish.

It will be observed from the foregoing that 48 hours are allowed to elapse between the first and second coats. It is believed that this interval is long enough to give the first coat a chance to dry so well that the res' of the work can be carried out successfully in the short time given. The standard body color of all Richmond cars corresponds to Masury's No. 9514 green, with light cream for the window and vestibule framing and plain aluminum striping. The green has proved a very durable body color and is easily matched. The vestibuled 32-ft. body convertible cars of the company have been cleaned and painted from the wood up for \$100. This figure included scraping down the inside of the car, revarnishing and cleaning up the seats, etc. The cars are retouched every 50,000 miles when they come in for the general overhauling.

PROPOSED CATENARY CONSTRUCTION FOR HARLEM RIVER BRANCH OF NEW YORK, NEW HAVEN & HARTFORD RAILROAD

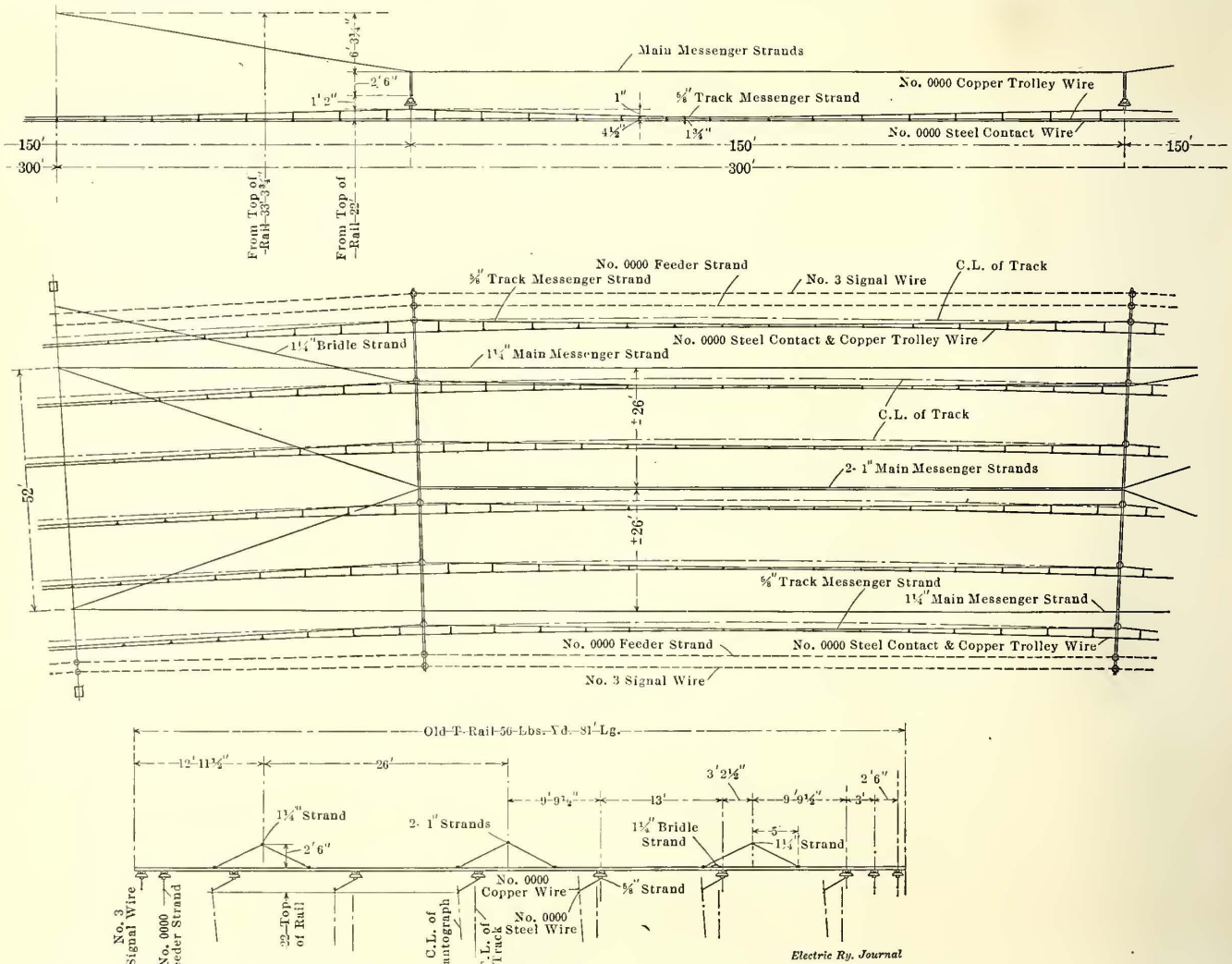
A 6000-ft. experimental section of catenary trolley construction of a novel type was built last fall by the New York, New Haven & Hartford Railroad eastward from the end of its electric zone at Stamford, Conn. The object in erecting this experimental section was to observe the results of electric locomotive operation under an overhead construction much lighter, more elastic and less costly to erect and maintain than the catenary construction with double messenger wires and triangular hangers which was used on the initial electric zone between Woodlawn and Stamford. The results have been so satisfactory that it has been decided to adopt this new construction with some modifications for the electric equipment of the six-track Harlem River branch between New Rochelle and Harlem River, 12.13 miles. The details of the experimental four-track section as built are shown in the accompanying engravings from photographs and the details of the six-track construction as modified for the Harlem River branch are shown in the line engravings. The following description refers to the modified design which is to be built.

spider castings mounted on the pipe. The total span of these six-track supports, which are spaced 300 ft. apart, is 87 ft. from center to center of foundations. On sharp curves the outside towers will be back-guyed.



New Haven Catenary—End Elevation of Supporting Towers for Six-Track Construction

The catenary structure is suspended from the overhanging ends of the supporting towers by four main messenger cables. The two outside cables, which are 1 1/4-in. stranded steel wire ropes, are stretched parallel to each other, while the two inside cables, 1 in. in diameter, converge from their points of sup-



New Haven Catenary—Details of One Span of Six-Track Construction on 2 Deg. 30 Min. Curve for Harlem River Branch

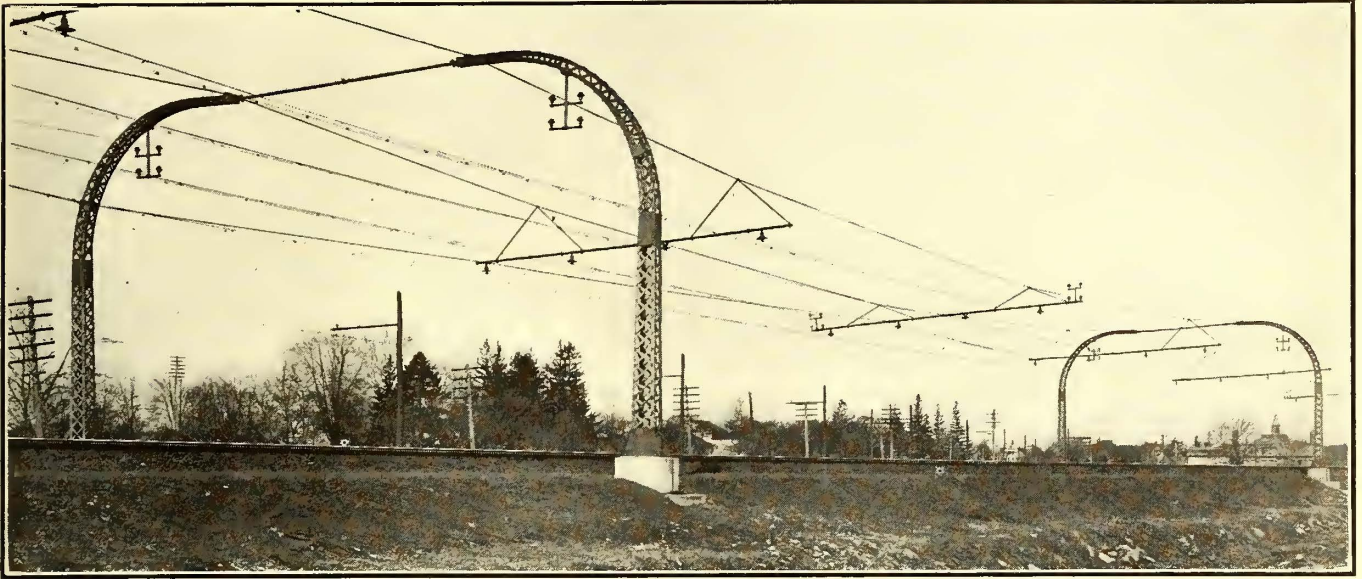
The supports are latticed steel towers bolted down on concrete foundations and bent over at the top with a graceful curve, so that the extreme end is horizontal and for six-track construction overhangs 23 ft. 6 in. from the center of the foundation. The overhanging ends are braced apart by a pipe truss 40 ft. long made up of a piece of iron pipe 4 1/2 in. in diameter and six 5/8-in. cables spread at the center with three

port on the towers and come together above the cross-bents. Between cross-bents they are stretched close together. The sag of the main messenger cables from the towers to the cross-bents is approximately 6 ft. 3 in. They are clamped in pairs on the underside of the towers 6 ft. in from the overhanging ends. Two cross-bents made of 56-lb. T-rail are used for each 300-ft. span. Iron pipe was first tried for this purpose and later

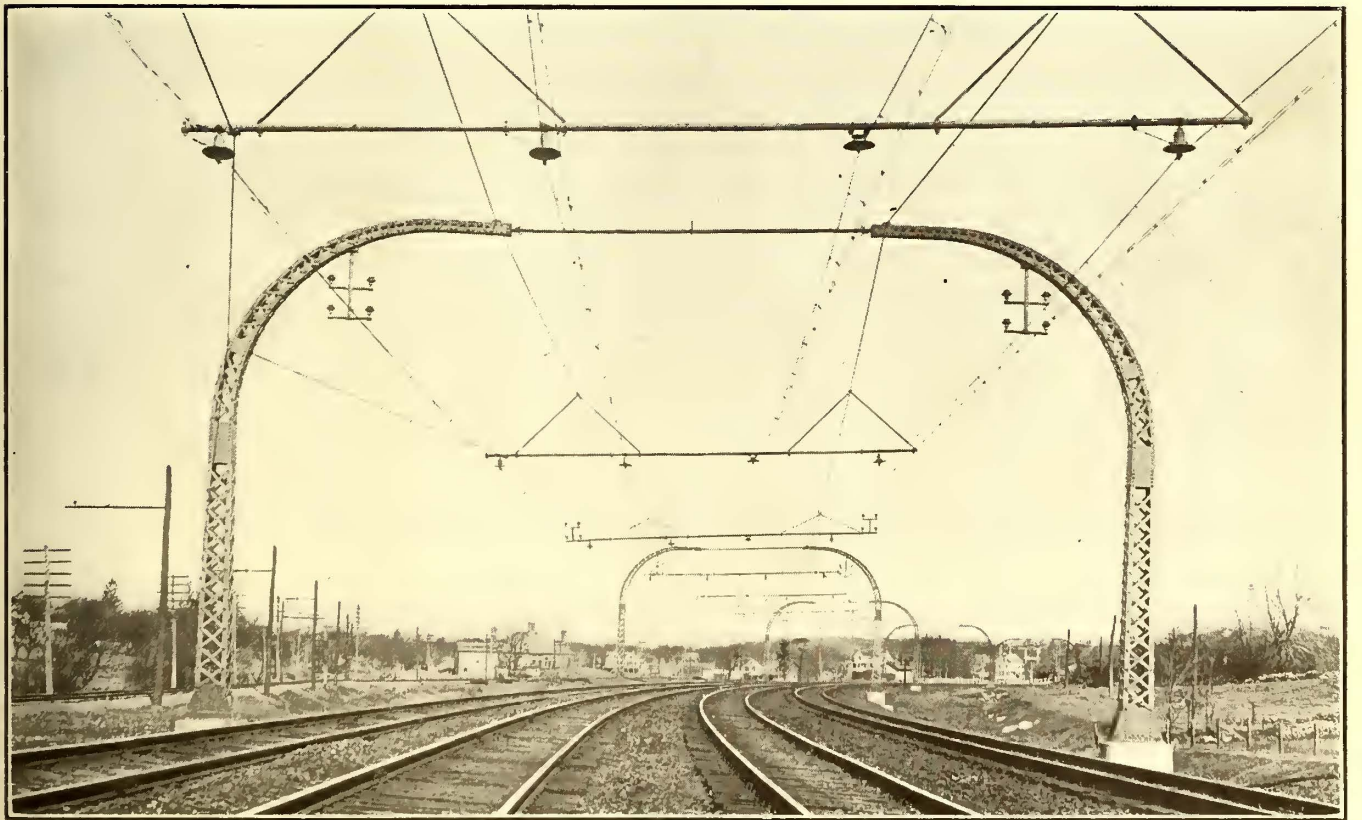
structural shapes were used. The old T-rail is cheaper and stiffer than either. These bents which support the six-track messenger cables are suspended at three points by heavy rod hangers from the main messenger cables.

From the cross-bents are suspended the $\frac{5}{8}$ -in. stranded messenger cables from which the trolley wires are hung. The track

wire is fastened to the copper wire above it with a simple clamp. On tangents where the messenger cable and the two grooved wires lie in the same vertical plane the bottom clamp of the rod hangers grips the copper conductor only. On curves, however, the trolley wire is offset to one side of the messenger cable and in order to maintain the two grooved wires in the



New Haven Catenary—Experimental Four-Track Construction East of Stamford, Conn.



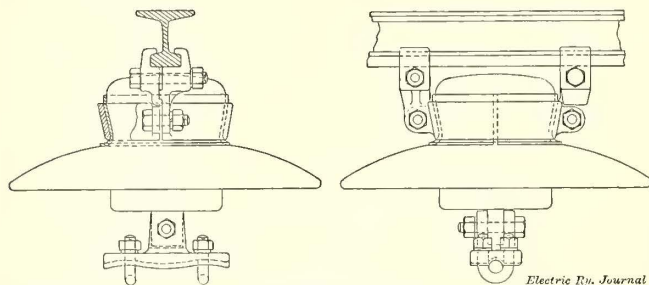
New Haven Catenary—Experimental Four-Track Construction East of Stamford, Conn.

messenger cables are insulated from the cross-bents by single-petticoat porcelain insulators 15 in. in diameter which are clamped under the head of the T-rail. One of the drawings shows a preliminary design for these insulators and clamps. The No. 0000 grooved copper conductor, which is strung $1\frac{3}{4}$ in. above the steel trolley wire of the same cross-section, is supported from the track messenger cable by plain rod hangers spaced 10 ft. apart. Halfway between these hangers the steel

same vertical plane a special form of hanger has been devised. As will be seen from the drawing on page 700, the hanger consists of a round rod with a bolted clamp on top and with its lower end threaded and bent to assume a horizontal position. This threaded end is screwed into a double clip, gripping both the upper and lower wires. This prevents any canting of the twin wires and thus procures the same vertical elasticity on curves as on tangents. The double clamps between hangers

are used on curves as well as on tangents. The track messenger cables are stretched to give a normal sag of 1 ft. in a 300-ft. span.

In addition to the trolley messengers the cross-bents carry two insulators at each end to which are attached an 11,000-volt feeder cable and a No. 3 wire carrying current at 2200 volts for the signal circuits. These two wires on each side are

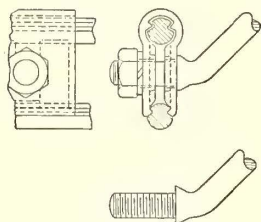
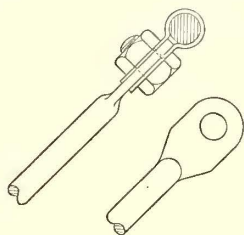


New Haven Catenary—Insulator for Track Messenger Wires

supported on a bracket at each of the towers, so that they have a span of only 100 ft.

On curves of over 2 deg. a 1¼-in. bridle cable is used to pull the entire overhead structure outward at the center of the span between towers. This cable is fastened to the outside towers and clamped on top of the cross-bents at the proper point to produce the desired deflection without undue strain.

It is estimated that this new type of construction can be erected at a considerable saving in first cost over the double-



Electric Ry. Journal

New Haven Catenary—Hanger for Use on Curves

messenger cable catenary used on the main line between Stamford and Woodlawn. Less resistance is offered to side winds. The use of a steel-contact wire below the copper conductor has proved so satisfactory on the main line that this feature has been retained.

This paper is indebted to W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, who gave permission to select the published drawings from his engineering files.

An American consul in Latin America reports that a business man in his district has obtained from the local government a concession for the construction of an electric railway to connect two points in the country. The contract is for 50 years and will call for the construction of about 1½ miles of track; the gage will be 1.07 m (3 ft. 6 in.). The government concedes the contractors free importation for all materials and equipment required by the company. Work must be commenced within a year from the approval of the contract, and must be completed within 18 months thereafter. Inquiries should be sent to No. 4726, Bureau of Manufactures, Washington, D. C.

ELECTRIFYING THE WENGERNALP RAILWAY FOR HIGH TENSION, D. C. OPERATION

The Alioth Company, of Basel, Switzerland is now engaged in electrifying for 1500-volt-2000 volt d.c. trolley operation the steam railroad which now connects the valleys of Lauterbrunnen Kleine Scheidegg and Grindelwald in Switzerland. This line was built about 15 years ago and is 24 km (14.9 miles) long. The road is well patronized by tourists, as it forms a part of the route to the famous Jungfrau Railway. Power for the line is to be taken from a converter station at Wengen, which will receive energy from a hydro-electric station at 7000 volts, three-phase, 40 cycles. Each of the two converter sets to be installed will consist of a 430-hp, 7000-volt, 485 r.p.m. asynchronous three-phase motor direct-connected to a 290-kw, 1500-2000-volt, interpole d.c. generator. A third set will be installed later. The generators will be operated in parallel with two independent storage batteries, each having 736 cells, rated at 513 amp-hours for four hours' discharge. Only one of these batteries will be used at first, but when both are in service they will be able to care for eight to 10 trains going upgrade. In fact, when a winter service is installed between Lauterbrunnen and Wengen, the complete battery equipment alone will furnish enough current to operate for a week two daily passenger trains and one daily freight train. This wise provision will insure greater reliability of service, as less dependence need be placed on the transmission lines in the severe Alpine winters. The converter station will also be furnished with two exciter sets and transformers for the same. The a.c. motors are to be controlled from nearby individual panels, which will carry the measuring instruments and control switches. The automatic oil switches and a.c. starting devices, however, will be placed in an underground metal compartment. The d.c. control apparatus will be mounted on a common switchboard. The trolley potential at periods of heavy travel will be maintained by a booster equipment, which will be kept in a double-truck car at Alpigen. The apparatus will consist of a three-phase motor, direct-connected to a 110-kw d.c. series generator and the necessary control board. The use of a car for this equipment is to permit the easy transportation of the latter to the shops at Grindelwald either for repairs or storage.

The trolley poles in the yards are to be of double channels, but of wood on the right-of-way. A novel feature in connection with these wooden poles will be their insertion in metal holders so that they may readily be exchanged. In sections liable to visits from avalanches, the poles will be removed in autumn and replaced in spring. The poles are generally placed on the inner or mountain side of the track to give the passengers an unobstructed view of the scenery.

The trolley circuit on the new route between Lauterbrunnen and Wengen, and on the rest of the line to Grindelwald, will consist of two-hard drawn copper wires carried from malleable iron brackets. The old route, which will be used only for empty cars, has but one trolley. The feeders between Wengen and Alpigen are carried on the high-tension wooden pole line which feeds the booster set. The feeder between Alpigen and Grindelwald is mounted on the trolley poles. Feeder taps are installed every 1542 ft. The high-tension line is usually carried at a distance of 300 ft. to 600 ft. from the railway. The return current will be sent through the running rails and also through the rack rails, except on the rack section between Wengen and Lauterbrunnen. With this exception, all rail joints are supplied with flexible copper bonds cross-bonded every 615 ft.

The trains will be made up of electric locomotives and trailers. The locomotives will be carried on single trucks, and will weigh about 15 metric tons. There will be two running axles and two pinion axles for operation on rack sections up to 25 per cent grades. In accordance with the Swiss railway regulations, each locomotive will have a braking equipment consisting of two independent hand brakes, one automatic brake and one brake for running downhill. The electrical apparatus will comprise two 150-hp motors always operated in series, one controller, and one set of starting and braking resistances.

FORMS FOR ACCOUNTS OF INTERURBAN AGENTS

A number of forms designated to facilitate the work of agency accounting have been prepared by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Mr. Hixson has found an agents' ledger of value. Loose-leaf pages measuring 14⁷/₈ by 11³/₄ in. are used. The list of items explanatory of the debits and credits shown on this ledger is the same as that set forth on the balance sheet which the agent makes out, with the exception that the ledger provides for agency transfers. This line is used in the auditor's office in case of a transfer of agents to credit the retiring agent and debit the incoming agent with the amount of uncollected accounts which the new agent accepts. When a new agent is installed, a new sheet is placed in the ledger, starting with a debit of items accepted from the retiring agent.

correct, return this sheet at once with notation, stating explicitly why objection is made." Space is provided below the words "corrections accepted and records corrected" for the agent to sign his name and the date. Corrections on way-bills, of the form adopted by the Central Electric Accounting Conference, are made by either the forwarding agent, receiving agent or auditor's office. Notice of corrections on the monthly ticket report is also sent to the agent, with instructions to correct his records accordingly.

In checking the reports of agents before making entries on the agent's ledger, the auditor's department checks the forwarded and received abstracts of business against each other, so as to disclose any discrepancies that may exist. For instance, when freight is shipped from Indianapolis to Richmond, the report of the forwarding agent is checked against the report of the receiving representative of the company. In case a difference is shown, reference is had to the way-bill to show the

AGENT ASSISTANT AGENT CASHIER	YEAR	MONTHS												STATION
		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
DEBIT														
Balance Due Company from Prev. Month														
Uncollected Accounts from Prev. Month														
Frt. and Adv. on Frt. and Dis. Frt. Rec'd														
F. P. Forwarded on Frt. and Dis. Frt.														
Bag. Rev. and Adv. on Baggage Received														
F. P. Forwarded on Baggage														
Storage														
Ticket Sales														
Cash from Conductors														
Auditor's Debit Advice														
Agency Transfers														
Balance Due Agent at Close of Month														
CREDIT														
Balance Due Agent from Previous Month														
Adv. on Frt. and Disp. Frt. Forwarded														
F. P. on Freight and Disp. Frt. Received														
Advances on Baggage Forwarded														
F. P. on Baggage Received														
Cash Remittances														
Auditor's Credit Advice														
Agency Transfers														
Balance Due Company at Close of Month														
Uncollected Accounts at Close of Month														

Forms for Interurban Accounts—Agent's Ledger

The recapitulation of balances of all agency accounts shows each month the same net balance due to the company, as shown by the controlling account of the general books.

Before the totals are entered under the various headings, abstracts of the way-bills and monthly ticket reports from which the entries are made are checked thoroughly and all necessary corrections made. The notice of all corrections in abstracts of way-bills is sent to the agent in duplicate with instructions as follows: "Correct your books and copies of reports; sign and return original by next train. Retain one copy for station file. If the above alterations are not found to be

source of the error. After all entries are made on the agent's ledger, from the freight abstracts, ticket reports, cash book and from other sources, each station is balanced to show the balance due the company or the agent at the end of the month.

The agent is required to send a balance sheet to the auditor each month. This balance sheet, which is 13³/₄ in. x 8¹/₄ in., is compared with the statement of the account on the agent's ledger. Any corrections which may be made on the agent's balance sheet are noted on red ink. The balance sheet is then returned to the agent together with an itemized statement of corrections which should be made on his monthly report. After

the agent checks the details as corrected, he signs the corrected balance sheet and returns it. With this practice the traveling auditor does not have to go further back than the last report which has been accepted by the agent. The balance sheet is returned to the agent for signature if no changes are made.

The practice of having agents make daily reports of way-bills was tried for one year and then abandoned, because Mr. Hixson concluded that too much work was involved for the benefits received. With daily abstracts of dispatch freight and freight way-bills received or forwarded, it was necessary, if

The "Ohio" form of interline way-bill provides that three copies go forward for shipment, the auditor of receiving road being furnished with copy of way-bill by his agent upon receipt of shipment and bills.

These way-bills are in accordance with the forms adopted by the Central Electric Accounting Conference.

