

Street Railway Journal

VOL. XXXI.

NEW YORK, SATURDAY, MAY 23, 1908.

No. 21

PUBLISHED EVERY SATURDAY BY THE

McGraw Publishing Company

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

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MAIN OFFICE:
NEW YORK, 239 WEST THIRTY-NINTH STREET.

BRANCH OFFICES:

Chicago: Old Colony Building.
Philadelphia: Real Estate Trust Building.
Cleveland: Schofield Building.
London: Hastings House, Norfolk St., Strand.

Cable Address, "Stryjourn, New York"; "Stryjourn, London"—Lieber's Code Used.

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TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Mexico and the Canal Zone:

Street Railway Journal (52 issues).....\$3.00 per annum
Single copies.....10 cents
Combination Rate, with Electric Railway Directory and Buyer's Manual (3 issues—Feb., Aug. and Nov.).....\$4.00 per annum
Both of the above, in connection with American Street Railway Investments (The "Red Book"—Published annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

To Dominion of Canada:

Street Railway Journal (52 issues), postage prepaid.....\$4.50 per annum
Single copies.....10 cents

To All Countries Other Than Those Mentioned Above:

Street Railway Journal (52 issues), postage prepaid.....\$6.00
25 shillings. 25 marks. 31 francs.
Single copies.....20 cents
Remittances for foreign subscriptions may be made through our European office.

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During 1907 the Street Railway Journal printed and circulated 427,250 copies, an average of 8216 copies per week. Of this issue 7500 copies are printed.

The Seventh Avenue Subway

Samuel Rea, third vice-president of the Pennsylvania Railroad, is another advocate of the construction of a subway on Seventh Avenue, and has just written a letter to the city comptroller urging it as an absolute necessity. Mr. Rea calls attention to a fact which has been evident to many people for a long time, that the construction of the Pennsylvania Railroad station on Thirty-third Street from Seventh Avenue west will effect a tremendous change in the distribution of travel in New York City and will vitally affect the character of the neighborhood west of Broad-

way between Twenty-third and Forty-second Streets. Mr. Rea's estimate of the number of people who will enter the city through this station from both the Pennsylvania and Long Island railroads is 200,000 daily, but as yet no provision has been made for their accommodation by subway systems to be built in the immediate future. If the proposed Lexington Avenue line should be built the subway system of the city would bear somewhat the resemblance of a figure 8, in which the new Pennsylvania station will be left a considerable distance to the west of the point where the new line crosses the old line. Mr. McDonald's recommendation, which would give the system roughly the appearance of an inverted A, except that there would be three east and west lines, one on Canal Street, one on Forty-second Street and one in the northern part of the city, would seem to give a much more logical distribution of transit facilities, and it is hoped that this plan will be given careful consideration before actual work is commenced or contracts are given out.

The Cost of Accidents

We are not aware that there has been anything like an exact analysis of the nature and cost of accidents on street railway systems in general. Individual companies have prepared such figures for their own use, but a comprehensive tabulation, based upon all or a large proportion of the roads in the country, would be very difficult to compile. Nevertheless, the matter becomes more important every year and the first step toward a prevention of accidents is an understanding of the causes in action. The cases are not rare where the amounts paid in damages annually equal from 4 to 5 per cent of the gross receipts. One cannot expect the casualties ever entirely to disappear. Human nature will continue fallible, and accidents are one of the prices which are paid for the enjoyment of the benefits of modern civilization, which include rapid transit. Nevertheless, in the last analysis all accidents, or practically all, are caused by negligence on the part of the public or the employee, or both. The pedestrian on the street will take chances about getting across the track before the approaching car reaches him, or will forget that another car may be coming in an opposite direction. The passenger will jump on or off the car while it is in motion and fail to do so safely. The motorman will start his car too soon or fail to stop it in time, the conductor will give the wrong signal, and so on down the list. These things are bound to occur, even under the best conditions, but there is no doubt some good will accrue from careful work in endeavoring to lessen them. A certain amount of instruction in the proper way of boarding and leaving cars can be given the public, but the principal remedy so far as the public is concerned

is in making everything as nearly fool-proof as possible. It is for this reason that the Minneapolis gate has proved successful in reducing accidents from boarding and leaving cars. The same advantage is claimed for the pay-as-you-enter car, because the conductor remains on the rear platform and sees that passengers do not injure themselves. The possibilities of instruction, so far as the train crews themselves are concerned, are more favorable, because these men can be brought together and told explicitly what to do under different conditions to avoid accidents as well as how to manipulate the controller or collect fares. For this instruction the services of the claim agents of the company are most useful, because they are constantly dealing with accidents and know under what conditions most of them arise. This plan is being followed by several companies with very satisfactory results.

Well Done!

The electric railway companies of the country and the railroad commissions to whom they report have every cause to be congratulated over the outcome of the recent conference at Washington with the Interstate Commerce Commission. In fact, every stockholder in an electric railway company and every user of financial statistics derived from electric railway operation should feel gratified, because all will be benefited by the establishment of a standard classification of accounts and a settlement of the knotty problem of depreciation.

For several years the revision of the existing classification of accounts and the adoption of a new classification, which would be officially recognized as standard, has been the most important subject before the electric railway accountants of the country. Recent events have brought the question into the immediate foreground, and during the last six months the attention of the Federal and State commissions as well as that of all departments of the electric railway companies has been focussed upon it. Considerable space has been devoted in the news and editorial columns of this paper to assist in obtaining a consensus of opinion on the subject from the operating managers and accountants, who in the end have to bear the brunt of carrying out the requirements of a classification. At times during this period it has seemed to some that it would be impossible to reconcile all of the divergent views upon this problem and to insure an agreement on one classification, in spite of the importance of doing so. But through the wise action taken at the conference in Washington last week, a new complexion has been put upon affairs. Even the question of depreciation, which seemed so insurmountable an object, has been found, when approached and examined closely, to be largely a bogey of straw. The companies in one section of the country follow one method of accounting for depreciation, those in another a second, while in a third still a different plan seems necessary. It appears impossible to make a ruling which could be applied to the country as a whole. But if this is the case, why not leave the initiative with the State commissions who are in touch with the companies in their respective jurisdictions? This certainly seems logical. Then when a sufficiently large number of State commissions have

adopted the principle of accounting for depreciation it can be incorporated in the national classification.

Again, the assignment to the representatives of the classification committee of the Accountants' Association of the task of preparing the text descriptive of each of the accounts was a happy selection. It insures the expression of the definitions in terms which are understood throughout the railway industry, and thus reduces the chance of a great many of the uncertainties which always arise from a new classification.

It would be incorrect to consider the result at Washington last week a victory for either the commissions or the railways, because there has been at no time, according to our interpretation of the matter, a struggle for supremacy; there has been rather, a candid, honest and sincere attempt made by all whose work brought them into this subject to arrive at the best result to all concerned. This, we believe, has been accomplished, and the opinion of this journal is that the railway companies will rise to the occasion and adopt the proposed classification. We further believe that three classifications are better than two; in fact the whole affair seems to have come to a satisfactory and harmonious termination.

If any special credit should be given for the result secured, it should, in the opinion of those most qualified to judge, be divided between Professor Adams, of the Interstate Commerce Commission, and General Harries and Mr. Ham, chairmen of the committees appointed by the two street railway associations. They have devoted so much time to this subject that it is doubtful if their work can be adequately recognized. Only those who have been in intimate contact with it can appreciate the labor which they have put into the work.

The Conservation of Our Natural Resources

The most important event of national interest during the past two weeks has been the conference of Governors at the national capital to consider various subjects, but especially the conservation of the natural resources of the country. Incidentally, the meeting emphasized the tendency of the present day for all of those engaged in any particular branch of activity to meet in conventions and discuss matters of common interest. The meeting adjourned sine die and the title, "American State Governors' Association," was not adopted. But it is not visionary to foresee such a plan of organization, with probably an extension of the name, to include the governments of the Territories and insular possessions, when the representatives of those communities become so numerous and important as to justify their recognition in the title of the association.

As President Roosevelt pointed out, it has been the tremendous revolution in industrial conditions, caused by the adoption of steam and electricity, which has produced the situation which the Governors were asked to consider. The resulting enormous consumption of lumber, coal, steel and copper, which has increased, especially during the past two decades, by leaps and bounds, has accentuated the necessity of at least reducing the prodigality and waste which now accompany the use of these materials. The engineering

profession cannot be accused of a neglect of the subject, as the joint meeting of the Engineering Societies in New York last month and papers before individual societies prove, but unless reinforced by public opinion and assisted by the National and State governments, engineers can accomplish little. To electric railway companies the subject is of vital interest, as they are large consumers of lumber, coal, copper and iron, the materials especially considered at the meeting. The electric railways of the country have already felt the scarcity of lumber, and with the increasing prices which are bound to follow a gradual exhaustion of the more accessible sources of mineral supply, will have to face a very serious situation.

The proper solution of the problem, assuming it can be worked out, will tax the capabilities of engineers in this and coming generations. It is certain that water powers will be more generally developed, and it may be that satisfactory methods will be devised for utilizing at least part of the tidal and direct solar power which is now going to waste. It is also probable that improved methods of mining will reduce the cost of bringing ore from the lower levels and of reducing metal from ore now considered commercially worthless. Again, greater economies will undoubtedly be effected from time to time in the production, distribution and utilization of power.