ENGINEERING COMMITTEE ON BUILDINGS AND STRUCTURES

Secretary Corning, of the American Street & Interurban Engineering Association, announces that the committee on

1 Terre Haute, Indianapolis and Eastern Traction Co.

Station 190 Freight Way Bill No. _____
Received from Original Point Shipment
Consignee _____
Billed to _____ Destination _____

No. Package	DESCRIPTION OF ARTICLES	Weight	Rate	Freight	Access	Freight

AGENT WILL IN EVERY CASE, WHEN DELIVERING SHIPMENT, TAKE CONSIGNEE'S RECEIPT ON THIS FORM AND FILE IN HIS OFFICE.
Received the property described hereon, in good order, except as noted _____ Consignee _____

WAY-BILL

2 EXPENSE BILL
TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY
Way Bill No. _____

THIS EXPENSE BILL MUST GO WITH SHIPMENT

From _____ To _____
Via _____ Via _____ Via _____
By _____ By _____ By _____
Date _____
Original Point of Shipment _____

Shipper _____ Consignee _____

No. Package	DESCRIPTION OF ARTICLES	Weight Sub. & Correction	Rate	Freight	Access	Freight

TOTAL TO COLLECT _____

Received payment for the Company _____ Date _____ 19____ Agent _____

Forms for Interurban Accounts—Local Waybill Sheet No. 1

Forms for Interurban Accounts—Interline Waybill Sheet No. 2

monthly totals were desired, to add the figures for 30 days and this was found to be a disadvantage.

A great many freight agents also handle dispatch freight business, and to reduce the number of reports a combined freight and dispatch freight abstract is used. This abstract shows separate columns for weight and freight revenue for freight and dispatch freight, but the advanced charges, the amount prepaid, or the amount to be collected on freight or dispatch freight, is shown in the same column under the three heads. This plan gives the necessary information as to revenue and tonnage for the two classes, and also gives basis for charges or credits to agents.

The Terre Haute, Indianapolis & Eastern Traction Company form of local way-bill provides for four copies, one to be mailed to auditor at close of day's business, two to go forward with the shipment, and the fourth to be retained by forwarding agent. The size of the original is 8½ in. x 5½ in. and No. 1 is reproduced. The receiving agent takes consignee's receipt on one copy of bill which he files with his station records, and he signs and delivers to consignee one copy, showing payment of freight charges.

The "Indiana" form of interline way-bill is similar to the local bill, with the exception that the forwarding agent makes five copies, sending two to the auditor of the Terre Haute, Indianapolis & Eastern Traction Company, and the auditor of this company forwards one of these copies to the auditor of the road on which station to which shipment is made is located. In case a shipment goes over more than two lines, an additional copy of way-bill is made for the auditor of each line interested. Sheet No. 2 is reproduced.

buildings and structures has been appointed. The following are members:

- Martin Schreiber (chairman), engineer maintenance of way, Public Service Railway Company, Newark, N. J.
- George H. Pegram, chief engineer, Interborough Rapid Transit Company, New York, N. Y.
- Thos. K. Bell, chief engineer, United Traction Company, Philadelphia, Pa.
- F. F. Low, architect, Boston Elevated Railway Company, Boston, Mass.
- Chas. H. Clark, engineer maintenance of way, Cleveland Railway Company, Cleveland, Ohio.

Form 205 (7-10-1917) TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY
BALANCE SHEET

REMITTANCES TO CARRIER (LESS AND CASH ITEMS ONLY)	STATION DEBITS				STATION CREDITS			
	FOR AGENT'S USE	FOR AUDITOR'S USE	FOR AGENT'S USE	FOR AUDITOR'S USE				
1	Balance Due Company from Previous Month			Balance Due Agent from Previous Month				
2	Uncollected Accounts from previous month			Advances on Freight and Dispatch Freight Forwarded				
3	Frt. and Adv. on Freight and Dispatch Freight Received			F. P. on Freight and Dispatch Freight Received				
4	P. P. on Freight and Dispatch Freight Forwarded			Advances on Baggage Forwarded				
5	Bag. Rev. and Adv. on Baggage Received			F. P. on Baggage Received				
6	F. P. on Baggage Forwarded			Cash Remittances (as Shown on Left of this Sheet)				
7	Storage			Auditor's Credit Advices (Show Number and Amount of Each)				
8	Ticket Sales							
9	Cash from Conductors							
10	Auditor's Debit Advices (Show Number and Amount of Each)							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
Total								
	Balance Due Agent Close of Month (See Analysis on Back)			Balance Due Company Close of Month (See Analysis on Back)				
				Uncollected Accounts Close of Month (See Attached List)				
NOTE—This Balance Sheet Must Show All Station Debits and Credits for the Month.				DATE FORWARDED TO AUDITOR _____ 191__				
				AGENT _____				

Forms for Interurban Accounts—Agents' Balance Sheet

M. H. Bronson, chief engineer, Rhode Island Company, Providence, R. I.

This is a new committee whose appointment was decided upon by the executive committee of the association at its last meeting.

VALUE OF LIGHTNESS IN CARS

BY M. V. AYRES, ELECTRICAL ENGINEER, BOSTON & WORCESTER STREET RAILWAY.

The publication in the April 2 number of the *ELECTRIC RAILWAY JOURNAL* of the article relating to the new cars of the Boston & Northern and Old Colony Street Railways marks a very important step in the movement looking to the reduction of car weights. This movement is hardly more than 2 years old, and it has been fostered almost exclusively by a discussion of the savings to be expected, as indicated by theoretical considerations.

I have contributed several papers to this discussion, and have done a large amount of work in the effort to collect data showing the results of actual experience bearing on the subject. This investigation has shown an almost total lack of exact information as to the comparative costs of operating cars of different weights, but of the same size, in similar service. It has also demonstrated the difficulty of getting detailed weights of the component parts of car equipment, information much needed as a basis for determining the best direction in which to attack the problem of reducing weights. Hence the article above referred to is especially welcome, because it supplies valuable information in both of these fields. The fact that the cars are of exactly the same size and have the same electrical equipment, gives the data on power consumption a peculiar value; while the completeness of the analysis of component weights compels astonishment and admiration.

The question of operating costs is, of course, the most important factor in this subject, as it is the final test of the merit of achievement in design, and it deserves a somewhat more extended discussion than it has received in the article in question.

Evidently in figuring the savings which will result to his company from the reduction of weight in the new cars Mr. Holst wished to be very conservative, and he therefore took the low figures of 0.6 cent per kw-hour as the cost of power at the car. I take it that this is intended to represent the saving in coal alone, all other elements of power cost being eliminated. This would be justified by the argument that the use of these particular cars would not reduce labor, repair or fixed charges in the power station. I believe this method of figuring is fallacious, because sooner or later increases must be made in the power plant and transmission system to accommodate increased traffic, and every kilowatt of demand saved by the lighter cars postpones that additional investment and permanently reduces the final amount of the investment. Moreover, I doubt if the figures chosen take proper account of the loss in transmission between the power house and the car. The published calculation of savings errs in the other direction by assuming too great an annual mileage. The figure of 210 miles a day is obviously too much in the case of the slow-gear car, as the actual schedule speed made in the test runs was only 10.5 miles per hour, which would require 20 hours' service to complete the 210 miles. Very few cars run more than 18 hours out of the 24. I find no statement in the article as to the mileage used in calculating the saving made by the high-gear car, but the results show that 270 miles were taken. This would result from running 15 m.p.h. for 18 hours, and is a reasonable figure. My criticism of the mileage, however, is principally directed at the assumption that each car would run all day, every day in the year, a condition that could never obtain.

Another just criticism of the test results arises from the unfortunate fact that in both sets of tests the average number of stops per mile was different for the light car and for the heavy car. In the tests with the slow gear this difference is in favor of the heavy car, and in the high gear tests it is in favor of the light car. It is remarkable, however, that in both tests the watt-hours per ton mile are less for the lighter car. This is contrary to what would be expected, and would seem to indicate that there is less friction in the motors or trucks

of the new cars. Possibly it is due to the shorter wheel base of the trucks.

To arrive at a more correct view of the real value of the results attained in reducing the weights of these cars, I have made some calculations based on the following assumptions. I have assumed these 44 cars, equipped with the higher gear ratio, to be the entire rolling stock of an interurban railway supplied with power from an alternating-current power plant with substations, a condition that actually exists on the Brockton-New Bedford line where the tests were made. I assume that at the dullest season of the year one-half the equipment, or 22 cars, would be required to run the load, averaging 270 miles per day each. At the time of best travel I assume that all the cars would be in service and that the average condition for the year would be equivalent to a daily use of 33 cars for 270 miles each per day. I have made no attempt to correct the power consumption figures for difference in stops per mile, in view of the fact already mentioned that the lighter cars seem actually to show a less frictional resistance. The power consumption therefore figures as follows:

If the cars were of the heavy 1907 type, the average daily load, at the cars, would be $33 \times 270 \times 3320 = 29,600$ kw-hours.

If the cars were of the light 1909 type, the average daily load, at the cars, would be $33 \times 270 \times 2781 = 24,800$ kw-hours.

If we assume the operating cost per kw-hour at the power house as 0.75 cent, the cost of direct-current at the substation will be about 1 cent, and at the car, allowing for trolley and feeder losses, about 1.15 cents. At this rate the annual cost of power for the heavy cars amounts to \$124,200, and for the light cars \$104,100.

The size of the necessary power station I figure as follows: For the heavy cars the average power requirement, at the cars, during time of heavy traffic when all cars are in use, is 2190 kw. Increasing this by the ratio of 1.15 to .75 gives 3360 kw as the average demand at the power station under these conditions. Of course, the peaks of the load will be very much greater than this, but I have assumed that a power station of exactly 3360 kw rated capacity would be large enough, which it would be if everything was in perfect working order. At \$125 per kw this station would cost \$420,000.

Figuring in the same way we find that the lighter cars would require a capacity of 2818 kw at a cost of \$352,000. If we figure fixed charges, i. e., interest, taxes, insurances and depreciation at 10 per cent, we have \$42,000 per annum chargeable to this item for the heavy cars, and \$35,200 for the lighter cars. We may figure the substations as having 25 per cent higher aggregate rating than the power station, and as costing \$25 per kw. This gives the substation cost in the two cases as \$105,000 and \$88,000 with annual fixed charges of \$10,500 and \$8,800.

The cost of the transmission system will be greater for the heavy than for the light cars, but it is difficult to arrive at correct figures without making complicated assumptions as to the layout and equipment of the system. I, therefore, arrive at an estimate in the following way: The cost of the electric line construction of the Old Colony Street Railway is given in the Massachusetts Railroad Commissioner's report for 1908 as \$1,982,996, and the annual cost of power as \$326,722. The transmission system cost 6.06 times the yearly cost of power. Figuring at a ratio of 6 to 1, the cost of this item for our assumed road using the heavy cars would be \$745,000. It is not correct to assume that this would be reduced in proportion to the power demand, as a portion of the overhead work would be the same in either case. Our power consumption is reduced by the light cars 16 per cent. It would seem fair to assume that the cost of the transmission system would be reduced 8 per cent, to \$685,000. Assuming fixed charges on this at 7½ per cent, we have annual charges of \$55,000 if heavy cars are used and \$51,400 if light.

There can be no doubt that repairs of electrical equipment will be less with the light cars, because the average load is 16 per cent less on the same motors. It seems fair to assume an 8 per cent reduction in repair costs. Again referring to the Railroad Commissioner's report, we find that repairs to elec-

trical equipment cost \$100,761 with a car mileage of 10,090,000. This is almost exactly 1 cent per mile. On our assumed road the repairs to the heavy cars at 1 cent per mile would amount to \$32,000. For the light cars, at 8 per cent less, this would be \$29,900. There is not the slightest doubt in my mind that other car repairs, not electrical, will be much less for the light than for the heavy cars. Brake shoe, wheel and bearing wear, for instance, should be reduced at least proportionately to the weight. I believe the lighter design is also inherently the stronger, but for lack of data on which to base an estimate I have refrained from assuming any saving in car repairs except that for electrical repairs above indicated.

There can be no doubt that the use of lighter cars would materially reduce track repairs, but for lack of data I make no attempt to estimate this saving. The costs above estimated are shown below:

	Heavy car.	Light car.
Cost of power.....	\$124,200	\$104,100
Fixed charges, power station.....	42,000	35,200
Fixed charges, substation.....	10,500	8,800
Fixed charges, transmission.....	55,900	51,400
Repair cars.....	32,500	29,900
Totals	\$265,100	\$229,400
Difference, \$35,700.		

I thus figure a saving of \$35,700 per year by the use of the lighter cars, instead of \$14,020, as figured by the designer of the cars. My figure is two and a half times the latter, and is still too low, as two important items of known saving are neglected. I believe that my method of calculating is the correct one, even although the savings of fixed charges and labor costs do not at once become evident. The actual result of equipping an entire system operating under the conditions indicated with one kind of equipment or the other would be to show an annual saving approximately equal to that indicated, of \$800 per car in favor of the lighter car. It is, therefore, only fair to credit the few cars actually in use with their full share of the saving ultimately to be achieved if the policy which led to their adoption is followed to its logical conclusion.

In my paper, "Car Weights as Affecting Operating Costs," which formed part of the report of the equipment committee of the American Street & Interurban Railway Engineering Association at Denver last October, I attempted an analysis of the probable savings due to a reduction of car weights. In the following table I give a comparison of the savings per mile per ton of weight reduction, as taken from my Denver paper, and as derived from the above calculations for the 44 cars under the condition assumed.

	SAVINGS, CENTS PER TON MILE	
	Denver estimate.	Old Colony car.
Power consumption.....	\$0.1000	\$0.1870
Cost of car repairs.....	0.0700	0.0242
Cost of track repairs.....	0.0260	.....
Fixed charges, power plant, including sub-station	0.0500	0.0791
Fixed charges, distribution system.....	0.0200	0.0419
Totals	\$0.2400	\$0.3322

The wide divergence between these two estimates is readily explained. It is principally due to a difference in power consumption. The Old Colony tests show a saving of 539 watt-hours per car-mile due to a reduction of weight of 3303 tons, or a reduction of power of 163 watt-hours per ton-mile. My Denver estimate was 100 watt-hours per ton-mile, but I specifically stated that this figure would vary between wide limits, according to conditions of operation, and the figure I chose was intended to apply to more moderate conditions of operation than evidently obtained on the Brockton-New Bedford route. Part of the increase in the power figure is due to the fact that in my present estimate I assume a somewhat greater loss in transmission than in the earlier estimate. I think the larger figure is more nearly correct. The increase in fixed charges on power plant and distribution systems is due directly to the increase in power. The difference in car repairs is due principally to the fact that in the present estimate I have made no allowance for reduced repairs to mechanical equipment, and have assumed a reduction in electrical repairs proportional

to only one-half the weight, whereas in the former estimate I assumed a reduction in all items of car repairs directly proportional to the reductions in weight.

The saving in cents per pound per year seems to be the figure which is most convenient for practical use, and the one which makes the strongest appeal to the imagination, although it is a figure which must necessarily vary with different conditions of operation. Some engineers have assumed a value for this as low as 2 cents. The value most commonly used appears to be 5 cents. The estimate made in my Denver paper as a fair average was 7½ cents. The value corresponding to the figures above given for the Old Colony cars is 12.6 cents. The saving estimated for these cars by the designer is only 4.82 cents for the interurban service, and his figures if corrected for the reduced mileage of my estimate would be reduced to 3.62 cents.

All of this testimony shows that the saving to be attributed to a reduction of car weights varies greatly with the conditions and still more with the point of view. However, for reasons already set forth, it appears clear that in the long run all of the factors of saving which I have discussed above will come into effect, and the net value of the weight reduction will approximate the largest figures rather than any of the smaller ones.

PROGRESS OF LONG ISLAND RAILROAD ELECTRIFICATION

In anticipation of the opening of the Pennsylvania Railroad terminal station in New York City, the Long Island Railroad, which will also use the station, has been extending its electric zone and making many expensive improvements. With the opening of the tunnels, it will have for its passenger service two tunnels from Seventh Avenue and Thirty-second Street to the Sunnyside yard in Long Island City; a six-track line from Sunnyside yard to Woodside, eight tracks from Woodside to Winfield; six tracks from Winfield to Glendale Junction to Jamaica.

The Long Island Railroad now has its line electrified from Flatbush Avenue, Brooklyn, to Hempstead, from Woodhaven Junction to Rockaway Park, from Rockaway Park to Valley Stream, and from Valley Stream to Jamaica. By July 1 the electrified line between Dunton and the Pennsylvania Terminal, and between Woodhaven Junction and Glendale Junction will be in operation. By September the line from Valley Stream to Long Beach will be electrified and in operation and by the end of 1911 electrification of the lines between Winfield and Whitestone Landing, from Whitestone Junction to Port Washington, and from Floral Park to Mineola and Oyster Bay will be completed.

The time which is expected to be made between the New York terminal station and the various stations on Long Island is as follows:

Between New York and	Minutes.
Jamaica	18
Garden City.....	34
Hempstead.....	38
Mineola	35
Roslyn	38
Oyster Bay.....	59
Hicksville.....	43
Huntington.....	53
Farmingdale.....	57
Lynbrook.....	33
Long Beach.....	40
Far Rockaway.....	33
Rockaway Beach.....	33
Flushing.....	16
Great Neck.....	26
Port Washington.....	32
Whitestone Landing.....	22

It is estimated that there will be a saving of from 20 to 25 minutes in each direction to people living in any of these towns over the time required at present to cross the ferry and take the trolley cars at the foot of Thirty-fourth Street.

The Odessa section of the Kaiserlichen Russischen Technischen Gesellschaft (Royal Russian Technical Society), announces that applications will be received up to May 1, 1910, for space at the Odessa Agricultural and Industrial Exposition at Odessa, Russia, which is to be held from May 15 to Oct. 1.

TESTIMONY ON ELECTRIC RAILWAY CONSTRUCTION AND OPERATION IN THE CASE OF MANHATTAN BRIDGE THREE-CENT COMPANY

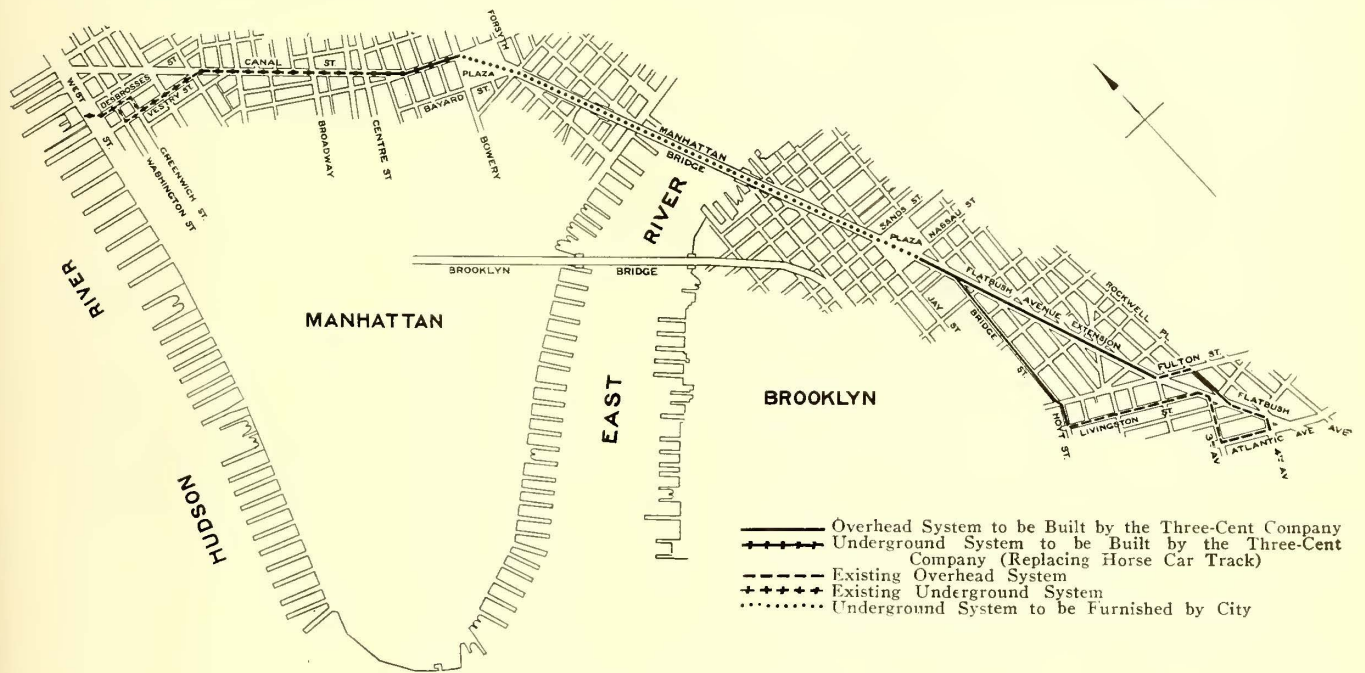
Some very interesting testimony on the cost of electric railway construction and operation was elicited during the past two weeks at the hearings before the Public Service Commission of New York, First District, in connection with the application of the Manhattan Bridge Three-Cent Company for a certificate of necessity and convenience for a franchise in the boroughs of Manhattan and Brooklyn.

Manhattan Bridge is one of the new structures across the East River and provides space for four surface-car tracks. It is part of an almost direct line between the Flatbush Avenue station of the Long Island Railroad in Brooklyn and Canal Street, which is one of the principal crosstown thoroughfares below Fourteenth Street, in Manhattan. Of the other three bridges across the East River the car service on Brooklyn Bridge is supplied by the Brooklyn surface lines, operating through cars to all parts of Brooklyn, and a bridge local service; that on the Williamsburg Bridge by the companies operating

It was during the hearing before the commission as to the advisability of granting this certificate that the figures on electric railway construction and operation were brought out.

The Three-Cent Company through its principal witness, J. C. Brackenridge, showed that it expected to have to invest \$851,345. It expected to carry 30,000 passengers per day, this being based principally upon the count of the Public Service Commission on Nov. 16, 1909, of 17,472 passengers carried by the Bridge Operating Company over the Brooklyn Bridge, and 23,663 over the Williamsburg Bridge. It further estimated that the cost of operation, including taxes, rentals and depreciation, would be 2¼ cents per passenger.

In opposing the petition, the Brooklyn companies retained Frank R. Ford, of Ford, Bacon & Davis, who presented a complete estimate of the investment required for such a line, and the cost of operation based upon the number of passengers which the Three-Cent Company expected to carry. Mr. Ford's testimony, which included the five tables presented herewith, was to the effect that the road would not pay on the basis proposed. The testimony was particularly interesting because while proposed 3-cent fare lines are not novelties, none has



Proposed Manhattan Bridge 3-Cent Line—Map of Route

surface cars in both Manhattan and Brooklyn, with a similar bridge local service, and that on the Queensborough Bridge by the New York & Queens County Railway Company, and the South Shore Traction Company. The bridge local service is operated from end to end of the bridges only, the fare being 3 cents one way, or 5 cents for the round trip.

Some time ago the Manhattan Bridge Three-Cent Company applied to the Public Service Commission, First District, for a certificate of necessity and convenience for a line from the Long Island Railroad Station in Brooklyn to and across Manhattan Bridge and across Manhattan Island to the North River along the route shown on the accompanying map, the rate of fare to be only 3 cents. For a considerable portion of this route the new company would be obliged to use tracks belonging to the constituents of the Brooklyn Rapid Transit Company, and to leased lines of the Metropolitan Street Railway Company and the Third Avenue Railroad Company. Under the present Public Service Commission law, the commission has authority to grant permission for the use of existing tracks for a distance not exceeding 1000 ft. on one street or connecting streets, and a certificate of necessity and convenience from the commission is also necessary, of course, for the construction of the line itself.

been suggested under just these conditions; that is, to take what might be called the "cream" of the traffic in a large city, leaving the burden of transportation in the suburbs to the existing companies.

Mr. Ford testified that in preparing his figures he favored the Three-Cent Company where doubt as to details existed, but estimated that the income applicable to return on the investment of about \$1,600,000 would be only about \$12,000, or ¾ of 1 per cent, and that this slender margin would be more than wiped out if payment for use of tracks of present companies was required to compensate for loss of business, interference with traffic, and for value of special franchises. While this return was based on a traffic of 30,000 passengers per day, as estimated by Mr. Brackenridge, Mr. Ford considered it doubtful if the new company would carry anywhere near that number in view of the fact that the present companies operating on the Williamsburg Bridge and Brooklyn Bridge, without competition, carry an average of only slightly more than 23,000 and 17,000 respectively, as mentioned above.

The discussion presented by Mr. Ford followed the order of determining, first, the service which would be required, then cost of installation and operation, and then the final income account.

ESTIMATE OF SCHEDULE

It was developed that the promoters of the line proposed to run every other car through from end to end of the route, and to turn back the intermediate cars at Broadway, Manhattan, and at Fulton Street, Brooklyn. One minute headway was proposed for the rush hours and three minutes for the day non-rush hours.

Beginning with an assumed traffic of 30,000 passengers per day, and a rush hour headway of one minute, which for this traffic corresponds with the service on the present bridges, the first question determined in Mr. Ford's calculation was the

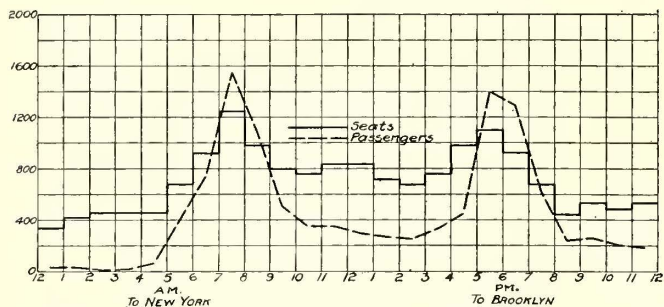


Fig. 1.—Proposed Manhattan Bridge 3-Cent Fare Line—Brooklyn Bridge Local Service, Count of Nov. 16, 1909

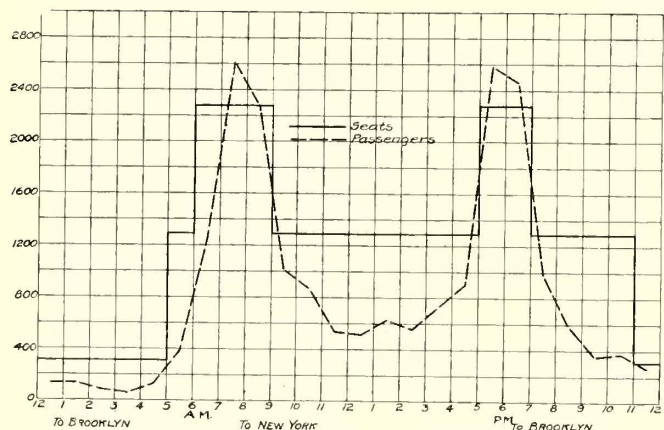


Fig. 2.—Proposed Manhattan Bridge 3-Cent Fare Line—Estimate of Ford, Bacon & Davis, Based on 30,000 Passengers Per Day

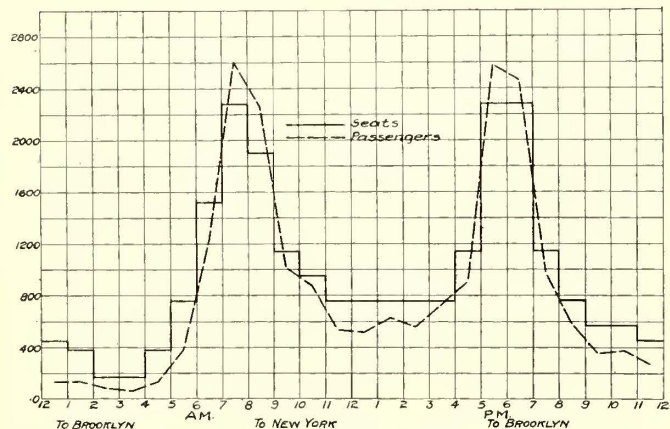


Fig. 3.—Proposed Manhattan Bridge 3-Cent Fare Line—Estimate of J. C. Brackenridge for the Three-Cent Company

maximum number of cars required at the rush hours, and the proper number of cars to be operated at other times of the day. The average headway during the non-rush hours was determined from the local service over the present bridges, which provides almost exactly one car for 20 passengers. The estimate of the Three-Cent Company was 24.6 passengers per trip.

With the number of trips determined, the number of cars to be operated depends upon the average speed. This was figured at 10 m.p.h. by the Three-Cent Company. To determine this vital factor accurately, Mr. Ford had a series of observations made along the existing tracks which the new company proposed to use, and on other sections of track which correspond to the proposed route. These observations were compiled in Table I, and based upon them it is found that the average speed for the through service could not be expected to exceed 8.0 m.p.h. and for the turn-back cars 10.2 m.p.h. From the headways and average speed as determined, proper allowance

TABLE I.—ACTUAL OPERATING SPEEDS ON PRESENT LINES IN NEW YORK AND BROOKLYN FROM OBSERVATIONS TAKEN DURING NON-RUSH HOURS, MARCH 11-15, 1909.

	Distance, miles.	Speed, m.p.h.
Manhattan:		
Third Ave. R. R., Desbrosses St. Ferry to Canal.....	0.36	6.0
Metropolitan St. Ry., Canal St. from Hudson to Center..	0.58	5.7
Williamsburg Bridge.....	1.37	11.7
Brooklyn:		
B. R. T. System:		
From L. I. R. R. Sta. via Flatbush and Fulton to Smith..	0.75	5.6
From Smith and Livingston via Livingston and Flatbush to L. I. R. R. Sta.....	0.73	7.3
C. I. & B. R. R.:		
From Livingston and Smith on Smith and Jay Sts. to Nassau	0.57	6.8
NOTE.—From above, an estimate was made assuming for <i>rush-hour</i> speeds 7 m.p.h. on all Brooklyn streets except Flatbush Ave. Extension, where 8.5 m.p.h. was assumed; in Manhattan 6 m.p.h. was assumed and on Manhattan Bridge 12 m.p.h. This gives an average speed of 7.8 m.p.h.		

TABLE II.—ESTIMATE BY FORD, BACON & DAVIS OF INVESTMENT REQUIRED.

Track construction (Brooklyn):		
7,350 ft. track, including paving, at \$7.29.....	\$53,582	
2,850 ft. track, including paving, at \$7.63.....	21,745	
16 special work layouts.....		\$75,327
		28,119
Total track.....		\$103,446
Line construction (Brooklyn):		
3,675 ft. double track overhead line, at \$1.26.....	\$4,630	
2,850 ft. single track overhead line, at \$0.97.....	2,765	
16 overhead special work layouts.....		1,534
Total line.....		8,929
Track and line construction (Manhattan):		
Rowery to Center, 2,750 ft. track, including paving, at \$26.50.....	\$72,875	
Special work layouts.....		44,500
Vault for attaching plows.....		10,000
Total track and line.....		127,375
Feeder and underground conduit.....		40,964
Power plant, 1,500 kw.....		220,000
Cars (48 passenger cars, 1 sweeper, 1 service car).....		223,400
Car house and shop (26,000 sq. ft. in car house and 6,500 sq. ft. in shop).....		194,400
Miscellaneous:		
Office furniture and fixtures.....		2,500
Materials and supplies.....		17,000
Track and line tools.....		2,000
Total.....		\$940,014
Incidentals and contingencies, 5 per cent.....		47,000
Total.....		\$987,014
Organization, engineering and legal, 20 per cent.....		197,403
Total.....		\$1,184,417
Interest, average 6 months, 3 per cent.....		35,532
Total cost.....		\$1,219,949
Livingston St. Payment to B. R. T., as per original franchise..		9,346
Working capital.....		50,000
Total investment.....		\$1,279,295
Additional cost if double slot construction is necessary west of Center Street, Manhattan.....		316,200
Total investment with double slot.....		\$1,595,495

being made for Sundays and holidays, the car-miles and car-hours per year were calculated.

The adaptation of the proposed headway or service to the traffic is shown graphically in Figs. 1, 2 and 3, in which the solid lines represent the passengers carried during each hour in the day, and the dotted lines the seats provided. Fig. 1 shows the local service over the Brooklyn Bridge; Fig. 2, the service proposed by the Three-Cent Company over the Manhattan Bridge, with traffic distributed as to time of day, similarly to that of the Brooklyn Bridge, and Fig. 3 shows the proportion of seats to passengers estimated by Ford, Bacon & Davis.

It will be noted that the experts for the Three-Cent Com-

pany planned a service following the passenger load line much more closely than the present bridge curve. Mr. Ford thought that such curtailment of service during the non-rush hours would give longer headway than is generally satisfactory to the public and would not provide sufficient employment for the platform men. Continuing, Mr. Ford showed that the service estimated by him would require an average of 528 car-hours, 4452 car-miles and 747 round trips per day. Forty-three cars will be required on the road during the rush hours. After pro-

line construction was based upon recent work in Brooklyn.

In estimating the power plant, Mr. Ford took as a basis an average of 26 kw per car, giving a total of 1090 kw, including current required for switching and shop auxiliaries. To handle this load three 500-kw units would be necessary, one to be in reserve. As the Three-Cent Company had proposed to locate its power station near one end of the bridge, \$40,000 was allowed for land, and with \$120 per kilowatt for building and apparatus complete, the total cost of the power house would be \$220,000. This estimate provides for direct-current generators driven by reciprocating engines.

The investment in cars covers 48 passenger cars with 28-ft. bodies and 5-ft. platforms, similar to those recently purchased by the Coney Island & Brooklyn Railroad Company. Such a car mounted on center swivel maximum traction trucks and equipped with two 50-hp motors would weigh about 31,000 lb., and the cost would be about \$4,600 complete. If prepayment platforms were used, the weight would be increased and 60-hp motors would probably be required. The estimate for cars includes also a sweeper and service car.

In estimating the cost of the car house and shop, Mr. Ford allowed car-house space for 45 cars at 540 sq. ft. per car. Of the 48 cars to be purchased, six would be on the road all night and four in the shops, leaving 38 cars to be provided for. It is good practice, however, to design a barn for somewhat more than actual present needs. The area allowed per car compares with 700 sq. ft. in the new Maspeth barn of the Brooklyn Rapid Transit Company and 870 sq. ft. in the Covert Avenue barn of the Coney Island & Brooklyn Railroad Company. Offices, locker rooms, etc., would take up a space of about 10 ft. x 200 ft., making the total of 26,000 sq. ft. for the car house alone. Land in the vicinity of this line could not be bought for less than \$3.50 per square foot, which, with the building figured at \$2 per square foot and an allowance for track and special work, would make a total cost of \$151,500. Shop space should be provided in addition for four cars, and the total shop area would have to be about 1600 sq. ft. per car to allow for machinery, benches, storeroom, etc. This, figured similarly to the car house, with the addition of \$5,000 for shop equipment, gives a total cost for the shop of \$42,900.

TABLE III.—SUMMARY OF ESTIMATED OPERATION DATA. PRESENTED BY MR. FORD.

Per year:	Through cars.	Short trips.	Dead mileage.	Total.
Car-hours	126,740	62,400	3,670	192,810
Average speed	8.1	9.7	....	8.4
Car-miles	1,016,000	604,800	4,400	1,625,200
Round trips	* 145,300	† 127,700	....	273,000
Per day:				
Car-hours	348	170	10	528
Car-miles	2,783	1,657	12	4,452
Round trips	398	349	..	747
Car-miles:				
On Manhattan lines	232,000	30,600	....	262,600
On B. R. T. lines	119,000	....	....	119,000
Total on lines of other companies	351,000	30,600	....	381,600
On bridge	383,500	337,000	....	720,500
On 3-cent company track in Manhattan.	66,500	58,600	....	125,100
On 3-cent company track in Brooklyn.	215,000	178,600	....	393,600
Total on 3-cent company track..	281,500	237,200	....	518,700
Dead mileage .....	....	....	....	4,400
Total all	1,016,000	604,800	....	1,625,200
Total passengers .....	....	....	....	10,950,000
Passengers per one-way trip .....	....	....	....	20.0

* 53 per cent. † 47 per cent.

viding five additional cars to allow for cars in the shop and for extra cars ready for service, a total of 48 passenger cars are required.

With these figures as a basis, Table II was prepared. It will be understood that the plans of the proposed road contemplate the use of the underground system in Manhattan and across the bridge, and overhead trolley construction in Brooklyn. This makes it necessary to provide some special facilities for changing from trolley to plow contacts on the street, the expense of which is covered under the item of "Vault for Attaching Plows." All of the construction estimates are based upon first-

TABLE IV.—ESTIMATE OF OPERATING EXPENSES. PRESENTED BY MR. FORD.

	Units and unit cost.	Amount	Per car-mile (1,625,200), cents.	Per passenger (10,950,000), cents.
Maintenance and depreciation of way and structures:				
On track owned in Brooklyn	452,300 car-miles at 2.4c	\$10,860	..	.10
On track on bridge	584,200 car-miles at 0.5c	2,920	..	.03
On track owned in Manhattan	207,100 car-miles at 2.5c	5,200	..	.04
On track operated jointly in Manhattan	262,600 car-miles at 2.5c	6,500	..	.06
On Livingston Street, Brooklyn	49,400 car-miles at 1.5c	740	..	.01
Total maintenance and depreciation of way and structures		\$26,220	1.62	.24
Maintenance and depreciation of cars and equipment	1,625,200 car-miles at 3.0c	48,750	3.00	.45
Total maintenance		\$74,970	4.62	.69
Power generated	1,575,800 car-miles at 2.4 kw-hrs. per car-mile by 1.0c per kw-hr.	\$37,819	2.33	.34
Power purchased on Livingston Street	49,400 car-miles at 2.6 kw-hrs. per car mile by 1.5c per kw-hr.	1,927	.12	.02
Total operation of power plant		\$39,746	2.45	.36
Platform wages	192,810 car-hours at 45c	76,300	4.70	.70
Other operation of cars	1,625,200 car-miles at 1.3c	21,500	1.32	.20
Total operation of cars		\$97,800	6.02	.90
Total transportation		\$137,546	8.47	1.26
Damages and legal	1,625,200 car-miles at 1.5c	\$24,380	1.50	.22
Insurance	Property insured times premium	2,370	.15	.02
Other general expenses	1,625,200 car-miles at 1.3c	22,000	1.35	.20
Total general		\$48,750	3.00	.44
Total operating expenses		\$261,266	16.09	2.39

class modern construction at recent prices. The estimate of \$7.63 per foot of track for track in Brooklyn covers 102-lb., 7-in. rail, creosoted ties and broken stone ballast. The cost of the track on Flatbush Avenue Extension is figured at a somewhat less cost per foot because no excavation will probably be necessary. The estimate for straight track in Manhattan is based upon average costs of similar work. Each special work layout was estimated separately in detail, and the cost of overhead

Incidental and contingent expenses were estimated at 5 per cent, and organization, engineering and legal expenses at 20 per cent. These percentages correspond with those developed before the commission by B. J. Arnold and Ford, Bacon & Davis in the Coney Island fare case.

The item entitled "Livingston Street payment to Brooklyn Rapid Transit Company" is calculated as prescribed in the franchise of the Nassau Electric Railroad Company under

which other companies are allowed to use the tracks and wires provided they pay to the Nassau Company a proportionate part of the cost of construction.

In addition, Mr. Ford estimated \$316,200 for the construction of double-slot conduit in Manhattan Borough, which would be necessary if the Three-Cent Company could not make arrangements with the existing companies in Manhattan for the purchase of power, as it developed that the new company might condemn the right to using the tracks of the old company for a certain distance, but could not compel the old company to furnish power for the operation of the new company's cars. This being the case, the new company would have to provide its own conductors and this would necessitate double-slot construction west of Center Street in Manhattan.

OPERATING EXPENSES AND INCOME ACCOUNT

The next feature of the testimony was the determination of the operating expenses. This is shown in Table IV and is based on the data given in Table III and from actual past experience of the existing companies. The total operating expenses are 16.09 cents per car-mile, not including taxes or rentals, which compares with the cost on the surface lines of the Brook-

TABLE V.—ESTIMATE OF INCOME ACCOUNT.
PRESENTED BY MR. FORD.

	Amount.	Cents per passenger.
Operating revenue:		
Passenger rev., 365 days by 30,000 passengers, at 3c.	\$328,500	3.00
Advertising privileges, 43 cars, at \$75.....	3,225	...
Total operating revenue.....	\$331,725	3.02
Operating expenses *.....	261,266	2.39
Net revenue from operation.....	\$70,459	.63
Taxes:		
City, 3 per cent of operating revenue on franchise tracks.....	\$6,160	
State, 1 per cent of operating revenue.....	3,317	
Car license, 48 cars, at \$20.....	960	
1.7 per cent on 89 per cent of cost of physical property owned †.....	14,900	
1 per cent of net earnings, federal.....		
Special franchise tax on intangible property in streets.....		
Total taxes.....	25,337	.22
Operating income (revenue over expenses and taxes)	\$45,122	.41
Income deductions:		
Rentals of physical property:		
Bridge toll, 273,000 round trips, at 5c.....	\$13,650	
Brooklyn line ‡.....	2,556	
Rental, Livingston Street construction §.....	1,635	
Manhattan lines.....	14,700	
Attachments to Brooklyn elevated structure..	292	
Total rentals of physical property ¶.....	32,833	.30
Income applicable to return on investment.....	\$12,289	.11
Return on investment:		
10 per cent on investment required (\$1,595,495)....	159,550	1.47
Net deficit.....	\$147,261	1.36

* Including depreciation and power purchased on Livingston Street.
 † Includes special franchise tax on tangible property in streets.
 ‡ 2.4c. per car-mile plus 35c. per lineal foot of track.
 § As per franchise.
 ¶ Not including charges for interference with use of existing property, loss of business and value of special franchise.

lyn Rapid Transit system of about 18 cents and on the Coney Island & Brooklyn Railroad of about 16 cents.

Table V then gives an estimate of the income account. It will be noted that the taxes as estimated amount to 0.22 cent per passenger. This does not include any allowance for the special tax on franchises except in that part of the ad valorem tax on physical property which covers tangible property on the public streets. As Mr. Ford estimated that there would be no net earnings or profits after deducting interest on the investment, he did not make any allowance for the Federal Corporation tax of 1 per cent.

The bridge toll is calculated at the rate paid on the present bridges. The rental for use of the physical property of the Brooklyn lines, exclusive of Livingston Street, covers maintenance and renewals of track and line at 2.4 cents per car-mile and interest and taxes on the cost of construction at 35 cents per foot of single track per year. These prices are used at present by existing companies in Brooklyn for interchange of facilities. The item for Livingston Street under the head of "Rentals" covers amortization of the Three-Cent Company's

portion of the cost of the Livingston Street construction, this franchise being for 10 years only. The estimate for rental of physical property of the existing lines in Manhattan is based upon the ratio which the service of the new company would bear to that of the present companies and covers the fixed charges on the cost of the construction used. No attempt was made to estimate the damage to the existing companies on account of loss of business or interference with use of the existing tracks or in the value of their special franchises. As before stated, Mr. Ford thought that this damage would amount to much more than the balance of income shown as applicable to return on investment.

The investment, as estimated, covers only the actual cash invested and does not provide for promotion expenses, property owners' consent, or many other expenditures which constitute a large part of the intangible property of a street railway. To attract capital to investment in a street railway project of more than usual uncertainty, a return of at least 10 per cent would have to be offered. Interest at 10 per cent on the investment of \$1,595,495 would amount to \$159,550, or 1.47 cents per passenger, which applied to the income applicable to return results in an annual deficit of \$147,261. The total estimated cost of operation and fixed charges per passenger is then 4.38 cents. If the rate of return on the investment were figured at 6 per cent, the total cost would be 3.76 cents per passenger. From these results Mr. Ford thought that the rate of fare of such a line should be from 3¾ cents to 4½ cents, and that 4 cents might be a reasonable figure.

FURTHER DATA ON THE EDISON-BEACH STORAGE BATTERY CAR

The Edison-Beach storage battery car, which was described in the ELECTRIC RAILWAY JOURNAL of Jan. 29, 1910, was placed in commercial operation on the Twenty-eighth and Twenty-ninth Streets Crosstown Railroad on March 3, after numerous trial runs since January last. The following is the schedule of a daily performance under the present service conditions. The car leaves the barn at 6 a. m., with the batteries fully charged. It travels over the line continuously until 8.30 p. m., during which time it handles the regular traffic of the line in making 14 round trips and covering a distance of 66.78 miles. At 8.30 p. m. the car comes into the car house, is inspected and charged for five hours. The average expenditure of current at the motors is 529 watt-hours per car-mile, and at the bus-bars, 853 watt-hours per car-mile.

On March 28 and March 29 a test was made to determine the mileage capacity of the car when carrying a normal passenger load. The car made 85 miles and then was found to be practically discharged. On the last trip in the 85-mile run, the car took on 27 passengers at the Twenty-third Street ferry making a total of 31 riders with the motorman, conductor and two engineers. The car maintained its regular speed over Twenty-eighth Street and the passengers were distributed all the way from the Twenty-third Street to the Thirty-fourth Street ferries. Only ten passengers were carried on the return trip from the Thirty-fourth Street ferry.

In considering these general data, it should be borne in mind that the conditions under which this car is working are not favorable to the economic operation or the long mileage per battery charged. The track conditions are bad and there are 46 curves in each round trip. On the long run of 85 miles there were approximately 700 stops.

The designers of this car had obtained by April 1, a record of performance of the Edison battery covering a period of 476 charges and discharges in commercial service. At the end of this number of complete charges and discharges, the battery was found to be 11 per cent higher in capacity than when at first put into service. Translated into car-miles, taking 80 miles per charge (5 miles less than was secured in the test run), the car traveled 38,800 miles and the battery appreciated in capacity 11 per cent over its original rating.

PROGRESS TOWARD ARBITRATION OF DETROIT APPRAISAL

Claudius B. Grant, formerly justice of the Supreme Court of Michigan, has been selected by the Detroit United Railway as its member of the board of arbitration which is to consider the appraisals of the property of the company. As stated in last week's issue, Judge James O. Murfin, of the Wayne County Circuit Court, has been named as the representative of the Committee of Fifty on the board. It is reported that Robert W. Tayler, judge of the United States Circuit Court at Cleveland, who was the arbitrator for the city and the company in the recent franchise negotiations at Cleveland, will be asked to be the third member of the board.

Frank W. Eddy, chairman of the Committee of Fifty, expresses satisfaction with the selection of ex-Judge Grant. He is quoted as saying:

"I am sure that the people will have confidence in the findings of a commission which contains two such men as ex-Judge Grant and Judge Murfin. They are men used to hearing evidence and weighing its value. They can be relied on as fair and impartial. I am sure that the person whom they choose for the third arbitrator will have the confidence of the public. Certainly no fault can be found by the citizens of Detroit with either of the men thus far chosen. I am glad that the Detroit United Railway has shown the same spirit as the Committee of Fifty in choosing a man who will be acceptable to the people."

The report on the appraisal of the property of the city lines owned by the Detroit United Railway, made by Frederick T. Barcroft for the subcommittee on appraisal of the Committee of 50 citizens, has been published in book form. The book has 237 pages and contains also maps illustrating the properties involved in the appraisal, the population and the area affected.

The subcommittee on appraisal is composed of Joseph Boyer, chairman; Edwin A. Burch, Fred C. Hees, David W. Simons, W. W. McMahan, Louis R. Geist and W. W. Hannan. In its report to Chairman Eddy, of the Committee of Fifty, the subcommittee states that the appraisal was made of the Detroit United Railway as a going concern in its present condition under the supposition that the present traction relations are to continue. If no settlement satisfactory to the city of Detroit should be made, the committee suggests that the appraisal be reduced to some extent. The total figures determined in the appraisal and also some of the figures of an appraisal made for the company about the same time were published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 20, 1909, page 1077.

The section of the report devoted to track is introduced by a discussion concerning the construction and depreciation of track, and includes also an inventory and the details of the basis of cost of the track and illustrations of the different types of construction. Specifications and costs of material for each type of construction follow. An inventory of the track in the car houses, yards and power stations is given with a deduction as an allowance for depreciation. The location of the special track work and the bases of cost on which this work was valued are given in detail. The section devoted to crossing protection devices gives the history of the various devices. Illustrations of the types of rail are given on the pages in which the location and weights of the various types are specified.

In valuing the cars, a division of the different types of rolling stock was made. After the different cars had been divided into groups, the average value was ascertained and the net value per car as determined was multiplied by the number of cars in that group in order to determine the present value. The non-revenue cars were treated similarly. Illustrations of the various types of cars are published. The report states the prices which were used in figuring the costs on electrical equipment of the rolling stock.

A discussion in reference to mechanical apparatus precedes the inventory and valuation of the shops. Sections are devoted to discussion on the subject of overhead charges and of paving. An appendix contains various laws and franchises affecting the Detroit United Railway properties.

REPORT OF CLEVELAND RAILWAY FOR MARCH

The report of the Cleveland (Ohio) Railway for March 1910, was presented to the City Council of Cleveland by G. M. Dahl, street railway commissioner of the city, at the meeting of that body on the evening of April 11, 1910. Gross earnings were \$475,749.50, or 22.96 cents per car-mile, and the operating expenses were \$321,181.86, or 15.50 cents per car-mile, divided as follows: Maintenance, \$82,885.64, or 4 cents per car-mile, as provided in the ordinance, and operation, \$238,296.22, or 11.50 cents per car-mile. The interest, which takes the place of the old dividend disbursements, amounted to \$110,788.42. The average rate of fare for the month was 3.4 cents. The average fare for March, 1907, under the rate of seven tickets for a quarter and universal transfers, was 3.6 cents. The statement in detail follows:

INCOME ACCOUNT.

		Cents per car mile.
Gross earnings from operation.....	\$475,749.50	22.96
Operating expenses	321,181.86	15.50
Net earnings from operation	\$154,567.64	7.48
Miscellaneous income	1,743.56	.03
Gross income, less operating expenses.....	\$156,311.20	7.54
Taxes	26,641.84	1.28
Income, less operating expenses and taxes....	\$129,669.36	6.26
Interest	110,788.42	5.35
Surplus	\$ 18,880.94	.91

GROSS EARNINGS FROM OPERATION.

		Cents per car mile.
Car earnings:		
Passengers	\$462,734.24	22.33
Less rebates to other companies.....	1,245.72	.06
Net from passengers	\$461,488.52	22.27
Chartered cars	1,305.52	.06
Touring cars .....	.....	.....
Freight and express.....	3,209.47	.16
Mail	1,156.58	.06
Passes	2,734.50	.13
Newspapers	1,333.33	.06
Total car earnings	\$471,227.92	22.74
Miscellaneous earnings:		
Advertising	\$4,481.58	.22
Rent of land and buildings.....	20.00	...
Rent of tracks.....	20.00	...
Rent of equipment.....	.....	...
Total miscellaneous earnings.....	\$4,521.58	.22
Gross earnings from operations.....	\$475,749.50	22.96

OPERATING EXPENSES.

Maintenance—2,072,141 miles at 4 cts.....	\$82,885.64
Operating expenses—2,072,141 miles at 11½ cts.....	238,296.22
Total	\$321,181.86

MISCELLANEOUS INCOME.

		Cents per car mile.
Interest on deposits.....	\$1,272.17	.06
Interest on bills receivable.....	25.00	...
Rent of real estate not used in operation.....	446.39	.02
Total miscellaneous income.....	\$1,743.56	.08

DEDUCTIONS FROM INCOME.

		Cents per car mile.
Taxes:		
On real and personal property.....	\$20,935.00	1.00
On earnings (to State).....	4,774.93	.23
U. S. corporation tax.....	931.91	.05
Total taxes.....	\$26,641.84	1.28
Interest:		
On funded debt.....	\$33,962.50	1.64
On floating debt.....	3,447.92	.17
On Cleveland Ry. stock.....	73,378.00	3.54
Total interest	*\$110,788.42	5.35
*Interest on Neutral Street Railway investment not included in above.		

MILEAGE.

Suburban	91,920
Trailers at 60 per cent.....	60,413
Regular	1,903,230
Total passenger	2,055,563
Chartered cars	3,820
Freight and express.....	9,229
Mail cars	3,468
Newspaper	61
Total revenue mileage.....	2,072,141
Work cars operating expense.....	2,293
Track department—maintenance	5,072
Pay car	375
Total	2,079,881

MARYLAND PUBLIC SERVICE COMMISSION LAW

The public utilities bill which was pending in the Legislature of Maryland was passed by the House during the week ended April 2, 1910, and was passed by the Senate on April 4, 1910, without being amended. On April 5, 1910, Governor Crowthers signed the measure. The bill is entitled "An act to create and establish a public service commission, and prescribing its powers and duties, and to provide for the regulation and control of public-service corporations and public utilities, and making appropriations therefor. The principal provisions of the bill follow:

The commission is to be composed of three members appointed by the Governor. The chairman is to receive \$6,000 a year and each of the other two \$5,000 a year. The commission is to be appointed and the names announced 10 days before the first Monday in May, 1910. The term of office of the commissioners now to be appointed is to be two years, four years and six years respectively, the Governor to designate when he appoints the commissioners which one is to serve two years, which four years and which six years. After the expiration of the terms of each of the first appointees, the terms of all are to be for six years. If the term of six years is held to be invalid, the term of each of the commissioners is to be limited to two years. The Governor, upon the recommendation of the commissioners, will alone appoint a general counsel to the commissioners, whose salary is to be \$4,800 a year, and his term of office six years, or two years, as in the case of the commissioners. There will also be an assistant counsel to be appointed by the general counsel, whose salary is to be \$3,000 a year. The secretary of the commission is to get \$3,000 a year, and the chief stenographer \$1,500 a year. The jurisdiction and the powers of the commission extend over all public service corporations in the State, including all common carriers, steam railroads, street railways, steamboats, canal and canal companies, ferry boats, gas and electric companies, telephone and telegraph companies, light, heat and refrigerating companies, water and water-power companies and virtually every other utility corporation.

The commission has the power to determine rates to be charged by each public-service corporation subject to the act. These rates are required by the act itself to be just and reasonable. The commission is vested with full and plenary powers to conduct investigations in order to enable it to ascertain what rates in the case of each particular public-service corporation are just and reasonable. Among the powers given to the commission for the purpose of enabling it to determine what are just and reasonable rates are the following: To summon and examine witnesses, to require the production of all books and papers, to entertain complaints and conduct hearings with respect to the reasonableness of rates and charges, to require switch connections, to require public schedules to be made out for the railroad companies, to prohibit undue preferences and discriminations on the part of rails, gas companies or any other companies subject to the act; to require the interchange of passengers and freight, to prevent discrimination between carriers, to prevent unjust discrimination with respect to long and short hauls and to require safe and reasonably adequate and proper service on the part of the various corporations.

Uniform systems of accounts may be required if the commission sees fit. Control over the issuance of new franchises or privileges and over the transfer of franchises is vested in the commission. The corporations subject to the act may, with the consent of the commission, issue stocks, bonds or other securities, payable more than 12 months after date, when necessary to acquire property or for the construction, completion, extension or improvement of their facilities, or for the improvement or maintenance of their service, or the discharge or lawful refunding of their obligations. The commission is given power to enforce its orders in various ways provided by the act. Power is also given it, whenever it may deem it desirable to do so, to value the property of any public-service corporation, but such valuation shall be so made that as far

as possible it shall not affect the value of bonds previously issued. The capitalization of merger agreements or franchises of public-service corporations and the issuance of stocks is prohibited, except that the amount actually paid for a franchise may be made the basis of capitalization and the issuance of stocks and securities.

The amount of \$75,000 per annum, or so much thereof as may be necessary, is appropriated for the salaries and expenses of the commission and for carrying out the purposes of the act. Provision is made for biennial audits by the State Auditor of all the receipts and expenses of the commission. All acts or parts of acts heretofore passed fixing the rates of any public-service corporation are repealed, and the powers of the commission to ascertain rates which are reasonable and just supersede such acts prescribing rates. The repeal of these acts includes the repeal of the existing act fixing the price of gas in Baltimore City at \$1.10, and gives the commission full power to reduce it to any figure which may be determined to be just and reasonable.

The office of the commission will be in Baltimore City, where the commission is directed to collect all necessary data pertaining to the corporations that come under its jurisdiction, such data to be regarded as public records. The hearings of the commission are to be public unless otherwise decided by necessity, but the records of any secret meeting shall not be withheld from the public more than 90 days. Provision is made in the act for an appeal from the findings of the commission to the Circuit Court and then to the Court of Appeals, although the burden of proof in such appeals shall be upon the party adverse to the commission. Another important provision is one which prohibits the giving of passes by public-service corporations to any persons other than bona fide employees.

RAILROAD COMMISSIONS ASKED TO CO-OPERATE WITH RULES COMMITTEE

C. D. Emmons, general manager, Ft. Wayne & Wabash Valley Traction Company and chairman of the interurban rules committee of the American Street and Interurban Railway Transportation and Traffic Association, has sent a copy of the following letter to the secretaries of all of the State railroad commissions in the United States:

Dear Sir:

The interurban rules committee of the American Street and Interurban Railway Association for 1910 is very anxious to keep in close touch with electric railway operation throughout the United States to study accidents in connection therewith, and to ascertain whether or not the rules are specifically clear as to how to avoid such accidents. If not, it is the desire of this rules committee to make such recommendations at the 1910 convention of the American Street and Interurban Railway Association as will tend to improve the rules to the point of greatest safety.

As chairman of this committee I would respectfully ask if we can make such arrangements with you as will give us data concerning accidents in the operation of electric street and interurban railways in your State, giving us in detail the full cause of such accidents. It is not necessary that we should know the road upon which the accidents occur.

If you have printed bulletins to cover these points, I will be very pleased if you will place me on your mailing list.

I believe you will fully appreciate the good which may be accomplished by this committee keeping in close touch with this work, and by your assisting the committee in this manner.

Thanking you in advance for the trouble which you may take in this connection, I am,

Yours very truly,

C. D. EMMONS,
Chairman Rules Committee.

The oldest tramway system in India is that of Madras. It was built in 1895 as an underground conduit road, but was soon converted for overhead trolley operation.

CONTACT TYPE SIGNAL SYSTEM

At the Feb. 17 meeting of the electrical section of the Franklin Institute, Philadelphia, Carl P. Nachod, general manager of the Nachod Signal Company, Philadelphia, presented a paper on "Automatic Signals for Electric Railways." The following is an abstract of the description of the contact type signal system invented and described by Mr. Nachod.

This contact system is for electric railways where cars run both ways on the single track sections. In track circuit systems the signal generally is located at the insulated track section, which is the entrance of the block, and the motorman entering the block assumes that the signal he leaves behind will drop to danger; nor does he look behind him to see that it has, before proceeding. It is desirable that the signal indication should be set sufficiently in advance of the contact device for setting, that the motorman may see the effect of his passing the device before he enters the block. In such a case a three-indication signal is preferable, having a neutral indication which can be changed to proceed or stop by the passage of cars, the neutral indication meaning that a motorman may pass the contact device, the block being presumably clear. In this manner the motorman protects himself with signals before passing the indication.

When the motorman about to enter the section of single track perceives that the signals are neutral, it indicates that there is no car on the block of single track, provided the signal system is operative. As his car passes under the contact switch, the trolley wheel causes an impulse of current to flow through the relay. This has the effect of setting permissive signals in front of him and danger signals at the other end of the block simultaneously, the circuit of the permissive signals being completed through that of the danger signals. The former is therefore an indication that the latter are displayed. Night and day signals are given at the same time in each box by a light and an opaque disk of the same color. A light alone, under certain conditions of direct sunshine and low voltage, is very unreliable as a day indication but the conditions that are against a light indication are all the more favorable for the disk indication, and vice versa.

The motorman, having seen that his car has set the signals, proceeds past the signal box into the block. The red signal, meanwhile displayed at the other end of the block would prevent a car which might have come up, from entering against him. When his car arrives at the end of the block, it runs under the contact switch, causing the signals to return to normal or neutral indication; after which the car held up by the red signal may now proceed into the block, setting the signals similarly but oppositely, and passing out will clear them. This signal, however, is used for what is known as permissive, as opposed to absolute block signalling. Several cars are admitted into the block from one end, and the signals held permissive at that end, and danger or stop at the other, so long as a car occupies the block. In the absolute block system, on the other hand, when a train occupies the block a danger or stop signal is displayed at both ends of the block.

To illustrate, suppose a car has entered the block and set the signals; and before it leaves, a following car arrives at the end of the block showing white. The motorman will understand by this that there is at least one car ahead of him going in the same direction, and that he may enter the block under control. As his car runs under the contact switch he observes the signal box, and notices the flash of the white light that his car causes. This is an indication that his car is counted in or registered in the signal relay; and so on for a number of cars following each other, each receiving its signal that there are other cars ahead of it and that it has counted in. When the first car arrives at the end of the block, in running under the contact switch, it causes a blinking of the light, but the signals are still set as before. They so remain until the last car clears them, leaving the block ready for cars in either direction.

The above is the normal operation, but if a car should enter

the block from one end and back out by the other track at the same end, using the single track merely as a Y or cross-over, the signals will be cleared when the car leaves the block. This makes a very flexible operation, as in the complicated case where a number of cars enter the block from one end, and are continuously entering and leaving, some leaving by one end and some by the other, but the signals protect all the cars in the block and are cleared only when they all leave it.

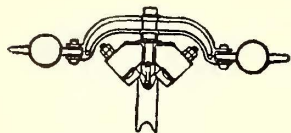
When the red signal is displayed, then the entering switch at that end of the block is "dead" and indications may not be changed by a car running against the red signal. Should a motorman intentionally violate the red indication and enter despite it, and a head-on collision result thereby, the signals will not have been changed, and the responsibility will be placed upon the offender. A knowledge of the certainty of his detection adds a safety feature to prevent the motorman from attempting to pass the signal set against him. However, a more frequent use of the lock-out device, as it is called, is the case where, of two cars approaching the block from opposite ends, one reaches the contact switch a moment before the other, and, obtaining a permissive signal, goes ahead. The motorman of the second car sees the red flash up, but is too near the contact switch to stop before passing it. He accordingly brings his car to a stop, and backs out again to wait, but the contact switch being dead, neither passage of his car will affect the signals. Should two cars run under the contact switches from opposite ends at exactly the same instant, then the permissive signal will not remain set by either car. They will therefore back to the contact switches, and the one reaching it first will hold up the other car.

The signal may also be operated as an absolute block system by leaving the hand-clearing switch open, which is equivalent to opening the line wire. For instance, a work train, entering the block to repair the trolley wire, closes the block at both ends by the motorman of the work train leaving the hand-clearing switch open. Then no permissible signals may be obtained from either end. In order to leave the signals for normal operation again, he must close the switch when leaving the block. In case of failure of line voltage, the signals reappear on its resumption with the same indications. The mechanism of the signal itself may be divided into three parts: The indicating, consisting of the lamps, color lenses and opaque color disks; the intermediate, represented by the relay, which converts the impulses of current caused by the passage of the car into signal indications; the actuating, consisting of the overhead trolley contact switches, which by the passage of the car determine the setting and the clearing of the signals.

The signal box is a cast-iron case, the upper part of which contains the indicating mechanism. The front cover is hinged to give access to the lamps, and has three openings: the upper, covered with clear glass through which one or the other color disks may be brought to an indicating position; the two lower openings, which have white and red semaphore lenses, respectively, behind which are lamps. The disk that is not indicating is used as a screen for the other lens. The disks are mounted as levers of the first class, counterweighted so as to fall to the indicating position by gravity, motion being communicated to the disks by push rods operated from the relay magnets below. This connection is such that the quick motion of the magnet is not transmitted to the color disk, which is thereby relieved of any shock.

The intermediate mechanism consists of the relay which is designed as an independent and easily replaceable unit. It consists of a number of iron-clad electromagnets of the stopped-plunger type, arranged to open and close the switches by sliding contact rings on which fixed spring-fingers press. The counter is a magnet-driven ratchet and pawl. The entire relay, including both magnet coils and switch contacts, is immersed in oil. This prevents rust, lubricates the moving parts continuously and lessens the violence of the magnet action, which otherwise might loosen the parts. The oil also extinguishes the arc at the break, keeps the coils cool to increase the range of operating current, improves the insulation of parts by decreasing the

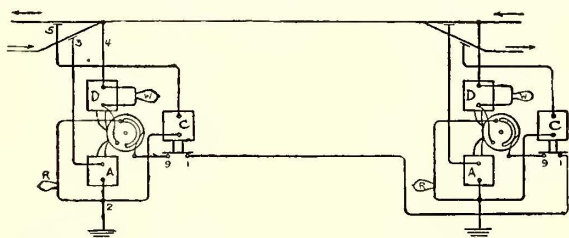
leakage distance, permits of compact design and lessens the liability of lightning damage. The connections from the relays to the lamps and incoming leads above are automatically made by spring contacts. Each of the magnet circuits is so designed that a powerful current starts the movement of its plunger, but when the latter is nearly seated the current is reduced to a safe value, either by inserting resistance in its circuit or shunting current around it.



End View of Switch

The trolley switch consists of a light angle-iron frame supporting at its ends through insulating blocks two flexible inclined contact strips, the trolley wire being withdrawn during the length of the contact strips, which are formed to receive the wheel without shock. One strip is connected to trolley, the other to ground through the relay. The wheel, being a metallic conductor, bridges them and sets the signal whether the car is taking power or not at the instant of passing the switch.

But one line wire is required for this system, and the installation consists of the hanging of two signal boxes on poles, and four trolley switches in the four branches leading to the single track, with the necessary taps to each. The operation of the signal is shown in the accompanying diagram, in which



Wiring Diagram of Overhead Contact Signal System

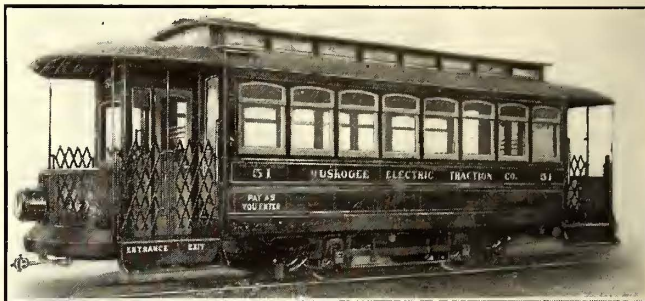
only the parts essential to a comprehension of the scheme are given. The parts are in position for no car on the block, in which case each end of the signal wire is grounded through a red lamp *R*. With no current in the coils, the armatures drop. The first entering car sends an impulse of current through magnet *A* in the relay at the entering end, operating a two-way revolving switch, which transfers that end of the signal wire to trolley through a white light *W* and a magnet *D*. This light and the red one at the other end now burn in series through the signal wire. Successive following cars turn the revolving switch so that the contacts overlap further, but make no change in the electrical circuit. Each leaving car energizes magnet *C* to break temporarily the signal circuit at 9-1, permitting magnet *D* in the first relay to drop its armature and revolve the switch in the reverse direction. When the same number of impulses has been made on magnet *C* as on *A*, that is, when all the cars that have entered the block have left it, the signals are cleared and the connections are as shown. The color disks are brought to an indicating position by magnets *D* and one in shunt with *R*, not shown. A no-voltage magnet, not shown, is interlocked with magnet *D* to prevent a motion of the armature of the latter should the power fail with cars on the block.

The American Street & Interurban Railway Association has just issued two new bulletins, one relating to the brake equipment used by different companies and the results secured, the other to the merit and demerit system of discipline. These two bulletins are for member companies only.

In 1909 the Liverpool Corporation Tramways carried 121,532,940 passengers, the traffic receipts amounted to £561,271, and the mileage run was 11,952,373. As compared with the figures for 1908, the passengers decreased 394,943, or .3 of 1 per cent, and the receipts were less by £1,873, or .3 of 1 per cent. Since the corporation owned the cars £234,970 has been contributed toward the reduction of taxes.

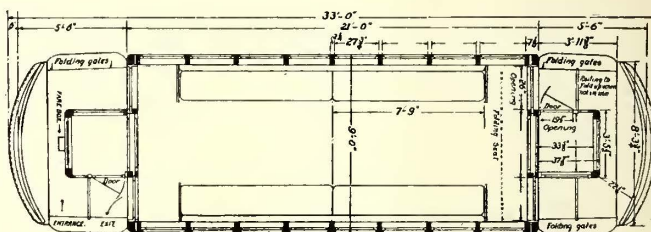
ONE-MAN PAY-AS-YOU-ENTER CARS FOR MUSKOGEE, OKLA.

The wide adaptability of the pay-as-you-enter car even for small cities is shown by the one-man design built by the Danville Car Company for the Muskogee Electric Traction Company, Muskogee, Okla. This car has standard pay-as-you-enter non-vestibuled platforms at both ends with folding gates at the steps on both sides. The rear platform gates are closed



Exterior View of One-Man Pay-As-You-Enter Car

and locked and passengers enter and leave by the front platform under the eye of the motorman. In this respect the six cars ordered follow the scheme of operating the one-man pay-as-you-enter cars used in Brunswick, Ga., which were described in the ELECTRIC RAILWAY JOURNAL for Dec. 11, 1909. An un-



Floor Plan of Car

usual feature, however, appears in the use of motorman's cabs about three feet square which are located against the bulkheads between the entrance and exit doors and which take the place of vestibules. Each cab has a folding side-entrance door and a single drop sash at the front. Passengers boarding the



Interior View, Showing Folding Seat Across Rear End

cars must pass the motorman and as they do so drop their fares in a fare box which is hung from the window of the motorman's cab. The type of fare box which is used for the Muskogee cars is Brill No. 4A which is suitable for both tickets and coins.

To prevent passengers boarding at the rear of the car the steps on both sides are protected by folding gates which are fitted with locks. To avoid confusion by passengers attempting to leave the car at the rear, a folding seat is provided which may be placed in position against the bulkhead and extending across both doorways. This feature is shown on the plan of the car and is one of the half tones on page 712.

The cars have longitudinal seats and in general dimensions are standard 21-ft. closed single truck cars as follows: Length over the end panels, 21 ft. 0 in.; length over the platform crownpieces, 32 ft. 0 in.; length over each platform, 5 ft. 6 in.; length over the bumpers, 33 ft. 0 in.; width at the sill including panels, 8 ft. 6½ in.; truck wheel base, 8 ft. 0 in.; track gage, 4 ft. 8½ in.; wheel diameter, 33 in.

The trucks which are of the Brill No. 21-E type, have pipe truss-rod supports at the ends to carry the extra weight due to the platforms of slightly increased length. The interior finish of the cars is ash with bird's-eye maple veneer ceilings. The seats are upholstered in cane. Push buttons are provided on each side post and each car is equipped with eight electric heaters. The cars were built under license of the Pay-as-You-Enter Car Corporation.

THE ANTISEPTIC TREATMENT OF TIMBER

Investigators of the wood preservation problem in weighing the merits and demerits of the so-called superficial methods of timber treatment as compared with the vacuum-pressure or creosoting process, sometimes overlook the fact that distinctly different distillates of the coal tar oils are required for each process. Timber treated by the superficial methods with oils of the creosote type can only give disappointing results because the amount of penetration thus secured is not sufficient to hold in the wood the oils which have a low distilling-point. Such oils are of a volatile nature and are only of value when they are forced through the wood by the aid of a costly vacuum-pressure treating plant.

On the other hand it is now known that in any process using coal-tar compounds only those oils remain in the wood which distill above 572 degrees Fahr. (300 deg. C.). The remaining distillates evaporate in a short time after treatment. The knowledge of this fact lead to the idea of employing the heavy oils only and to applying them either with a brush, by dipping the wood or in accordance with the well-known open-tank process. The theory of this treatment is that as the fungi which produce decay enter the wood from the outside it is necessary to protect only the entire outer zone of the wood. These heavy oils remain in the wood both to repel water and to prevent the growth of fungi and their spores. Under the proper conditions of installation, such as where the wood is not subjected to severe mechanical wear and exposure, the superficial treatment will give, per dollar spent, much better returns than the more expensive creosoting methods. Aside from the greater cost of the preservative itself a creosoting vacuum pressure plant will cost from five to ten times as much as a superficial preservation outfit for the same capacity.

The wood-preserver known as "Antiseptine," made by the American Wood Preserving Company, Chicago, Ill., is a well-known coal-tar oil which is strongly advocated for the superficial method because it not only contains the oils which distill at about the temperature of 300 deg. C., but also contains all oils which distill between 350 deg. C. and 400 deg. C. This condition is necessary because the most permanent pungent and acrid antiseptics such as acridine and cryptidene are found only in that portion of that compound which has a boiling point of 350 deg. C. to 360 deg. C. These antiseptic oils will be partly solid at ordinary temperature but this is not objectionable because the wood-preserving liquid should be applied hot to secure sufficient penetration. Such a compound in fact is perfectly limpid at 38 deg. C. and is heated to about the boiling point of water when applied. In this way deep penetration is secured and the full benefit obtained from the subsequent solidification of the alkaloidal antiseptics in the wood.

A DROP-AND-LOCK CAR FENDER

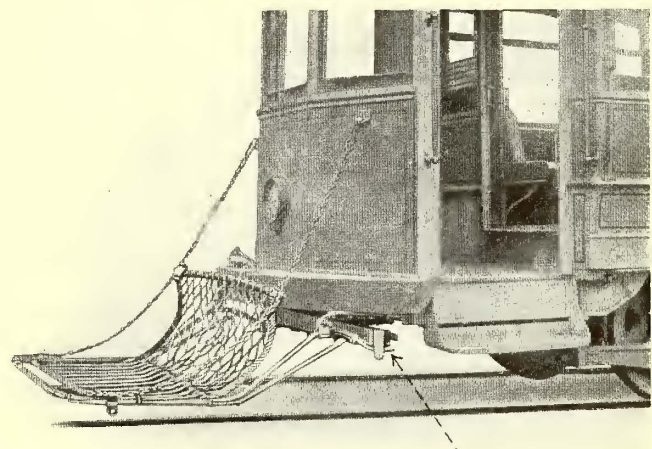
R. W. Sharp & Son, Camden, N. J., are makers of a drop-and-lock device which can be applied either to their own fenders or to other hanging fenders already in use by electric railway companies. The object of this invention is to provide hanging fenders with a safe and durable drop-and-lock attachment by altering slightly the side arms of the fender and applying two small track rollers which are used only when the fender has been dropped. The accompanying inverted view of this device shows the center plunger for starting operation,



Drop and Lock Device for Fender

stay-bolts on the extreme ends for holding elevated and locking down the fender, expansion springs, etc., all on a channel-iron base which is installed under the car platform. The combination of hanging fender and drop-and-lock attachment is operated as follows:

Should the motorman observe that a pedestrian is in danger of being run down by his car, he trips a conveniently-placed



Drop and Lock Device for Swing Fender

platform pedal. This action withdraws the two staybolts shown on each end of the channel base mentioned. When the fender is hanging normally, the extreme rear ends rest below the staybolts which keep them about 6 in. above the rail. As soon as the staybolts are withdrawn, however, the fender drops to the track by its own weight. It is prevented from buckling or other damage by means of two track rollers attached, as shown in the second view. The expansion springs geared around the staybolts force the latter outward when the fender is in the lowered position. As the extreme rear ends of the fender arms are above these staybolts, the lock thus secured makes it impossible for the fender to be raised. Hence, no person or object can be wedged under the dropped fender or come into contact with the trucks or other running gear.

SWISS RAILROAD REPORT

The report of the Swiss Railway and Postal Department for the year ending 1908 shows that Switzerland then had 628 km (390 miles) of electrified steam or interurban railways and 3874 km (2402 miles) of steam railroads. A rather interesting fact about the steam lines is that more track is laid on steel than on wooden ties. The street railway mileage for the year ending 1908 was 413 km (256 miles) of route, divided among 37 undertakings, which had 2972 employees. The estimated total installation cost of the street railways was 59,700,000 francs (\$11,522,100); the gross earnings, 12,900,000 francs (\$2,489,700), and the operating expenses, 10,300,000 francs (\$1,987,000).

FUNERAL CARS FOR OPERATION IN CHICAGO

The Calumet & South Chicago Railway Company recently has had built by the G. C. Kuhlman Car Company, Cleveland, Ohio, two funeral cars which are to be operated in Chicago over the lines of the Chicago City Railway Company. These cars are of the double compartment type, one section being reserved for the casket and pallbearers and the other for the mourners. The compartments are separated by a double partition and end bulkheads which have hinged windows and single sliding doors with Burdett-Rountree ball-bearing hangers. One side of the casket compartment has a longitudinal seat, the



Mourners' Compartment of Chicago Funeral Car

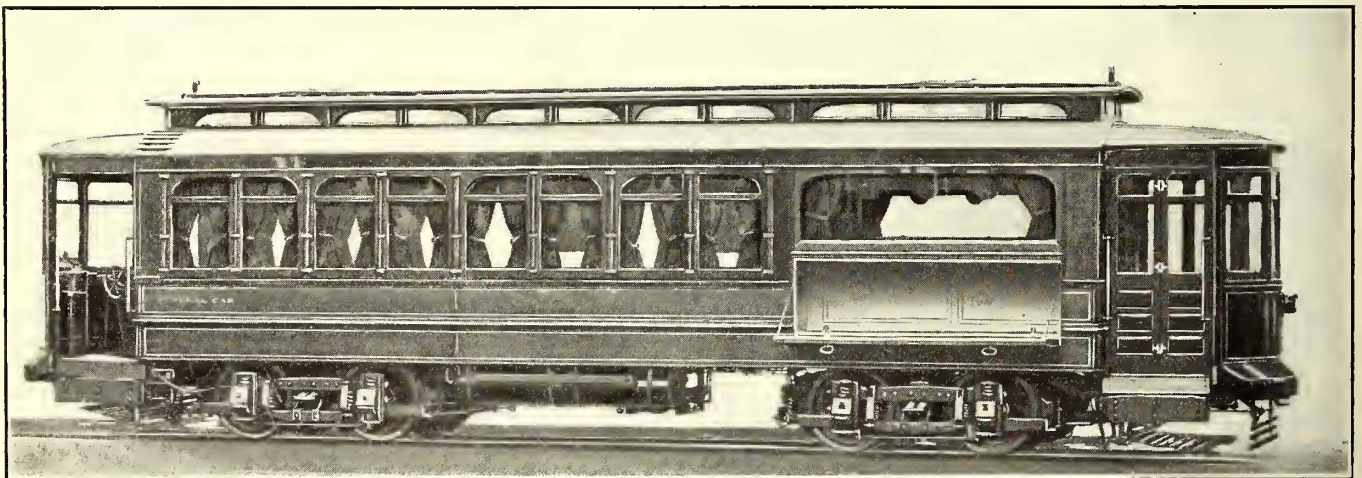
other side being occupied by a locker for the casket. The locker is provided with both an inside and outside door. The latter is made to hinge downward and is held in place horizontally by chains and hooks as shown in the view of the exterior. Rollers on the inside of this door and the locker floor are provided for the traveling carriage used in installing and

for double end operation. The platforms have folding steps and those on each platform are so inter-connected that one will close when the other is opened.

DETAILS OF UNDERBODY FRAMING

The car underframe is very substantial, both side sills consisting of 10-in., 15-lb. channels extending the full length of the car body. The side sill on the casket locker side is reinforced with a 10-in. 15-lb. steel channel, the full length of the locker door opening; the remaining part of this sill and the other side sill have a 3-in. x 2½-in. x 5/16-in. steel angle riveted on with the 3-in. leg flush with the bottom of the 10-in. channel. This 5/16-in. angle has a slot cut in between the posts for the escape of waste gathering in the sash pocket. The side sill opposite the casket compartment is reinforced at the center for a length of 12 ft. with 3-in. x 3-in. x ¾-in. steel angle riveted to the top flange of the 10-in. channel. The end sills are of 10-in. 15-lb. steel channels projecting 1¾ in. below the side sills and flanged toward the platform, lined on both sides with yellow pine and fastened to the side sills with malleable iron angles. The cross-framing is made of 6 in. 8 lb. steel channels fastened to the side sills with steel connection angles and filled with yellow pine nailing strips for fastening the floor. The underframe is diagonally braced at the center with a steel angle having the top leg flush with the bottom of the underframe. The trap door beams consist of T-irons extending from the under sill to the second floor beam inside of the bolster. The body bolster is of cast steel of I-beam section, the ends of which are gibbed down under the side sills and bolted to the same. The body bolster is machined where the surface comes in contact with the side sills and at the center plate and side bearings. This center plate is of cast steel and the side bearings are of 4-in. x 1-in. wrought-steel bars secured with countersunk bolts.

The platform side knees are 7½-in. x 3-in. x ¾-in. steel Z-bars. These knees are suspended from the end sills with 1-in bolts with connecting strip plates. The backs of the side knees run up inside of the side sills and are bolted and riveted to the same. The center platform knees are of white oak from the end sill to the bumper. The platform plates are of 2¼-in. white oak bolted to the knees which are cut out for



Funeral Car for Calumet & South Chicago Railway

removing the casket. The inside panel of the locker is removable so that it can be used as a reserve outlet for the casket through the 30-in. body end door and the extra large front window. The passenger compartment has 12 transverse seats and four stationary corner longitudinal seats. The cross seats are of the Hale & Kilburn "Walkover" type, upholstered in Spanish leather. The corner seats are finished in the same manner and are removable to permit access to sand boxes and conductors' lockers. The longitudinal seat in the pallbearers' compartment also is upholstered and finished in Spanish leather. Vestibules with double folding doors are provided

the plates. The platforms are laterally braced by beams running diagonally which are mortised and tenoned into the side knee floors and center knees. The bumpers are 7-in. 9¾-lb. steel channels.

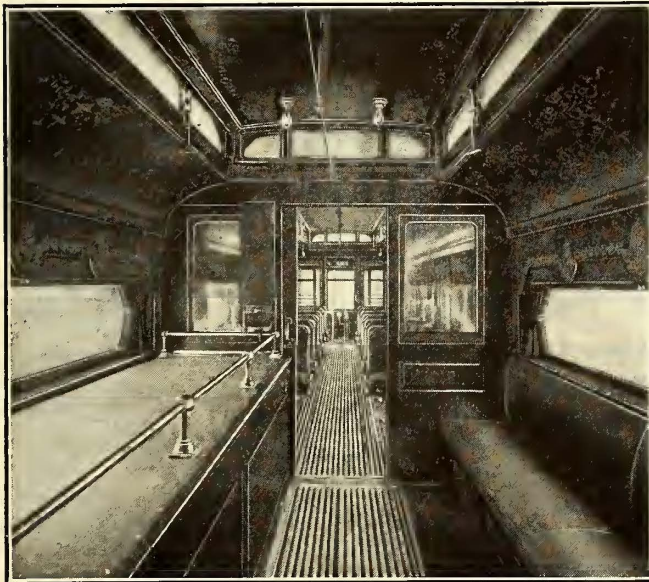
The through truss is composed of 2½-in. x ¾-in. iron bars inserted longitudinally on the inside of the body framing at a height of 28 in. from the bottom of the side sills, and anchored at the bolsters to posts which are reinforced with a 2-in. x 2-in. x ¼-in. steel angle and a 1¼-in. rod welded to the end of the truss bar and threaded and fastened to the side sill at the end sill with a special casting and nut. At the casket com-

partment end of the car this rod is fastened to the side sill between the partition and the next side posts.

DETAILS OF UPPER BODY FRAMING

The corner posts of the body framing are $3\frac{3}{4}$ in. \times $4\frac{1}{4}$ in. and the side posts are $2\frac{1}{4}$ in. \times $3\frac{3}{4}$ in. with a sweep of $1\frac{3}{4}$ in. A pier post made up of two pieces of $5\frac{1}{2}$ -in. width each is set at the partition between the two compartments. All of these posts are of white ash bolted to the side sill panels. The side plates extend the full length between the body ends and are fastened to the side posts with strap bolts and tie rods. The intermediate vertical body framing consists of ash ribs spaced about 10 in. center to center.

The outside panels are concave and convex $\frac{1}{2}$ -in. poplar clear



Compartment for Casket and Pallbearers

wood. The panel ribs are of ash spaced approximately 10 in. center to center. The wooden panels are covered with No. 12 sheet steel in three sections on each side, held in place by screws through a steel overlapping molding, white-leaded before being put in place.

The roof is supported on side posts with $1\frac{1}{2}$ -in. \times $3\frac{3}{8}$ -in. iron carlins extending from plate to plate. The ends of the iron carlins are turned and fastened at the top of the side posts by $\frac{1}{2}$ -in. rods which pass vertically through the latter. The wood carlins are spaced about 11 in. centers. The lower deck carlins are of ash. The roof board is of tongued and grooved white-wood covered with cotton duck laid in white lead. The roof frame was thoroughly painted with lead and oil before the roof covering and linings were put in place. Wire glass is used in the upper deck sash.

The bottom flooring consists of $2\frac{7}{8}$ -in. \times $3\frac{3}{4}$ -in. Georgia pine except where floor mats are laid in which places there is only one layer laid lengthwise. Where double floors are laid, the top layer is of edge grain with felt between the layers. The floor mats are of white maple strips screwed to the flooring the full width of the aisle and the entire length of the car.

The passenger compartment is furnished with four sets of half-elliptic window pairs on each side. The upper sash of each is stationary and the lower sash arranged to drop into a pocket. The pallbearers' compartment has a single plate glass stationary window on each side extending the full length of this division. The car windows are furnished with Pantasote curtains and Curtain Supply Company's Forsythe fixtures. The side windows and the inside end and partition windows are fitted with black draperies.

The inside finish of both compartments is of cherry and all sash and doors are also of cherry of a uniform color, stained mahogany and finished dull. The interior finish of the pier compartment is in white and gold. The upper deck is covered with $\frac{3}{16}$ -in. and the lower deck with $\frac{3}{4}$ -in. waterproof Aga-

sote board, which is painted so that it will match the interior finish of the car.

DETAILS OF EQUIPMENT

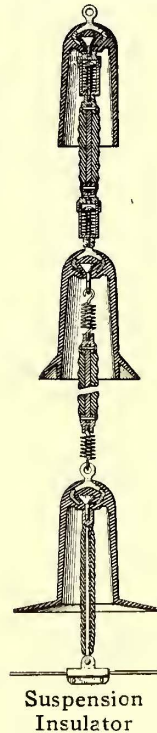
Iron pipe conduit and flexible steel conduit are used for the power and lighting circuits. The car is lighted with frosted incandescent globes mounted in the center of the upper deck, there being 10 lights in the passenger compartment, four in the pallbearers' compartment and one on each platform. The platform lights are connected with four others through a three-way idea so that only one platform is lighted at a time. Interchangeable arc headlights are used on these cars. The motor equipment consists of four G.E.-80 motors and two controllers. The cars are electrically heated. Other equipment specified for these cars included hand brakes, air brakes, Nichols-Lintern air sanders, H. B. wheel guards, and push buttons to be furnished by the Consolidated Car Heating Company.

GENERAL DIMENSIONS

The general dimensions of these cars are as follows:

- Length of car over bumpers, 43 ft. 1 in.
- Length of car over crown pieces, 42 ft. 1 in.
- Length of car over end sills, 31 ft. $11\frac{1}{2}$ in.
- Length of car over end panels, 32 ft. 1 in.
- Length of platform, 5 ft. 6 in.
- Width of car over side sill angles, 8 ft. $\frac{1}{2}$ in.
- Width of car over guard rails (over all), 8 ft. 6 in.
- Width of car over posts at belt rail, 8 ft. 4 in.
- Width of car over drip molds, 8 ft. 5 in.
- Height of car from rail to top of trolley board, 11 ft. 10 in.
- Distance between centers of side posts, 2 ft. 7 in.
- Distance between body bolsters c to c, 20 ft. 5 in.

HIGH-TENSION TRANSMISSION LINE INSULATION



The accompanying illustration shows a late development of the suspension type of insulator, for use with very high tensions, recently invented by Louis Steinberger of the Electro Manufacturing Company, Brooklyn. As with other suspension insulators the insulators are in series. Each insulator is of two parts. The upper part is of the so-called thimble type and the lower is of the rod type, the whole forming a chain which can be extended indefinitely. The thimble shape of the insulators protects thoroughly from the weather the upper parts of the rod insulators by which spring suspension is provided. This construction gives a resiliency so that the chain of insulators is relieved in all its parts as well as in its entirety from the results of sudden or abrupt strains usually so destructive to mechanism of this kind.

The various parts of the insulators may be detached and replaced by other parts and the total number of parts may be increased or diminished at will, after the original structure is built. This feature is specially important in instances where after the installation of a conductor the voltage is increased.

BULLETIN ON TECHNICAL BOOKS

The McGraw-Hill Book Company, New York, N. Y., has commenced the publication of a bulletin entitled "Engineering Book Notes," designed to keep book readers in touch with the latest and best books in all fields of engineering and science. The bulletin, which is for free distribution, contains notes and comments on recent engineering literature, and lists of technical books grouped under appropriate headings. The names of the books issued by the publisher last month are given on the cover of the first number of the magazine, which is that of April.

News of Electric Railways

Cleveland Traction Situation

At the regular meeting of the City Council of Cleveland on the evening of April 4, 1910, members protested against a delay in street railway legislation until the expiration of the trial period of eight months, and insisted upon action on ordinances to reroute cars, disregarding the advice of Mayor Baehr and Street Railway Commissioner Dahl. The latter had prepared a resolution providing that interurban cars should not be required to handle city passengers and fixing a rate of 5 cents on interurban cars within the city limits. Mr. Dahl said that it would probably not be legal for interurban railways to charge a fare of 5 cents. Mr. Dahl did not press his resolution on account of threatened opposition. Councilman Haserodt moved that his bill, which provided for the abolishment of the plan of turning cars at the Public Square and re-establishing through lines, be taken from the street railway committee, but the resolution was referred to the street railway committee. The resolution that the street railway commissioner file with the clerk of the Council the car-miles operated, the earnings per car-mile and the passenger earnings was also referred to the street railway committee.

At the meeting of the Council on the evening of April 11, 1910, Mr. Dahl presented the statement of the earnings of the Cleveland Railway for March. This statement is published on page 700 of this issue. At this meeting of the Council the members pledged themselves to an eight months' trial with the 3-cent fare, plus 1 cent for a transfer, although at the meeting on April 4, 1910, as stated above, there were evidences of early legislation.

The report that the earnings of the system for March would show a surplus has resulted in opposition to the clause in the grant that provides for the payment of 1 cent for transfers. The amount paid for transfers in March was \$35,554. Those who oppose the charge of 1 cent for a transfer say that it would be better to make the minimum fare 4 cents, with 1 cent extra for a transfer, the cent for the transfer to be refunded by the conductor who took up the transfer.

Mr. Dahl has suggested that illuminated markers should be used on the cars at night to designate the different lines. The officers of the Cleveland Railway have promised to consider this suggestion.

The question of fare from points within the original city limits to points north of Adams Avenue in Collinwood has been submitted to City Solicitor Baker by Mr. Dahl. The Tayler grant provides that two fares shall be paid, but does not specify what they shall be, and the company has been collecting two 5-cent fares. Mr. Dahl thinks that the ordinance contemplates that the charge for the ride within the city shall be 3 cents and the other 5 cents.

Mr. Dahl has refused to approve the purchase of the Puritan Springs line of the Cleveland, Southwestern & Columbus Railway for \$215,000, in order that the tracks on Lorain Street may be utilized, as required by the city ordinance. He has also refused to consider the purchase of the tracks on Lorain Street alone at \$86,000, until Engineer Ross has estimated their value.

Developments in Storage Battery Application

Taliaferro Milton, district engineer in Chicago of the Electric Storage Battery Company, addressed the Chicago Electric Club on April 6, 1910, on the application of storage batteries for the regulation of alternating-current loads. So far as railway work was concerned, Mr. Milton said that the reasons for installing batteries were chiefly to control the fluctuation of the load so as to reduce wear on the generating apparatus and save fuel by improving the load factor. Until very recently no system of battery regulation according to the alternating current demand was successful. After 10 years of experimental work, however, several plants have been installed with the battery charge and discharge so controlled as to smooth the alternating current demand. One of the first plants of this type was installed in the generating

plant of the East St. Louis & Suburban Railway, which furnished current for lighting, power and direct-current railway service. This battery was connected across the brushes of rotary converters and the field of the series booster was supplied indirectly with current through transformers connected in the alternating current mains. Thus, when any load came upon the alternating current mains and the voltage tended to fall, the potential of the battery, in combination with the booster, was raised automatically and the battery drove the rotary as an inverted machine fed current into the alternating current mains, thus lessening the demand on the generators.

Another battery plant which had given excellent service in smoothing the alternating current demand curve was that of the Spokane & Inland Railroad, at Spokane, Wash. This company's Inland division is operated by single-phase current. Formerly power was purchased from the Washington Water Power Company at Spokane, and the battery and regulating devices were installed to cut down the power bill, a penalty being charged for maximum demands. Three-phase current was received from the Washington Water Power Company and used to drive each of three similar three-unit sets. Each set consists of an induction motor, a single-phase generator and a direct current railway generator mounted on one shaft. The induction motor receives current from the supply line; the single-phase motor generates current which is distributed at high voltage to step-down transformer stations feeding the trolley lines; the direct current machine acts either as a generator or a motor to charge the battery or run the single-phase generator, according to the load demand on the railway distribution line. A "watt-solenoid" controls the booster field and varies the charge and discharge of the battery so that the demand on the generating company's lines is kept practically constant. Mr. Milton quoted the officers of the road as having said that this battery had paid for itself in two or three years. A little more than a year ago the Spokane & Inland Empire Railroad completed a 60-cycle generating station of its own. This plant now supplies the single-phase railway system and the battery regulating installation was still used to relieve the water-power plant of the comparatively severe railway peaks. Mr. Milton stated that these successfully operated batteries were sure to be followed by similar installations, because the system of alternating current regulation had shown itself to be successful from a technical standpoint, and is economical.

Transit Affairs in New York

The Brooklyn Union Elevated Railway, a subsidiary of the Brooklyn Rapid Transit Company, has applied to the Public Service Commission for a franchise to run its elevated lines across the Williamsburg Bridge and through the Manhattan end of the so-called bridge loop subway to the Brooklyn Bridge. The application says that the direct effect of this operation would be:

First—To bring traffic crossing both the Williamsburg and Brooklyn Bridges to the one point in Manhattan—at or near City Hall.

Second—To increase the number of cars per hour for the present traffic and give better time on account of the freer movement of trains.

Third—The operation of Myrtle Avenue trains from Metropolitan Avenue and Ridgewood without change of cars by making a physical connection between the Broadway and Myrtle Avenue lines.

Fourth—Relieve the congestion on the Brooklyn Bridge and all connections leading thereto on tracks that are now greatly congested by diverting trains over the Williamsburg Bridge.

The Manhattan part of the Brooklyn loop subway was laid out by the old Rapid Transit Commission and contracts for its construction were let by that commission. It was designed to connect the three bridges over the East River, namely, the Williamsburg Bridge, the Manhattan Bridge

and the Brooklyn Bridge. The Brooklyn part of the loop subway, better known as the Broadway-Lafayette Avenue route, has not yet been built, but it is among the new subways which the Public Service Commission will soon submit to bidders. The Manhattan part of the loop has cost about \$10,000,000 and is nearing completion.

Resolutions setting aside \$60,000,000 for the construction of subways were adopted by the Board of Estimate and Apportionment of New York on April 8, 1910.

The Public Service Commission is preparing a bill for presentation to the Legislature which will authorize the commission in its negotiations to order a change of grade of any existing railroad as well as the grade of any existing street. Under the present railroad law the commission has the power to decree that a street or highway shall be raised or lowered when a grade crossing is eliminated, but it has no right to say that the grade of the railroad shall be altered so as to make it pass under or over the thoroughfare.

Hearing on Boston & Eastern Tunnel

The committee of the Legislature of Massachusetts on metropolitan affairs gave a hearing recently on the bill to provide for the construction of a tunnel under Boston Harbor by the Boston & Eastern Electric Railroad. Counsel for the company argued that the public necessity of the enterprise had already been determined by the Railroad Commission, and that the final step before construction was the building of a tunnel from East Boston to Postoffice Square. J. H. Bickford, chief engineer of the company, stated that the road would not interfere with any improvement planned for Boston by the joint commission on transportation matters.

W. H. Coolidge, for the Boston & Maine Railroad, said that the companies opposed to the construction of the Boston & Eastern Electric Railroad had never admitted the need of its construction. There was not enough suburban traffic in the territory to support the project, which would cost \$11,000,000. The policy of the State was against destructive competition. Assistant Corporation Counsel Spring, of Boston, said that the construction of a new tunnel under the harbor might interfere with the profitable leasing of the East Boston tunnel later. The Boston Elevated Railway desired to have the Boston & Eastern Electric Railroad terminate on its system, where it could handle all the traffic in and out of Boston.

New Road Opened in California.—The Modesto (Cal.) Interurban Railway has been placed in operation between Modesto and Oakdale.

Central Electric Traffic Association.—The Central Electric Traffic Association will meet at Lima, Ohio, on April 16, 1910. The association will take up the subjects of a joint tariff on milk and cream, which was put over for further consideration at the meeting of the association in Indianapolis, and a merchants' dispatch freight tariff.

Bridge Company Has Condemnation Rights.—According to a recent decision by the Circuit Court in St. Louis, the St. Louis Electric Bridge Company, which is building the McKinley bridge across the Mississippi River at St. Louis, has the right to condemn a right of way for the west approach over tracks of railroads.

Central Electric Railway Association.—The hotel committee of the Central Electric Railway Association has arranged to hold the meeting of the association on May 26, 1910, at the Boody House, Toledo, Ohio, which will reduce rates for the meeting and arrange for exhibits by manufacturers who are members of the association.

Milwaukee 1200-Volt Lines.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has re-equipped its interurban divisions formerly operated with alternating current to operate with 1200-volt direct current. The change on the interurban line from Waukesha Beach to Oconomowoc and Watertown to 1200-volt service was made on March 16, 1910. The lines from St. Martin's to East Troy and to Burlington began operating at 1200 volts on April 5. The new equipment is reported to be working satisfactorily.

Iowa Street & Interurban Railway Association.—L. D. Mathes, Dubuque, Ia., secretary and treasurer of the Iowa Street & Interurban Railway Association, announces that the attendance at the annual convention of the association, which is to be held in Sioux City on April 21, 22 and 23, 1910, promises to exceed that of previous years. The programme, as previously announced, includes a paper on "City Railway Track," by J. G. Huntoon, Davenport, Ia. Mr. Mathes states that his paper has been written and will be presented by W. A. Heindle, superintendent of construction of the Tri-City Railway, Davenport, Ia.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—Hearings have been closed upon the bills to permit the New York, New Haven & Hartford Railroad to acquire electric railways in the Berkshire district. Bentley W. Warren, in concluding, emphasized that the railroad acquired its street railway holdings in the State in good faith, and that it disposed of them in the same spirit when the courts decreed that the laws prohibited such control. The entire Berkshire district was in accord with the proposed development, and the company was prepared to expend \$2,000,000 if the Legislature would permit it to use the electric railways as feeders. The committee on street railways has continued the hearings upon the so-called Boston Elevated holding bill. F. E. Snow, counsel of the Boston Elevated Railway, stated that the company would not object to the insertion of a clause providing that the combined bond issue should not exceed the combined capital of the separate companies. Bentley W. Warren, on behalf of the Massachusetts Electric Companies, asked that that organization be permitted to purchase the securities of the Boston Elevated Railway. Hearings have been closed upon the proposed tunnel of the Boston & Eastern Electric Railroad under Boston harbor. If the bill passes the question of exigency will probably be reopened before the Railroad Commission. The bill to permit railroads to operate their lines by electricity or other power has been passed to be enacted. The bill permitting the purchase of foreign street railways by companies within the State has been given a first reading in the Senate, after having passed the House. The committee on metropolitan affairs has introduced a bill to exempt the transit bonds of Boston from the provisions of law relative to loans by that city. The Senate has accepted the adverse report of the committee on street railways upon the Hennebery bill to provide for the transportation of freight and express by street railways.

Maryland.—The session of the Legislature which was convened on Jan. 5, 1910, was adjourned on April 4, 1910. The most important work was the passage of the public utilities bill recommended by Governor Crowthers and drawn under the direction of Attorney-General Straus. As noted in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, the bill was passed by the House during the week ended April 2 by a vote of 95 to 3. On April 4 the bill was passed by the Senate by a vote of 25 to 2. The Governor signed the measure the following day. The commission created under the act is to consist of three members whose terms of service are to be 6 years. The first appointees will be chosen for 2, 4 and 6 years, however. The chairman of the commission will receive a salary of \$6,000 per year and each of the other commissioners \$5,000. The total expenses of the commission in a year are not to exceed \$75,000. Of this sum approximately \$30,000 is needed for salaries. The members of the commission are to be appointed not later than April 22. A digest of the principal provisions of the measure is published on page 710 of this issue.

New Jersey.—The Legislature adjourned on April 7. The most important work of the session was the enactment of the public utility law, the text of which was published in the ELECTRIC RAILWAY JOURNAL of April 2, 1910, page 626. One of the measures passed permits the Pennsylvania Railroad to lease the Pennsylvania Tunnel & Terminal Railroad, which has erected the New York terminal for the Pennsylvania Railroad. The Lee bill was defeated in the Senate. This measure was designed to permit electric railways to construct a half a mile of connecting railroad in cities without the consent of the Councils or property owners.

Financial and Corporate

New York Stock and Money Market

April 12, 1910.

With the exception of the activity and buying which occurred yesterday after the announcement that the Supreme Court had ordered rehearings in the two important Sherman law test cases, the market for the past week has been lifeless and prices have sagged. The rise of yesterday was lost to-day, however, and the market is little improved.

The financial market has not been seriously affected by the shipments of gold. Rates are still easy enough to encourage speculation if there was any disposition by the public or the professionals to go into the market. Rates to-day were: Call, 2 $\frac{3}{4}$ to 3 $\frac{1}{2}$ per cent; 90 days, 4 $\frac{1}{4}$ to 4 $\frac{1}{2}$ per cent.

Other Markets

There is no longer any serious pressure to sell Philadelphia Rapid Transit and Union Traction. Despite this, prices have not advanced.

In the Boston market, it is the same old story. There has been fair trading in the issues of Massachusetts Electric and Boston Elevated, but prices have declined fractionally during the week.

In the Chicago market there has been very little trading in traction shares. Series 1 and 2 of the Chicago Railways have appeared in small lots. Prices are somewhat lower.

In addition to the regular trading in the bonds of the United Railways, the Baltimore market has handled during the past week some small blocks of the stock of the same company. The prevailing price is about 13 $\frac{1}{2}$.

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

	April 5.	April 12.
American Railways Company.....	a45 $\frac{1}{4}$	a45 $\frac{1}{4}$
Aurora, Elgin & Chicago Railroad (common).....	*57 $\frac{3}{4}$	*57 $\frac{3}{4}$
Aurora, Elgin & Chicago Railroad (preferred).....	*94 $\frac{1}{4}$	*94 $\frac{1}{4}$
Boston Elevated Railway.....	126	a126
Boston & Suburban Electric Companies.....	a16	a16
Boston & Suburban Electric Companies (preferred).....	a76	a75
Boston & Worcester Electric Companies (common).....	a10 $\frac{1}{2}$	a10 $\frac{1}{2}$
Boston & Worcester Electric Companies (preferred).....	a46	a46
Brooklyn Rapid Transit Company.....	77 $\frac{1}{4}$	78 $\frac{3}{8}$
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	84 $\frac{1}{4}$	*84 $\frac{1}{4}$
Capital Traction Company, Washington.....	a133	*133
Chicago City Railway.....	*185	*195
Chicago & Oak Park Elevated Railroad (common).....	*3 $\frac{1}{2}$	*3 $\frac{1}{2}$
Chicago & Oak Park Elevated Railroad (preferred).....	*7 $\frac{1}{2}$	*7 $\frac{1}{2}$
Chicago Railways, ptcptg., ctf. 1.....	*106	a100
Chicago Railways, ptcptg., ctf. 2.....	*33	a32
Chicago Railways, ptcptg., ctf. 3.....	*16	a18
Chicago Railways, ptcptg., ctf. 4s.....	*9	a8
Cleveland Railways.....	*91 $\frac{1}{2}$	*91 $\frac{1}{2}$
Consolidated Traction of New Jersey.....	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds.....	a104 $\frac{1}{2}$	a104 $\frac{1}{2}$
Detroit United Railway.....	63	*64
General Electric Company.....	150 $\frac{1}{2}$	152
Georgia Railway & Electric Company (common).....	110	a110
Georgia Railway & Electric Company (preferred).....	a87	a87
Interborough-Metropolitan Company (common).....	27 $\frac{7}{8}$	22 $\frac{1}{4}$
Interborough-Metropolitan Company (preferred).....	58 $\frac{3}{8}$	*57 $\frac{1}{4}$
Interborough-Metropolitan Company (4 $\frac{1}{2}$ s).....	81	*81
Kansas City Railway & Light Company (common).....	*28	a31
Kansas City Railway & Light Company (preferred).....	*78	a77 $\frac{3}{8}$
Manhattan Railway.....	136 $\frac{1}{2}$	134
Massachusetts Electric Companies (common).....	a18	17 $\frac{1}{4}$
Massachusetts Electric Companies (preferred).....	a85 $\frac{1}{2}$	a88
Metropolitan West Side, Chicago (common).....	*16 $\frac{1}{2}$	a17
Metropolitan West Side, Chicago (preferred).....	*51 $\frac{1}{4}$	a54
Metropolitan Street Railway.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	*76 $\frac{1}{2}$	77 $\frac{1}{2}$
Northwestern Elevated Railroad (common).....	*15	a17 $\frac{1}{2}$
Northwestern Elevated Railroad (preferred).....	*68	a50
Philadelphia Company, Pittsburg (common).....	a50 $\frac{1}{2}$	a50 $\frac{3}{4}$
Philadelphia Company, Pittsburg (preferred).....	a43	a44 $\frac{1}{2}$
Philadelphia Rapid Transit Company.....	a22 $\frac{3}{8}$	a21
Philadelphia Traction Company.....	a87 $\frac{1}{4}$	a87
Public Service Corporation, 5 per cent col. notes.....	*100 $\frac{1}{2}$	a96 $\frac{1}{2}$
Public Service Corporation, ctf. 5.....	a104 $\frac{1}{2}$	a104 $\frac{1}{2}$
Seattle Electric Company (common).....	a114 $\frac{1}{2}$	a113 $\frac{1}{2}$
Seattle Electric Company (preferred).....	103	103 $\frac{1}{4}$
South Side Elevated Railroad (Chicago).....	*52 $\frac{1}{2}$	a53
Third Avenue Railroad, New York.....	74	8
Toledo Railways & Light Company.....	10 $\frac{1}{4}$	10 $\frac{1}{4}$
Twin City Rapid Transit, Minneapolis (common).....	*115 $\frac{1}{4}$	*115 $\frac{1}{4}$
Union Traction Company, Philadelphia.....	a49 $\frac{7}{8}$	a49 $\frac{3}{4}$
United Rys. & Electric Company, Baltimore.....	13	a13 $\frac{3}{4}$
United Rys. Inv. Co. (common).....	*37	37
United Rys. Inv. Co. (preferred).....	*67	*67
Washington Ry. & Electric Company (common).....	a39	a38 $\frac{3}{8}$
Washington Ry. & Electric Company (preferred).....	a91 $\frac{1}{4}$	*91 $\frac{1}{4}$
West End Street Railway, Boston (common).....	a89 $\frac{1}{2}$	88 $\frac{1}{4}$
West End Street Railway, Boston (preferred).....	83	*83
Westinghouse Elec. & Mfg. Company.....	66 $\frac{1}{2}$	66 $\frac{3}{4}$
Westinghouse Elec. & Mfg. Company (1st pref.).....	*125	*125

a Asked.

* Last Sale.

Report of Chicago Railways for Year

The comparative income statement of the Chicago (Ill.) Railways for the years ended Jan. 31, 1910, and Jan. 31, 1909, follows:

Income.	Year ending Jan. 31, 1910.	Year ending Jan. 31, 1909.
Passengers.....	\$12,155,017	\$10,773,914
Chartered cars.....	4,728	4,619
Mail.....	35,556	31,813
Advertising.....	63,000	44,333
Rent of land and buildings.....	13,262	14,633
Rent of equipment.....	27,182	33,974
Sale of power.....	19,922	17,925
Interest on deposits.....	37,040	41,711
Miscellaneous income.....	87,175	74,149
Gross.....	\$12,442,882	\$11,037,071
Expense.		
Maintenance, way and structures.....	546,507	544,763
Maintenance equipment.....	762,862	844,712
Renewals.....	*37,639	171,201
Operation power plants.....	1,326,919	1,000,149
Operation cars.....	4,042,786	3,618,694
General expenses.....	1,393,538	1,119,639
Expense acct. invest. real. est.....	62,868	54,837
Taxes (estimated).....	612,177	371,955
Total.....	\$8,710,017	\$7,725,950
Balance (actual).....	\$3,752,864	\$3,311,121
Balance (based on 70 per cent for operation).....	3,732,864	3,311,121
Deduct interest of 5 per cent on valuation.....	2,275,718	1,739,684
Net income.....	\$1,457,146	\$1,571,437
City of Chicago 55 per cent.....	801,439	864,290
Chicago Railways 45 per cent.....	655,716	707,147

*Credit

Chicago (Ill.) Railways.—The report of the Chicago Railways for January, 1910, compared as follows with the report of the company for January, 1909: Gross receipts for January, 1910, \$1,020,614, as compared with \$945,856 for January, 1909; operating expenses for January, 1910, \$776,805, as compared with \$549,694 for January, 1909; earnings from operation for January, 1910, \$243,808, as compared with \$396,162 for January, 1909; net income for January, 1910, \$91,742, as compared with \$123,366 for 1909; City of Chicago (55 per cent), for January, 1910, \$50,458, as compared with \$67,851 for January, 1909; company (45 per cent), for January, 1910, \$41,284, as compared with \$55,515 for January, 1909.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—Charles L. Henry, receiver of the Indianapolis & Cincinnati Traction Company, who was instructed to file with the court not later than April 15, 1910, a written report on the progress made toward reorganizing the company, has informed the court that there is a movement among certificate holders to organize a new company. Receiver's certificates for \$1,000,000 have been issued, and the people who control certificates representing about one-half of this amount have stated that they were in accord with the movement to reorganize the company. It is proposed now to organize a new company, cancel the outstanding bonds by issuing preferred stock for them and issue new bonds to take the place of the outstanding receiver's certificates. Mr. Henry stated that the plan could be worked out by July 1, 1910.

Janesville (Wis.) Street Railway.—A judgment of foreclosure and sale of the property of the Janesville Street Railway was entered on April 5, 1910. As announced in the ELECTRIC RAILWAY JOURNAL of March 19, 1910, page 508, W. H. Lemons and William Murphy were recently appointed receivers of the company.

Kansas City Railway & Light Company, Kansas City, Mo.—The Kansas City Railway & Light Company announced on April 9, 1910, through R. J. Dunham, chairman of the board of directors of the company, that in order to provide for the payment of the consolidated mortgage 5 per cent gold bonds of the Metropolitan Street Railway, maturing on May 1, 1910, arrangements have been made to issue new 5 per cent coupon bonds maturing on May 1, 1913. Holders of the bonds which mature on May 1 who wish to exchange them for the new bonds which mature May 1, 1913, must deposit their bonds at the office of Lee, Higginson & Company, Boston, New York or Chicago, or at the office of J. P. Morgan & Company, New York, on or before April 16, 1910. A cash payment of \$20 for each \$1,000 bond so deposited will be made, and coupons due May 1, 1910, if presented, will be cashed at the same time and place. Bonds

not so exchanged will be paid in full on or after May 1, 1910, upon delivery to the Old Colony Trust Company, Boston, Mass.

Louisville (Ky.) Railway.—A syndicate of the Louisville banks and trust companies has purchased \$1,500,000 of the Louisville Railway's new 5 per cent 40-year bonds at a price said to have been between 98 and 99, and will offer them for public subscription. These bonds are part of an issue of \$20,000,000 of 5 per cent 40-year bonds recently authorized, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 12, 1910, page 295. It is stated that they are all of the issue that are to be sold this year, \$8,000,000 being reserved to retire \$6,000,000 of first mortgage 5 per cent bonds and \$2,000,000 of second mortgage 4½ per cent bonds of the company. The proceeds of the \$1,000,000 of bonds which have just been sold will be used to pay for the Louisville & Southern Railway and to complete the construction of the road to Shelbyville, a distance of 24 miles.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has issued an order directing the receivers of the Metropolitan Street Railway to spend \$510,000 on the Eighth Avenue Railway for the purpose of rehabilitating that property. The formal decree of the United States Circuit Court, based on the mandate of the Circuit Court of Appeals, directing the sale under foreclosure proceedings of the Metropolitan Street Railway because of the default in payment of principal and interest on mortgage bonds held by the Guaranty Trust Company, amounting to \$13,589,270, was filed on April 7, 1910. The decree of the court directs that this sum, together with interest at 6 per cent from March, 1909, be paid into court by the receiver before April 27, 1910. If this order is not complied with, William L. Turner, who is appointed special master, is directed to sell at public auction, at a time to be fixed by him, all the property, estate, rights, franchises, contracts and effects of the Metropolitan Street Railway and all the leased roads in its possession. The proceeds of the sale, after payment of the costs and master's charges, are to be used for the payment of receivership certificates amounting to \$3,500,000, the principal and interest on bonds, and taxes due the city and the Federal Government. Each bidder is required to deposit \$100,000 in cash before the sale.

Milford & Uxbridge Street Railway, Milford, Mass.—The Railroad Commission of Massachusetts has authorized the Milford & Uxbridge Street Railway to issue \$88,000 of new stock to pay floating debt.

Philadelphia (Pa.) Rapid Transit Company.—In order to meet recent extraordinary expenses and to provide capital for improvements and the construction of extensions, the Philadelphia Rapid Transit Company has applied to the City Council of Philadelphia for permission: 1. To sanction a new loan, not to exceed \$2,500,000, to be secured by pledge of such property as the company has available and to run not longer than the city contract of July 1, 1907. 2. To authorize the use of car trust securities whenever in the future new equipment may be required for the purchase of the same to the extent of not more than 85 per cent of the value of the same. (The company is in need of new rolling stock, costing approximately \$500,000, for its elevated system.) 3. To make possible the sale of the final \$600,000 of the \$5,000,000 5 per cent collateral bonds of 1908 by authorizing an amendment to the lease of the Lehigh Avenue Railway so that the stock of that company "would carry a rental of 6 per cent upon par guaranteed by the Union Traction Company and the Philadelphia Rapid Transit Company," and so be available as collateral for the 1908 loan, as it is not at present. 4. To authorize the sale of the remaining \$635,000 of the \$1,500,000 bonds of the Darby, Media & Chester Street Railway guaranteed by the Philadelphia Rapid Transit Company, but only to cover actual outlays for the betterment or extension of the property of that company. At present about \$50,000 has been expended thereon, and \$50,000 more is needed.

Toledo & Indiana Traction Company, Toledo, Ohio.—The Toledo & Indiana Traction Company has made a mortgage to secure a temporary loan of \$400,000 with which to pay off the minority bondholders of the Toledo & Indiana Railway, which it has succeeded. Plans are now being made for the reorganization of the company.

Traffic and Transportation

New Wage Agreement in Connecticut

After several conferences with a committee of its employees the Connecticut Company, New Haven, Conn., has established a new wage scale, which modifies and unifies the working conditions on its various divisions. The new scale follows the old scale in beginning at the minimum rate and working up to the maximum at the end of five years, but instead of three scales there are now only two, as Middletown and Torrington have been promoted from third class to second class and Bridgeport and Waterbury from second class to first class. The new working conditions are substantially the same as those heretofore in effect on the New Haven division. The new scale of wages went into effect on April 9, 1910, and for purposes of comparison the old scale and the new scale follow:

	OLD SCALE					
	First year.	Second year.	Third year.	Fourth year.	Fifth year.	Sixth year and thereafter.
New Haven and Hartford New London, Stamford, New York & Stamford, Meriden, Bridgeport, Waterbury, Derby, New Britain, Norwalk and Putnam Divisions.	21	21½	22	23	24	25
Middletown and Torrington Divisions	20	21	22	22½	23	24
	19	19½	20	21	22	23
	NEW SCALE					
	First year.	Second year.	Third year.	Fourth year.	Fifth year.	Sixth year and thereafter.
New Haven, Hartford, Bridgeport, Waterbury, Meriden, New London, Stamford, Derby, New Britain, Norwalk, Middletown, Torrington, New York & Stamford	21½	22	22½	23½	24½	26
	20½	21½	22½	23	23½	25

The principal clauses of the agreement follow:

"Five cents per hour above employee's regular rate will be paid for overtime, snow plow and sweeper work.

"An extra man assigned to other than a regular run will be paid overtime after having worked 10 hours.

"Any regular man ordered to report on the second half of his run later than his regular time will be allowed time from the time called for on his regular run, but overtime will not begin until the time called for by his regular run has been worked.

"When a regular man who has finished his run is ordered to report for extra work he will receive at least one hour's time.

"Any man taken from his regular run for extra service and who reports for same but does not make the time his regular run calls for, shall be paid for the time of his regular run. Any man taken from a regular run for extra service, and who reports for same, shall receive overtime after working the number of hours called for on his regular run.

"Any motorman or conductor suspended for any cause, who upon investigation, is proved not guilty of the charges preferred, shall be reinstated to his former position and paid for all lost time.

"All motormen and conductors will be allotted passenger car runs according to seniority of continuous service, and the bidding-in system shall prevail, the superintendent reserving the right to change allotments, giving next best runs practicable, if necessary for the good of the service.

"A motorman or conductor desiring to see his record as kept in the office of the superintendent will be allowed to do so upon application. The record above referred to covers discipline for misses, accidents and general infraction of the rules.

"Upon reasonable notice the company will, at all times, treat with its employees or properly accredited representatives from among their number."

Letter from F. W. Coen, Lake Shore Electric Railway, on Interstate Commerce Bill

The committee on Interstate and Foreign Commerce has made public a number of letters received by the committee on the subject of joint rates and through routes in connection with the bill now before Congress to amend the powers

of the Interstate Commerce Commission. One is from F. W. Coen, vice-president and general manager of the Lake Shore Electric Company. Under date of March 30, 1910, Mr. Coen urged strongly the amendment of the bill so that the commission will have authority to order through routes and tickets between steam and interurban roads. He says that there is a great many points on the Lake Shore Electric Railway where trains interchange traffic between that company and the steam railroads which the electric line crosses. For instance, at Munroville, where the line crosses the Baltimore & Ohio Railroad, the steam trains stop in front of the interurban station instead of the steam railroad station, but any passengers who desires to use both roads must buy two tickets and have his baggage checked twice on account of the present agreement between steam railroads. Mr. Coen continues: "The Lake Shore Electric comprises about 215 miles and for the year ending June 30, 1908, carried approximately 6,000,000 passengers. The Wheeling & Lake Erie, which comprises about 500 miles (almost entirely within the State of Ohio), handled during the same period, approximately, 1,090,000 passengers. All of these 1,090,000 passengers had the opportunity of buying through tickets, having their baggage checked through to point of destination, while on our system of less than one-half the mileage and handling six times as many, passengers were not accorded this privilege. It is a remedy to cover this discrimination which I seek. I trust you will appreciate the situation and will lend your influence to have the bill amended so that the commission may, in its judgment, order through rates and routes between steam and interurban railroads."

Six-For-a-Quarter Tickets Withdrawn in Des Moines

The Des Moines (Ia.) City Railway issued the following notice on April 1, 1910, regarding the withdrawal of six-for-a-quarter tickets:

"From time to time everything except fares in connection with street railway transportation has advanced. In the face of this advance the company has tried to give satisfactory service and reduce fares, but finds itself unable to do so.

"In the last 10 years the cost of everything which the company buys, including rails, ties, poles, coal, copper, lumber, machinery, cars, and other equipment, and the wages of employees have increased from 33 $\frac{1}{3}$ per cent to 125 per cent, and during the same period the length of a ride for a single fare has increased 180 per cent; but the price that the company receives for transportation which it sells has remained the same.

"All these items add thousands of dollars to its expense account, and finally compelled the company to admit its inability to sell six tickets longer for a quarter; and it therefore discontinues the same from this date."

Full Fare for Dogs on Illinois Traction System.—In order to discourage the practice of carrying dogs on its cars the Illinois Traction System, Peoria, Ill., has established a rule that passengers must pay regular fare for dogs, and that the animals must not be permitted in any way to annoy passengers.

Complain About Fare Between Dunkirk and Fredonia.—On April 15, 1910, the Public Service Commission of the Second District of New York was to hear at Buffalo the complain of the residents of Dunkirk and Fredonia against the Buffalo & Lake Erie Traction Company regarding the rate of fare between Dunkirk and Fredonia.

Increase in Wages in Columbus, Ohio.—The Columbus Railway & Light Company, Columbus, Ohio, on April 7, 1910, granted its employees an increase in wages to 24 cents an hour, with an addition of one-half cent an hour from Jan. 1, 1911. The company has agreed to reinstate the men who were discharged recently for their activity in union affairs while on duty, but has not recognized the union.

Northampton Street Railway Asks for Fare Readjustment.—The Northampton (Mass.) Street Railway, through its president, Henry M. Tyler, has petitioned the Massachusetts Railroad Commission to discontinue the sale of reduced rate tickets between Northampton and Williams-

burg and Northampton and Haydenville; to establish certain new fare limits and certain ticket book sales on the 6-cent basis, enumerated in detail in the petition.

Veterans in Brooklyn.—The Brooklyn Rapid Transit Company has sent to each of its directors a group photograph of 21 veterans of the company which has been mounted and framed and a pamphlet entitled "The Old Guard of the B. R. T.," which contains a reprint of an article from the Brooklyn *Daily Eagle* of Feb. 27, 1910, in which an extended account was given of the services performed by these men during their connection with the company.

Proposal to Limit Number of Passengers to a Car in Norfolk.—It has been proposed in revising the City Code of Norfolk, Va., to include the following regulation for street cars: "Cars shall stop at every street crossing, when necessary to accommodate the public, unless all the seats are occupied, in which case the motorman may display a sign 'Limit' and pass on without violation of law, it being understood that unless a seat is provided a passenger shall not be obliged to pay fare."

Increase in Wages in Rhode Island.—The Rhode Island Company, Providence, R. I., has increased the wages of its employees, effective from April 9, 1910. The lines of the company are divided into two divisions. A comparison of the old and new hourly scales of wages for both divisions follows: Exclusive of the Woonsocket division—First year, from 20 cents to 21 $\frac{1}{2}$ cents; second year, from 21 cents to 22 cents; third year, from 22 cents to 22 $\frac{1}{2}$ cents; fourth year, from 23 cents to 23 $\frac{1}{2}$ cents; fifth year, from 24 cents to 24 $\frac{1}{2}$ cents; after fifth year, from 25 cents to 26 cents. Woonsocket division—First year, 20 cents to 21 $\frac{1}{2}$ cents; second year, 20 cents to 22 cents; third year, 20 cents to 22 $\frac{1}{2}$ cents; fourth year, 22 $\frac{1}{2}$ cents to 23 $\frac{1}{2}$ cents; fifth year, 22 $\frac{1}{2}$ cents to 24 $\frac{1}{2}$ cents; sixth year, 22 $\frac{1}{2}$ cents to 26 cents.

Pay-as-You-Enter Cars on Sea Shore Line.—The Public Service Commission of the First District of New York has approved plans submitted by the Ocean Electric Railway for the conversion of 10 open cars into cars of the pay-as-you-enter type. This company is a subsidiary of the Long Island Railroad, and operates about four miles of road from Hammel to Belle Harbor and Far Rockaway. It carried more than 2,000,000 passengers during 1908. The cars which it is proposed to convert are the familiar summer type, with benches extending across the car and entrance to each bench from a running-board at the side. It is proposed to close the sides of the cars with metal gratings and to cut an aisle through the center of the car from end to end and rearrange the platforms to conform to the pay-as-you-enter type. The cost of the improvement will be from \$400 to \$500 per car.

Summer Schedules of Inland Empire System.—Waldo G. Paine, traffic manager of the Spokane & Inland Empire Railroad, has announced that the summer rates of that road will be effective from May 13 to Sept. 26, inclusive. The summer schedules provide special round-trip rates on Sundays and for week-end trips. These include the fares to the several lake resorts and the combination route over the Coeur d'Alene division and the steamer lines of the Red Collar and the Perry-Lyon Navigation companies, which operate on the St. Joe River and serve the Coeur d'Alene mining district. Twenty-five-ride family commutation tickets, good for purchaser and members of his family, will be sold between Spokane and Coeur d'Alene or Hayden Lake, Idaho, at rates of \$16.20 and \$21.20, respectively. Special rates also are announced for round-trip parties, the fare per passenger being graded according to the total number of passengers in the party.

No-Seat-No-Fare Ordinance.—The City Council of Trenton, N. J., has passed the following ordinance: "It shall be the duty of all corporations operating a line or lines of street railways within the city limits, between the hours of 6 and 9 in the morning, and 5 and 7 in the evening of each day, to furnish and run a sufficient number of cars to provide a seat for each passenger from whom a fare is demanded. Section 2.—That persons desiring transportation thereon shall not be kept waiting longer than ten (10) minutes. Section 3.—Any corporation violating the foregoing provision shall forfeit and pay a penalty of \$50 for each offense." The Council has also passed an ordinance

which provides that the city engineer shall inspect at least once every three months, the roadbed, tracks and overhead equipment of electric railways operating in Trenton, and report any defects to the chief of police, who shall notify the company to remedy the defects within 30 days. A fine of \$10 is imposed for each day during which these defects shall be unremedied, the penalty beginning with the day following the expiration of the 30 days' notice.

Accident Fakir Convicted in Baltimore.—The United Railways & Electric Company, Baltimore, Md., has secured the conviction of George Custerd, or Czyzewski, in the Criminal Court of Baltimore, upon a charge of attempting to defraud the company by a fraudulent accident claim. Custerd filed a claim with the company on Feb. 28, 1910, for injuries alleged to have been received while boarding one of the company's cars at 5:45 p.m. on Feb. 23, 1910. He made affidavit that after the alleged railway accident a plaster cast had been placed on his ankle at the City Hospital and that he was later removed to his home. He claimed \$25 in settlement. An investigation proved that Custerd had not been taken to the City Hospital. The claimant finally admitted that the injuries which he had sustained to his foot were received from a cart which ran over his foot. He was arrested on the charge of attempting to obtain \$25 from the company under false pretense, and at a hearing at the Central Police Station was held for the action of the Grand Jury. He pleaded guilty before Judge Duffy in the Criminal Court on March 29, 1910, and was sentenced to 30 days in jail.

Sleeping Car Exhibited.—The Illinois Traction System has put the two new 10-section sleeping cars which were described in the *ELECTRIC RAILWAY JOURNAL* of March 19, page 476, into service on its line between Peoria and St. Louis. Previous to the installation of the new service one of the cars was exhibited in Illinois by Fred G. Buffe, of the department of publicity of the company, for the purpose of advertising them. The sleeper which was exhibited was drawn by a new motor car from Champaign to all the cities and small towns on the Illinois Traction System, and was exhibited for one day at each of the larger terminals and for shorter periods in the smaller towns, making the tour extend over a period of two weeks. In four days 18,000 people were shown through the car. At Springfield, Ill., where the car was exhibited on a Saturday night and Sunday, visitors were shown through it at the rate of 18 per minute. A picked crew of employees were on duty during the entire trip. One trainman was stationed at each section of the car, and visitors were sent through in groups at short intervals. The trainman in each section made a short address to each group regarding some feature of the equipment. On leaving the car the visitors were presented with an illustrated description of the equipment and told about the service, which was begun with the cars on April 1.

Commission Upholds 10-Cent Fare for Special Service in Ithaca.—The Public Service Commission of the Second District of New York has dismissed the complaint of residents of Ithaca against the Ithaca Street Railway as to alleged unreasonable fare charged between the East Ithaca station on the Elmira, Cortland & Northern branch of the Lehigh Valley Railroad and other points in Ithaca. The commission holds that section 101 of the Railroad Law permits that company to charge a 10-cent fare in each direction, subject to reduction under and by reason of the enactment of the Public Service Commission Law; that the service rendered by the company between points in Ithaca and the East Ithaca station is a special service in that it involves transportation upon a line having an elevation of more than 450 ft. within a distance of $1\frac{1}{2}$ miles, and the 10-cent fare in force affords small return to the company above the cost of operation. The 10-cent fare on the line in question has been a mooted question in Ithaca for years. Nearly 400 lawsuits resulted from the levying of this fare, one of which reached the Court of Appeals. It was held in the trial court that section 37 of the Railroad Law did not apply to street railways, but that under section 39 of the Railroad Law the Ithaca Street Railway, having acted in good faith and under the advice of eminent counsel, was not liable for penalties. Before the case had its final hearing legislation expressly authorizing the 10-cent fare was obtained in the shape of an amendment to section 101 of the Railroad Law.

Personal Mention

Mr. C. T. Munz has been appointed purchasing agent of the Toledo & Western Railroad, Toledo, Ohio, to succeed Mr. T. U. Franklin, resigned.

Mr. W. T. Corbusier has been appointed superintendent of the Schuylkill & Dauphin Traction Company, Harrisburg, Pa., to succeed Mr. S. S. Straub, resigned.

Mr. M. H. Bochow has been appointed superintendent of the Philadelphia & Easton Electric Railway, Doylestown, Pa., to succeed Mr. L. C. Lugar, resigned.

Mr. John J. Stanley, vice-president and general manager of the Cleveland (Ohio) Railway, has been elected president of the company to succeed Mr. Horace E. Andrews. Mr. Stanley will continue as general manager of the company.

Mr. Horace E. Andrews has resigned as president of the Cleveland (Ohio) Railway, but will continue as a director of the company. Mr. Andrews will in the future devote all his attention to his financial interests in New York, where he will be located permanently. He has been succeeded as president of the Cleveland Railway by Mr. John J. Stanley, vice-president and general manager of the company.

Mr. Oliver I. Davis has been appointed local auditor of the Dayton, Covington & Pique Traction Company, in charge of the company's office at West Milton, Ohio. When the company's line was opened 8 years ago Mr. Davis was appointed chief clerk to the general superintendent and afterward filled the position of auditor of freight accounts and local auditor, under Mr. M. M. Smith, who resigned in March, 1910.

Mr. Ira P. Scofield resigned recently as superintendent of motive power and equipment of the Toledo & Western Railroad, Toledo, Ohio, to become master mechanic of the Dayton, Springfield & Xenia Southern Railway, Dayton, Ohio. Mr. Scofield entered the service of the Toledo & Western Railroad during its construction, and for the last eight years had been superintendent of motive power and equipment of the company.

Mr. E. R. Kelsey has been appointed manager of the publicity and advertising department of the Toledo Railways & Light Company, Toledo, Ohio. Mr. Kelsey has been in newspaper and theatrical work in Toledo for a number of years and has recently devoted part of his time to the interest of the Toledo Railways & Light Company. The demands of the company upon Mr. Kelsey's time have assumed such proportions that it was recently decided to retain his undivided service as manager of the publicity and advertising department.

Mr. D. C. Powell has recently been appointed general freight and passenger agent of the Evansville (Ind.) Railways. Mr. Powell began his railroad career in 1893 with the Southern Railway at Evansville, Ind., as a messenger. Subsequently he served the company as night operator and bill clerk, through bill clerk and ticket agent and city freight agent and solicitor at Evansville. In 1903 he was appointed relief agent of the company, but returned to Evansville in 1905 as through rate clerk. In 1907 Mr. Powell was made city freight clerk and assistant commercial agent of the Southern Railway at Evansville and in 1909 he was appointed freight and passenger agent of the company in that city.

Mr. George M. Curtis, Jr., who has been connected with the legal department of the Brooklyn (N. Y.) Rapid Transit Company for 13 years, has been appointed Assistant Corporation Counsel of Brooklyn. Mr. Curtis was born in Brooklyn and prepared for college at the Mount Pleasant Military Academy, Ossining, N. Y. Afterward he attended Lehigh and Yale Universities, and was graduated from Yale in 1893. Subsequently he attended the Yale Law School. He began with the Brooklyn Rapid Transit Company as a trial lawyer in the municipal courts, and gradually took the company's more important cases in the county and Supreme courts. Mr. Curtis was endorsed for the position to which he has been appointed by Supreme Court Justices Stapleton, Hirschberg, O'Gorman and Dugro, and by Mayor Gaynor, of New York.

Mr. L. M. Levinson has resigned as secretary and general manager of the Shreveport (La.) Traction Company

to become connected with the Salt Lake & Ogden Railway, Salt Lake City, Utah. Mr. Levinson was sent to Shreveport in October, 1897, by the Kansas City Southern Railroad as chief clerk of the shops of the company. In 1899 Mr. Walter B. Jacobs, president of the Shreveport Belt Railway, appointed Mr. Levinson superintendent of these lines, and in 1900 he became manager of the company which is now the Shreveport Traction Company. Several months ago he was elected secretary and general manager of the Shreveport Traction Company. During Mr. Levinson's connection with the company the road has been completely rebuilt and extended to double the original mileage with a new power station, new cars, overhead lines, tracks, etc.

Mr. E. L. Green, formerly foreman of the 146th Street shops of the Metropolitan Street Railway, New York, N. Y., has been appointed master mechanic of the York (Pa.) Railways. Mr. Green was graduated from Princeton in 1893 with the degree of A. B. From 1893 to 1895 he was an instructor in the New York Military Academy. In 1896 he re-entered Princeton as a graduate student and after a year at the university became an apprentice at the Plank Road shops of the Public Service Railway, Newark, N. J., where he remained until May, 1899, when he accepted a position with the Metropolitan Street Railway. Mr. Green continued with the Metropolitan Street Railway until February, 1907, as night foreman of the Twenty-third Street and the Thirty-fourth Street car houses and day foreman of the Eighth Avenue and Fiftieth Street and the 146th Street shops. From February, 1907, to October, 1907, Mr. Green was employed by the Westinghouse Electric & Manufacturing Company. He then re-entered the employ of the Metropolitan Street Railway as foreman of the overhauling and new equipment shops and continued in this position until appointed to the York Railways.

Mr. W. P. Bailey, division passenger and freight agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has been appointed general freight and passenger agent of the Western New York & Pennsylvania Traction Company, Olean, N. Y. Mr. Bailey began his railway career in 1891, and was connected with several steam roads in various capacities for 12 years. In 1903 he entered the employ of the Indianapolis & Northwestern Traction Company, which was taken over later by the Terre Haute, Indianapolis & Eastern Traction Company, as train dispatcher, and shortly afterward was made chief clerk to the general manager. Later he was appointed auditor of the company. When the Terre Haute, Indianapolis & Eastern Traction Company was organized, Mr. Bailey was made assistant auditor of the Northwestern division, under Mr. L. T. Hixson, and continued in that capacity for two years. He then accepted a position as division superintendent of the Chicago, South Bend & Northern Indiana Railway, but after serving a year with the company he re-entered the employ of the Terre Haute, Indianapolis & Eastern Traction Company as division passenger and freight agent. His resignation from the Terre Haute, Indianapolis & Eastern Traction Company became effective on April 15.

Mr. H. W. MacKay has been appointed superintendent of the Western division of the New Hampshire Electric Railways, Haverhill, Mass., to succeed Mr. Clarence P. Hayden, whose resignation was announced in the *ELECTRIC RAILWAY JOURNAL* of April 2, 1910. Mr. MacKay entered the employ of the Boston (Mass.) Elevated Railway in June, 1898, as a motorman, but resigned from the company in September, 1898, to enter the employ of the Boston & Northern Street Railway at Haverhill, Mass., as a conductor. He was later appointed starter, and then foreman with the Boston & Northern Street Railway, and on April 1, 1903, he was appointed superintendent of the Haverhill division to succeed Mr. David Bruce, who was transferred to Lawrence, Mass. In July, 1904, Mr. MacKay left the Boston & Northern Street Railway to enter the employ of the Boston & Worcester Street Railway, and on April 1, 1905, he was appointed division superintendent of that company, with headquarters at Marlboro, Mass. On April 30, 1907, he accepted the position of superintendent of the Eastern division of the New Hampshire Electric Railways with headquarters at Amesbury, Mass., and continued in that capacity until he was appointed to succeed Mr. Hayden.

Construction News

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

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

RECENT INCORPORATIONS

Norwich, Colchester & Hartford Construction Company, Norwich, Conn.—Incorporated in Connecticut for the purpose of building an electric railway between Norwich and Hartford. Capital stock, \$50,000. Incorporators: A. L. Potter, Frank Kramer, C. E. Stark and W. H. Woodworth. [E. R. J., March 12, '10.]

***Athens Railway & Electric Company, Athens, Ga.**—Chartered in Georgia to build an electric railway in Athens. Capital stock, \$1,050,000. Incorporators: John R. White, Whitehall, Ga.; J. Y. Carithers, W. S. Holman, A. H. Hodgson, C. D. Flanigan, James White and W. T. Bryan, Athens.

Toronto & Eastern Railway, Toronto, Ont.—Incorporated in Ontario to build an electric railway from Cobourg to Toronto, with branches to Peterboro, Uxbridge and Lindsay. F. L. Fowke is interested. [E. R. J., Nov. 13, '09.]

***South Carolina Western Railway, Hartsville, S. C.**—Incorporated in South Carolina to build a 40-mile railway to be operated by steam or electricity, to connect McBee, Stokes Bridge, Hartsville, Swift Creek, High Hill, Darlington and Florence. Capital stock, minimum, \$20,000; maximum, \$500,000. Headquarters, Hartsville. Directors: W. R. Bonsal, Hamlet, N. C., president; S. O. Bauersfeld, Hamlet, secretary; Chas. Gibbons, S. Lawrence and J. E. Hancock, Hamlet, N. C.

***Iowa & Dakota Interurban Railway, Yankton, S. D.**—Incorporated in South Dakota to build a 125-mile railway between Sioux City, Ia., and Mitchell, S. D. Capital stock, \$500,000. Headquarters, Yankton. Directors: B. E. Wells, E. E. Bamford, H. E. Valentine, Centerville; C. L. Phillips and W. G. Amundson, Lake Andes, S. D.

***Temple Northwest Railway, Temple, Tex.**—Incorporated in Texas to build a 100-mile railway between Temple and Comanche, passing through Bell, Coryell and Hamilton Counties. Capital stock, \$100,000. Incorporators: George E. Wilcox, A. F. Bentley, John A. Cole, P. L. Downs, H. W. Peck, J. W. Beard and D. J. Gribbsby.

Western Washington Railway, Aberdeen, Wash.—Incorporated in Washington to build an electric railway from Grays Harbor to Puget Sound, via Elma and Shelton. Capital stock, \$100,000. Headquarters, Aberdeen. Incorporators: C. C. Quackenbush and W. B. Sammons, Aberdeen. [E. R. J., March 26, '10.]

FRANCHISES

Riverside, Cal.—J. B. Jackson, in the interests of the Pacific Electric Railway, Los Angeles, has asked the County Board of Supervisors for a franchise to build a railway in Riverside. The route of this proposed 25-mile extension will be through San Jacinto, Hemet, Florida, Lakeview and Moreno.

Sacramento, Cal.—The Board of Supervisors has granted a franchise to the Northern Electric Railway, Chico, to erect a bridge over the Sacramento River at the foot of M Street, in Sacramento. This is part of a plan to extend this line to Woodland, Los Molinos and Red Bluff.

Carrier Mills, Ill.—The Egyptian Traction Company, Eldorado, has applied to the Board of Trustees for a franchise to operate an electric railway in Carrier Mills. A similar application will be made at Eldorado. This projected 100-mile railway will connect Murphysboro, Marion, Carrier Mills, Harrisburg, Eldorado, Ridgway and New Haven, Ill., and Mount Vernon, Ind. [E. R. J., April 9, '10.]

West Hammond, Ill.—The Eastern Illinois Railway, a subsidiary of the Chicago City & Connecting Railways, has been granted a 50-year franchise for an electric railway over certain streets in West Hammond. This line will extend from West Hammond to Riverdale, via Harvey, Burnham and Hegewisch. [E. R. J., March 19, '10.]

Covington, Ky.—The City Council has granted a franchise to the Cincinnati, Louisville, Lexington & Maysville Traction Company, Dry Ridge, Ky., to build an electric railway

through Covington to the Ohio River. This is part of a plan to build an interurban railway between Cincinnati, Ohio and Lexington, Ky., a distance of 200 miles. [E. R. J., Dec. 4, '09.]

Worcester, Mass.—The Council has granted a franchise to the Worcester & Providence Street Railway, Worcester, to build an electric railway over certain streets in Worcester. This proposed 45-mile railway will extend from Worcester to Providence, via Millbury, Sutton, Manchaug and Douglas, Mass., and Burrillville, Mohegan, North Smithfield, Smithfield and North Providence, R. I. [E. R. J., Jan. 29, '10.]

***Bessemer, Mich.**—Messrs. Appleyard and associates have applied to the City Council of Bessemer, Mich., for a franchise to build an electric railway from Ironwood to Bessemer. Work will begin as soon as the franchise is granted.

Lincoln, Neb.—The Town Board has voted a franchise to the Lincoln (Neb.) Traction Company to extend its railway in two directions over certain streets in Lincoln.

***North Bend, Ore.**—L. D. Kinney has applied to the Council for a franchise to build a railway in North Bend. He will make a similar application in Marshfield for a franchise. This is part of a plan to build a railway between North Bend and Marshfield. Surveys have been started and it is stated that Seattle capital is financing the enterprise.

Zanesville, Ohio.—The Ohio Electric Railway, Cincinnati, has been granted a franchise to build additional track over certain streets in Zanesville. It has also been recently granted a franchise for the reconstruction of its tracks in Dayton.

Cosmopolis, Wash.—The Council has granted a franchise to the Gray's Harbor Electric Company, Aberdeen, to build a railway in Cosmopolis.

Seattle, Wash.—The King County Board of Commissioners has granted a franchise to the Seattle-Tacoma Short Line, Seattle, to build an electric railway over certain portions of the highway between Seattle and Tacoma. The company proposes to begin work on the new line within 60 days. It will be 29 miles long.

Spokane, Wash.—Application has been made to the City Council by the Okanogan Electric Railway, Spokane, for a franchise to build an electric railway in Spokane. This proposed railway is to connect Loomis, Okanogan, Ophir, Malott, Brewster and Riverside, and will connect at the north end with Victoria, Vancouver & Eastern extension of the Great Northern Railway. A. M. Dewey, Empire State Building, Spokane, president. [E. R. J., May 1, '09.]

Wenatchee, Wash.—The Council has granted the Wenatchee Valley Railway & Power Company a franchise to build a railway in Wenatchee. This projected line will extend from Wenatchee via Cashmere to Leavenworth.

Morgantown, W. Va.—The County Court has been asked to grant a franchise to the Union Utilities Company, Morgantown, to extend its lines up Decker Creek to Dellslow and Cheat. H. R. Warfield, Morgantown, general manager. [E. R. J., March 19, '10.]

TRACK AND ROADWAY

***New Decatur, Ala.**—W. J. Cottingham, New Decatur, and others are advocating the building of a 50-mile railway from Union Depot in New Decatur to Curtis Wells, Neal, Danville, Jessetown, Needmore, Moulton, Landersville, Mount Hope, Newburg and Russellville.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company is considering plans for building an extension of its line from Graton to Guerneville and also a branch to Camp Meeker. E. M. Van Frank, Petaluma, manager.

Chicago City Railway, Chicago, Ill.—This company is said to be in the market for 5000 tons of rails.

Beech Grove Traction Company, Indianapolis, Ind.—This company has awarded the contract to the Alan Construction Company to build its railway between Beech Grove and Indianapolis. Work will be started within a few days. The company has filed a mortgage with the Security Trust Company to secure \$100,000 worth of first mortgage bonds, due in 30 years. At a recent meeting the following officers were elected: W. H. Ogan, president; John Woche, vice-president; C. F. Schmidt, secretary, and M. S. Hawkins, treasurer. [E. R. J., April 9, '10.]

Evansville (Ind.) Railway.—The citizens of Chrisney have offered this company a subsidy of \$20,000, the right of way and the grading of the roadbed if it will extend the Richland branch of its railway to Chrisney.

Kansas Union Traction Company, Altamont, Kan.—At an election held in Parsons on April 5, this company was voted \$10,000 in bonds to aid in building an interurban railway from Parsons to Coffeyville, via Altamont and Edna. This makes a total of \$41,500 in bonds that have been voted for the benefit of this line. Surveying is now being done by Archer, Rollins & Company, Kansas City, Mo. Barney McDaniel, Altamont, secretary. [E. R. J., April 2, '10.]

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company is considering plans to extend its railway on the Maryland side of the North Branch River to McCoole, and there into Keyser over the bridge already spanning the river. C. L. Bretz, Cumberland, president.

***Hibbing, Minn.**—W. N. Brown and associates are promoting a plan to construct a street railway in Hibbing.

***Fenton, Mich.**—David L. Dillon, Fenton, is said to be interested in an electric railway between Fenton, Ann Arbor and Flint. The line would connect with the Ann Arbor Railroad at Ann Arbor and with the Saginaw & Flint Railway, Saginaw, at Flint.

***Missoula, Mont.**—Negotiations are pending between W. H. Smead and the Chamber of Commerce for the building of a 75-mile electric railway between Missoula and Polson.

Virginia City Southern Electric Railway, Virginia City, Mont.—This company has awarded to Luther H. Leber, New York, N. Y., the contract for the construction of its projected railway to Alder. [E. R. J., April 9, '10.]

Citizens' Traction & Power Company, Albuquerque, N. Mex.—This company advises that construction will commence about May 10 on its proposed 2-mile electric line in Albuquerque. One car will be operated at first. Capital stock authorized, \$75,000; issued, \$25,000; bonds authorized, \$15,000. Officers: A. W. Hayden, 412 West Copper Avenue, Albuquerque, president; D. H. Beatright, vice-president; Isaac Barth, Stern Building, Albuquerque, secretary, and J. C. Baldrige, treasurer. [E. R. J., March 26, '10.]

Southwestern New York Traction Company, Bolivar, N. Y.—This company advises that construction will commence about June 1 on its 15-mile line between Bolivar, Scio, Allentown and Wellsville. The power station will be located at Allentown, and five cars will be operated. It will furnish light and power along the route. Officers: Chas. M. Van Curen, Bolivar, president; Benj. F. Patterson, Baltimore, Md., vice-president; Albert Matson, Bolivar, N. Y., secretary, and B. F. Patterson, Bolivar, N. Y., general manager. [E. R. J., April 9, '10.]

Port Jervis Traction Company, Port Jervis, N. Y.—This company has applied to the Public Service Commission, Second District, for permission to extend its railway in Deer Park, Orange County, and to abandon a portion of its route in Port Jervis.

Cleveland (Ohio) Railway.—This company has awarded a contract to the Carnegie Steel Company for 8000 steel ties.

Toledo & Indiana Traction Company, Toledo, Ohio.—This company has decided to start work shortly on the completion of its line from Bryan, Ohio, to Fort Wayne, Ind. Surveys have been made. C. S. Schenck, president. [E. R. J., Feb. 19, '10.]

***Eugene, Ore.**—F. B. Kidder and John Baird are promoting the construction of an electric railway in the vicinity of Eugene, including a line between Eugene and Springfield, and one to Siuslaw and Coos Bay and also up the McKenzie Valley.

Oklahoma City & Suburban Railway, Oklahoma City, Okla.—This company has increased its capital stock from \$250,000 to \$400,000. It expects to build 32 miles of new track from Edmond to Moore. Construction has already commenced. John W. Shartell, president. [E. R. J., Aug. 21, '09.]

Clackamas Southern Railway, Portland, Ore.—This company announces that it has secured financial backing and work will soon commence on its proposed electric railway to connect Silverton and Oregon City. Incorporators: F.

M. Swift, David Loring and A. E. Clark. [E. R. J., Dec. 26, '08.]

Johnstown (Pa.) Traction Company.—This company announces a comprehensive system of improvements of its local system which will involve the expenditure of \$145,000. The work will include the construction of new curves at the stone bridge, new curves and turn-outs at the Eighth ward transfer, and a new loop at the terminus of the railway in Coopersdale. E. M. Du Pont, president.

Pittsburgh & Allegheny Valley Railway, Leechburg, Pa.—This company will advertise for bids for the construction of its railway from New Kensington to Leechburg about May 1. H. A. Waddell, Leechburg, superintendent.

Sunbury & Freeburg Street Railway, Sunbury, Pa.—This company, which was chartered a short time ago, has completed surveys between Selinsgrove and Freeburg, 15 miles, and it is reported that work will be commenced on the line this summer. W. H. Lyons, Sunbury, president. [E. R. J., Jan. 8, '10.]

Tioga Traction Company, Wellsboro, Pa.—This company, which proposes to build a 15-mile railway to connect Wellsboro, Middlebury, Chatham, Covington and Mansfield, has secured rights-of-way and has nearly financed the proposition. Applications for franchises will shortly be made. Geo. F. Keagle, Avis, general manager. [E. R. J., Dec. 11, '09.]

Greenville & Spartanburg Electric Railway, Greenville, S. C.—This company has awarded a contract to W. J. Oliver & Company, Knoxville, Tenn., to construct its railway between Greenville and Spartanburg. H. H. Prince, Greenville, S. C. [E. R. J., Dec. 18, '10.]

Aberdeen (S. D.) Street Railway.—This company is receiving bids for the construction of 4 miles of new track in Aberdeen. Plans and specifications have been drawn up and work will commence this month.

Galveston-Houston Railway, Houston, Tex.—This company has awarded a contract to Hartley & Ford, Bay City, for the construction of 19 miles of roadbed from Clear Creek to Bray's bayou. The contract calls for completion by Oct. 1. The Galveston Creosoting Company was awarded the contract for approximately 500,000 ft. of creosoted bridge timbers, enough material for the construction of 36 bridges and culverts. [E. R. J., April 9, '10.]

Houston (Tex.) Electric Company.—This company has accepted a bonus of \$27,000 offered it by the Western Land Corporation, to extend its line through the eastern part of South Houston to La Porte. Surveyors are now at work laying out the route. David Daly, Houston, manager.

***Washita (Tex.) Electric Company.**—A. E. Perry, president of this company, and several other capitalists are promoting an interurban railway from Pauls alley, Okla., to Dallas, Tex., via Ardmore, Marietta, Sivells Bend, Gainesville, Whiteboro and Denton. Power could be obtained from Washita Falls power plant.

***Seattle, Wash.**—It is stated that J. L. Anderson, of the Anderson Steamboat Company, plans to build a railroad on the east side of Lake Washington from Bellevue to Redmond, via Kirkland. Gasoline cars are to be used at first and later the line will be electrified.

Clarksburg & Western Traction Company, Clarksburg, W. Va.—This company advises that it has not decided when construction will commence on its proposed 25-mile electric railway between Clarksburg and Weston. It will furnish power for lighting. Capital stock, \$25,000. Officers: F. B. Haymaker, Clarksburg, president; W. G. Bennett, Weston, vice-president; W. M. Cornray, Clarksburg, secretary and treasurer, and S. G. Munroe, Clarksburg, general manager. [E. R. J., April 2, '10.]

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company has awarded a contract to the Pennsylvania Steel Company for 4500 tons of girder rails.

SHOPS AND BUILDINGS

Fresno (Cal.) Traction Company.—This company has completed the construction of its combined car house, shop and office building at Fresno. [E. R. J., Oct. 9, '09.]

Capital Traction Company, Washington, D. C.—This company is having plans prepared by Beale & Meigs, Wash-

ington Loan & Trust Building, Washington, for remodeling its passenger station. The structure is to have three stories, and will be built of steel and concrete. The improvement is to cost \$150,000.

Illinois Traction System, Champaign, Ill.—This company has purchased a site on Twelfth Street, between Morgan Avenue and Lucas Avenue in St. Louis, on which it will erect a four-story express building. The structure is estimated to cost \$100,000.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company recently purchased 40 lots at \$15,000 in Indianapolis on which it is reported it will build a new power house.

Northern Indiana Railway, South Bend, Ind.—In a heavy gale on April 6, the steel skeleton of the new car house and repair shops of this company which has been under construction at South Bend, collapsed. The building was being erected by the George Hoffman Company, South Bend, which awarded the subcontract to the Lafayette & Construction Company, Lafayette.

Charles City & Western Railway, Charles City, Ia.—This company has recently decided upon Charles City as the location of its new car house, 60 ft. x 80 ft., and its repair shop, 40 ft. x 55 ft. The buildings will be built of steel and cement. Work will begin at once. C. W. Hart, Charles City, president.

North Jersey Rapid Transit Company, Paterson, N. J.—This company has awarded a contract to E. W. Goates, Ridgewood, for the erection of a fireproof one-story building, 67 ft. x 147 ft., in Hokokus. It is to be of brick and corrugated iron with concrete roof and floors and will contain the superintendent's office, power plant and car house.

Yakima Valley Transportation Company, North Yakima, Wash.—This company expects to erect soon a new car house at North Yakima. The estimated cost, \$5,000. M. C. Richards, North Yakima, general manager.

Seattle, Renton & Southern Railway, Seattle, Wash.—This company is constructing on its property at Columbus Station, Seattle, a new car house and repair shop, to be 140 ft. x 120 ft. It will also contain headquarters of the company.

POWER HOUSES AND SUBSTATIONS

Albany (N. Y.) Southern Railroad, Hudson, N. Y.—This company is making inquiries regarding one 400-kw rotary converter and one 350-kva, single-phase air-blast transformer.

Northern Ohio Traction & Light Company, Akron, O.—This company is said to be considering the erection of a new power plant to have a capacity of 75,000 hp. The estimated cost, it is said, will be \$1,500,000. The company now operates power plants at Bedford, Cuyahoga Falls, Akron, Canton and Midvale.

Columbus Railway & Light Company, Columbus, Ohio.—This company has placed the following contracts for power equipment for its Spring Street plant: The Jeffrey Manufacturing Company, Cincinnati, secured the contract for the structural steel work for the new plant and also for the coal and ash conveyors. The Allis-Chalmers Company, Milwaukee, was awarded the contract for the turbo-generators; these generators will have a normal capacity of 4000 kw, with a maximum capacity of 6000 kw. The Worthington Pump Company, New York, secured the contract for the condensers. The Babcock & Wilcox Company was awarded the contract for the boilers. The Green Fuel Economizer Company, Chicago, secured the contract for the induced draught fan apparatus. The Green Engineering Company, Chicago, was awarded the contract for the automatic stokers. The improvements will cost approximately \$200,000. The excavation for the new addition to the plant is completed and it is expected that the improvements will be completed by Aug. 1.

Northern Texas Traction Company, Fort Worth, Tex.—This company expects to erect a new power house at Handley at an estimated cost of \$30,000.

Ogden Rapid Transit Company, Ogden, Utah.—This company will install a 300-kw, 550-volt Allis-Chalmers generator in its power plant at Ogden. An extension will be built to the present switchboard and this will also be furnished by the Allis-Chalmers Company.

Manufactures & Supplies

ROLLING STOCK

Chicago City Railway, Chicago, Ill., is planning additional cars for its wrecking and street-cleaning equipment.

Ohio Electric Railway, Cincinnati, Ohio, is having 10 interurban passenger cars built by the Cincinnati Car Company.

Interborough Rapid Transit Company, New York, is finishing the specifications for the 100 cars to be ordered soon for elevated service.

United Railroads, San Francisco, Cal., reported in the *ELECTRIC RAILWAY JOURNAL* of Dec. 11, 1909, as contemplating the purchase of 50 city cars, it is rumored is now in the market for this rolling stock.

Chicago & Oak Park Elevated Railroad, Chicago, Ill., is rebuilding 30 cars in its own shops. The cars will have seven reversible seats on each side, and short longitudinal seats in the four corners.

Albany & Southern Railroad, Albany, N. Y., reported in the *ELECTRIC RAILWAY JOURNAL* of Jan. 29, 1910, as contemplating the purchase of two double-truck cars, has decided not to order this rolling stock until fall.

Lexington, Ky.—Y. Alexander, president of the Third National Bank of Lexington, contemplates the purchase of one gasoline or gasoline-electric motor car for use on a short steam railroad in Northern Kentucky.

Chicago & Joliet Electric Railway, Joliet, Ill., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Dec. 1, 1909, as being in the market for cars, it is reported, has placed an order with The J. G. Brill Company for two cars.

Pennsylvania Railroad, Philadelphia, Pa., is building 42 electric locomotives in its own shops at Juniata, Pa., for service in the New York tunnels. Westinghouse Electric & Manufacturing Company, Pittsburgh, is furnishing the electrical equipment.

New Orleans Railway & Light Company, New Orleans, La., reported in the *ELECTRIC RAILWAY JOURNAL* of April 2, 1910, to be in the market for from 35 to 50 cars, it is rumored, has ordered 50 cars from the St. Louis Car Company, St. Louis, Mo.

Michigan United Railways, Jackson, Mich., mentioned in the *ELECTRIC RAILWAY JOURNAL* of March 5, 1910, as contemplating the purchase of two sets of trucks, has purchased three sets of type O-50 trucks from the Standard Motor Truck Company, Pittsburgh, Pa.

Interborough Rapid Transit Company, New York, has placed an order with the Westinghouse Traction Brake Company for enough electric-pneumatic brakes to equip all the company's subway express cars. The 10-car trains which will soon be run in the subway necessitated a change of brake systems and the one decided upon gives each car an independent air supply which acts instantaneously and simultaneously on each car.

Virginia Railway & Power Company, Richmond, Va., reported in the *ELECTRIC RAILWAY JOURNAL* of Feb. 5, 1910, to have ordered 20 pay-as-you-enter cars from The J. G. Brill Company, has decided on the following details for this rolling stock:

- Seating capacity..... 47
- Bolster centers, length..24 ft. 6 in.
- Length of body.....32 ft.
- Length over vest..44 ft. 11 in.
- Height rail to sills.....30 in.
- Body wood
- Underframe wood
- Air brakes G.E.
- Car trimmings..... bronze
- Curtain fix....Curtain S. Co.
- Curtain material.. Pantasote
- Destination signs..... glass
- Fenders Providence
- Gongs Dedenda
- Hand brakes..... Peacock
- Heaters Consolidated
- Headlights Dayton
- Motors.....two; G.E. 210
- Roofs monitor deck
- Sanders air
- Sash fixtures..... Brill
- Seats Winner
- Step treads..... Mason
- Trucks, type.....Brill 30E

Winona Interurban Railway, Warsaw, Ind., reported in the *ELECTRIC RAILWAY JOURNAL* of April 2, 1910, as having ordered six 13-bench open, two closed and one baggage car, has contracted with the Jewett Car Company, Newark, Ohio, for the baggage and open cars and for five combina-

tion baggage, smoker and passenger cars with the following details:

- Seating capacity..... 66
- Weight32,000 lb.
- Bolster centers, length..35 ft. 11 in.
- Length of body..47 ft. 10 in.
- Length over vest..57 ft. 8 in.
- Width over sills.....9 ft.
- Width over posts at belt.9 ft. 3 in.
- Body wood
- Interior trimmahogany
- Underframe composite
- Bumpers.....oak faced with steel
- Car trimmings..... bronze
- Couplers.....Wright M.C.B. radial
- Curtain fix....Curtain S. Co.
- Curtain material.. Pantasote
- Fenders....Loco. type pilot
- HeatersSmith hot water
- Headlights Lima Sanders De France
- Sash fixtures..... Jewett
- Seats...H. & K. No. 99 EE
- Seating material leather
- Trolley retrievers.. Peerless steel

Visalia (Cal.) Electric Railroad, mentioned in the *ELECTRIC RAILWAY JOURNAL* of Oct. 30, 1909, as having ordered two three-compartment cars from The Moran Company, Seattle, Wash., has specified that one be of the combination passenger, smoking and baggage type to seat 58 and the other of the combination passenger and smoking type to seat 70 passengers. Other details of these cars follow:

- Weight with trucks.90,000 lb.
- Wheel base..... 84 in.
- Length of body..51 ft. 8½ in.
- Length over vest..56 ft. 3 in.
- Length over all....57 ft. 9 in.
- Width inside.....8 ft. 3 in.
- Width over all....9 ft. 4 in.
- Height inside....8 ft. 3½ in.
- Sill to trolley base..9 ft. 9 in.
- Height rail to sills..3 ft. 8 in.
- Body metal
- Underframe metal
- Air brakes.....West
- Axles Baldwin
- Bolsters, body, cast steel, Moran
- Bolsters, truck.... Baldwin
- Car trimmings..... bronze
- Control system.... Westinghouse
- Couplers.....Janney M.C.B.
- Curtain fix....Curtain S. Co.
- Curtain material ..Pantasote
- Fenders wood pilot
- Gongs..fitted with Keystone pneumatic ringer
- Hand brakes.Lindstrom
- Heaters Consolidated
- Lavatory fittingsDuner
- Motors...single-phase West.
- Sanders Nichols-Lintner
- Sash fix.....Curtain S. Co.
- Seats.....Hale & Kilburn
- Draft springs..... Simplex
- Step treads..... Mason
- Trolley poles and attachments Westinghouse
- Trucks Baldwin
- Ventilators Globe
- Vestibule....steel lined with birch

TRADE NOTES

King Bridge Company, New York, N. Y., moved its office on April 6 to room 1040, 30 Church Street.

T. H. Symington Company, Baltimore, Md., has moved its offices from the Equitable Building to the Maryland Trust Building.

Robins Conveying Belt Company, New York, N. Y., reports that the business in the last 3 months exceeded that of the entire year of 1909.

W. J. Jeandron, New York, N. Y., has returned from a trip abroad. He visited the works of the Le Carbone Company at Paris, France, and took a pleasure trip through Italy and Southern Europe.

American Tie & Lumber Company, New York, N. Y., announces the shipment of 200,000 yellow pine and cypress cross ties during the month of March, which, it is stated, is the largest number of cross ties ever shipped by the company in one month.

Duff Manufacturing Company, Pittsburgh, Pa., manufacturer of Barrett jacks and Duff-Bethlehem hydraulic jacks, has been awarded the contract by the Central South African Railway for jacks in competition with English, German and other American manufacturers.

Wonham, Sanger & Bates, New York, N. Y., recently closed a contract for 100 30-ft. Tripartite steel poles with the South Shore Traction Company. The company has received a large number of inquiries for these poles for both street and power transmission work.

Burton W. Mudge & Company, Chicago, Ill., will on May 1 remove its office to temporary quarters in suite 1003, People's Gas Building, until such time as the southern portion of the same building is completed, when it will occupy offices overlooking Michigan Boulevard and Adams Street.

W. A. Morschhauser, New York, N. Y., sole agent for the Millionaire calculating machine, in the past several years has introduced this device into a large number of electric railways throughout the country. The machines have been so successful that a number of roads now have two or three at work in the accounting department.

Edgar Allen Manganese Steel Co., Chicago, Ill.—To meet the constantly increasing demand in America for its "Stag" brand manganese steel products, and particularly for railway frogs and crossings, Edgar Allen & Co., Ltd., of the Imperial Steel Works, Sheffield, England, is erecting and equipping an up-to-date and very extensive plant at Chicago for the manufacture of its specialties. This branch of the organization has just been incorporated at Springfield, Ill., with a capital stock of \$300,000, under the name of Edgar Allen Manganese Steel Co.

Dearborn Drug & Chemical Works, Chicago, Ill., advise that Paul T. Payne, who has had charge of the Philadelphia office for the past two years, has returned to Chicago to do special work in the general office. Mr. Payne has been connected with the company for the past 12 years, having spent some time in the laboratory before entering the sales department. Mr. Payne's assistant at Philadelphia, P. G. Jones, will assume the management of the Philadelphia office, covering Eastern Pennsylvania, and W. J. Stokes will look after the company's interests in Maryland and Virginia, with office at 809 American Building, Baltimore, Md. Mr. Stokes was formerly with the H. W. Johns-Manville Company. Both Mr. Jones and Mr. Stokes will work under the general supervision of the New York office of the Dearborn Drug & Chemical Works at 299 Broadway, the headquarters of Grant W. Spear, vice-president and general Eastern manager.

Harrisburg Foundry & Machine Works, Harrisburg, Pa., announces the following changes in its organization: C. H. Israel, formerly assistant engineer at Harrisburg, has been appointed manager of the Baltimore district with headquarters at 1415 Continental Trust Building, Baltimore, Md., to succeed F. W. Jackson, who will become manager of the company's Chicago district with an office in the Marquette Building, Chicago, Ill. Mr. Jackson succeeds A. M. Morse, resigned, and will have Walter Bird associated with him as district engineer. Geo. M. Illges, formerly manager of the Atlanta, Ga., district, will have charge of the company's St. Louis district with headquarters at 1415 Chemical Building, St. Louis, Mo., to succeed Geo. D. Pogue, resigned. P. A. Haradon will be associated with Mr. Illges as district engineer. R. B. Hall, Jr., has been appointed manager of the company's Atlanta district with an office in the Empire building, Atlanta, Ga., to succeed Messrs. Illges and Hall. Walter Castanedo will be in charge of the company's New Orleans district with headquarters at 1103 Hennen Building, New Orleans, La., to succeed Mr. Glenn. Mr. Castanedo will have R. M. Doherty associated with him as district engineer.

Henry D. Shute has been appointed acting vice-president of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. Mr. Shute was graduated from the Massachusetts Institute of Technology in 1892, with the degree of electrical engineer. Following his graduation, he studied for a year in Germany and in Austria. In 1893 Mr. Shute entered the works of the Westinghouse Electric & Manufacturing Company at Pittsburgh as an apprentice. He spent his first two years with the company in the testing department, and then took up erection work, under C. F. Scott, and later became an assistant foreman of one of the departments of the works. After 5 years' service with the company, Mr. Shute was promoted to the sales department at the East Pittsburgh office, and in 1901 was placed in charge of the alternating current division, correspondence department. Two years later he was appointed assistant to L. A. Osborne, vice-president, which position he held at the time of his recent appointment. Mr. Shute has been associated with the Westinghouse company for 17 years. He is a member of the American Institute of Electrical Engineers and the Engineers Club of New York.

Ackley Brake Company, New York, N. Y., of which Griffin S. Ackley is proprietor, has established a subsidiary company under the name of the British Ackley Brake Company, with offices in the Westinghouse Buildings, Norfolk

Street, Strand, London, England. The British company will introduce and sell the Ackley adjustable brake in the United Kingdom, the Colonies and other territory in which the Ackley brake is covered by patents, and will manufacture this brake for all requirements in this territory. The remarkable success of the Ackley brake in Europe necessitated establishing the British company to relieve the demands made upon the New York company for these brakes, as they are now in use in almost every country in the world. The business of the British Ackley Brake Company will be conducted under the joint management of W. L. Lorkin, A.M.I.E.E., and E. E. Daglish, A.M.I.E.E., of the Equipment & Engineering Company, London, who have hitherto acted as sole agents for the Ackley brake since its introduction into British territory. In addition to the British company the Ackley Brake Company is represented in Europe by agencies established in Paris, Berlin, Brussels and Zurich. Mr. Ackley, the patentee and sole proprietor of all foreign rights for the Ackley brake, is making his second tour through Europe in the interests of these companies and agencies.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its list of second-hand electrical machinery for April, 1910.

George R. Stanton, Decatur, Ill., is distributing a circular describing and illustrating his coach and window washer.

Euclid Crane & Hoist Company, Euclid, Ohio, has issued a 14-page catalog in which its various cranes are described and illustrated.

Consolidated Car-Heating Company, Albany, N. Y., has issued its Catalog No. 10, which is an attractive arranged illustrated booklet describing its buzzer system.

Wonham, Sanger & Bates, New York, N. Y., have issued a circular about Tripartite steel poles and other rolled steel specialties, for which they are selling agents. The circular contains a list of some of the prominent users of Tripartite poles.

General Vehicle Company, Long Island City, N. Y., has published *Elec-Tricks* for April. It contains a description and illustrations of two electric trucks furnished to the Philippine Government at Manila and other interesting articles relating to electric trucks.

Ohmer Fare Register Company, Dayton, Ohio, is mailing a circular calling attention to its various types of indicating, recording and printing registers. An illustration is presented showing a group of delegates in Denver during the last convention of the American Street and Interurban Railway Association.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 4723, in which its regulating pole rotary converters are described and illustrated. They are built in capacities of from 300 to 3000 kw, with a voltage range between 240 and 300 to cover the usual lighting circuit requirements. The company has also issued an attractive publication entitled "Transformer Manufacturing Facilities," in which the various processes of transformer manufacture at the Pittsfield (Mass.) works are illustrated.

Fairbanks, Morse & Company, New York, N. Y., have issued catalog No. 101-B descriptive of gasoline motor cars for every requirement and department of railroad work, from the small car light enough for one man to handle to a large car seating 35 people for passenger service. It also contains descriptions of two new types of gasoline cars, Nos. 12 and 26, designed for section work. The publication is well arranged, and is profusely illustrated with half-tones of cars in operation in different sections of the country.

Vacuum Car Ventilating Company, Chicago, Ill., has issued an attractive illustrated booklet in which its method of car ventilation is described. The application of the Cooke system to 350 new pay-as-you-enter cars of the Chicago Railways is illustrated, the appearance of the installation, the circulation of air and methods of installing parts all being shown. The booklet states that the Chicago Railways order "is the largest contract ever placed by any street railway for a car ventilating system, and it is also the first instance where such a contract was ever placed under an absolute guarantee by a ventilating company to accomplish set results under all operating conditions."