Thus far we have considered only the possible saving in fuel and in the cost of ore, but there is no doubt that inventive genius will also be stimulated in the direction of devising substitutes for what will soon be the rare metals—steel and copper. Evidence of this is shown in the increasing use of concrete in many cases where steel or wood were formerly considered necessary. In electric railway construction, engineers have already widely adopted concrete for bridges, culverts and buildings, and are commencing its use for poles and ties. The question is not one which can be settled in a day or a year, even if it admits of a solution, but for their own protection railway companies should watch every avenue for a reduction of the cost of the materials which go to make up the total cost of the construction and operation of their properties.

Gas-Engine Operation by Steam Engineers

One reason why the introduction of the gas engine in large sizes into general industrial service has been slow is undoubtedly the assumption by many plant owners that an ordinarily skilled steam engineer is unfitted to handle gas power without long and arduous experience. It is true that the operation of a gas-engine plant requires an entirely different point of view from that needed in the steam-engine installation, and that engineers with thorough experience in the gas-engine field are much-wanted men, but there is nothing inherent in the performance of any reputable make of gas engine which is beyond the prompt mastery of any engineer possessing sound common sense and the faculty of reasoning from effect to cause. In the operation of steam engines a careless engine can increase the annual cost of repairs and the wear and tear to just as annoying a total as in a gas plant improperly handled.

The main essentials in the successful operation of a gas engine are easily looked after if the engineers in the plant

are thoroughly interested in their work. The behavior of the ignition needs to be kept well in hand, and as electricity is mainly used for this purpose in the larger installations, it is a simple matter to include a home-made indicator in the sparking circuit which will show at once when any interruption or delay in the ignition occurs. Improper ignition, valve setting or leaky valves are liable to cause a knocking inside the cylinder, but while the efficiency may not suffer as in the case of a steam engine, the cylinder may be strained. Hence the ability to diagnose gas-engine troubles by their sound is one of the most important qualifications to be acquired by the engineer whose work includes the operation of an internal-combustion engine. The sparking indicator is a valuable auxiliary in this connection.

Close control of lubrication and cleanliness of equipment are features familiar in steam-engine practice that cannot be neglected in the proper handling of gas power. It is desirable in each installation to find out how much oil per minute is essential to the proper lubrication of cylinders, valves, rocker arms, wrist pins, etc. Too much oil tends to cause carbonization when used in the cylinders, and consequent pre-ignition. In an engine with a 10-in. cylinder diameter a liberal oil supply may be a drop every five or six seconds, with a drop on each wrist-pin bearing every four or five seconds, depending somewhat upon the quality of the oil. A 20-in. cylinder will take approximately double the former supply, but in each installation it is one of the first duties of importance to determine what the best rates are, for the conditions prevailing. Such a problem is entirely within the scope of a trained steam engineer, assisted by the suggestions of the gas-engine manufacturer's installation expert.

The supply of the proper quality of gas with the best mixture of air, the uninterrupted flow of clear, cooling water through the jackets, the prevention of tarry accumulations in the gas piping and cylinders and regular temperature measurements at the discharge outlet from the jackets are matters slightly different from the points that the steam-engine operator has to bear in mind, but they involve no serious difficulties. In the gas plant it is generally the case that the responsibility per man is somewhat greater on the score of keeping the equipment in continuous service, and the cycles differ in principle from those of the steam-driven prime mover. To this end it is wise to bring to bear all the aids to complete understanding that can be employed in familiarizing the steam engineer with the new conditions, such as colored diagrams of the piping and auxiliary apparatus, well-digested operating rules and carefully compiled instructions in case of trouble. Definite periods for inspection and cleaning of interior parts and auxiliary equipment are certain to give better results than irregular examinations, although in case of emergency it is usually possible to carry the plant past the regular inspection date two or three days without a shutdown. One factor that has been helpful in interesting steam engineers in the gas engine is the development of the automobile. They become versed in the principles of automobile motors through conversation or actual practice, and the step to the larger engines comes easily.

THE NORTHWESTERN ELEVATED EXTENSION AT EVANSTON, ILL.

The Northwestern Elevated Railroad, of Chicago, began running through trains to Evanston on May 16 over the electrified Evanston branch of the Chicago, Milwaukee & St. Paul, north from the present elevated terminal at Wilson Avenue. The electrified line is 7 miles long and extends to Central Street, the north limit of Evanston, where it connects with the Chicago & Milwaukee Electric Railway. When electric operation is begun the present suburban trains of the Chicago, Milwaukee & St. Paul which are hauled by steam locomotives will be taken off. For most of the distance there are three tracks on the right of way, but for the present only two of these will be operated electrically, the third track being retained by the steam road for freight movements. Arrangements will probably be made later to handle freight north of Wilson Avenue by electric locomotives.

LINE RECONSTRUCTION

The reconstruction work involved in changing over the steam road to electric operation is largely of a temporary

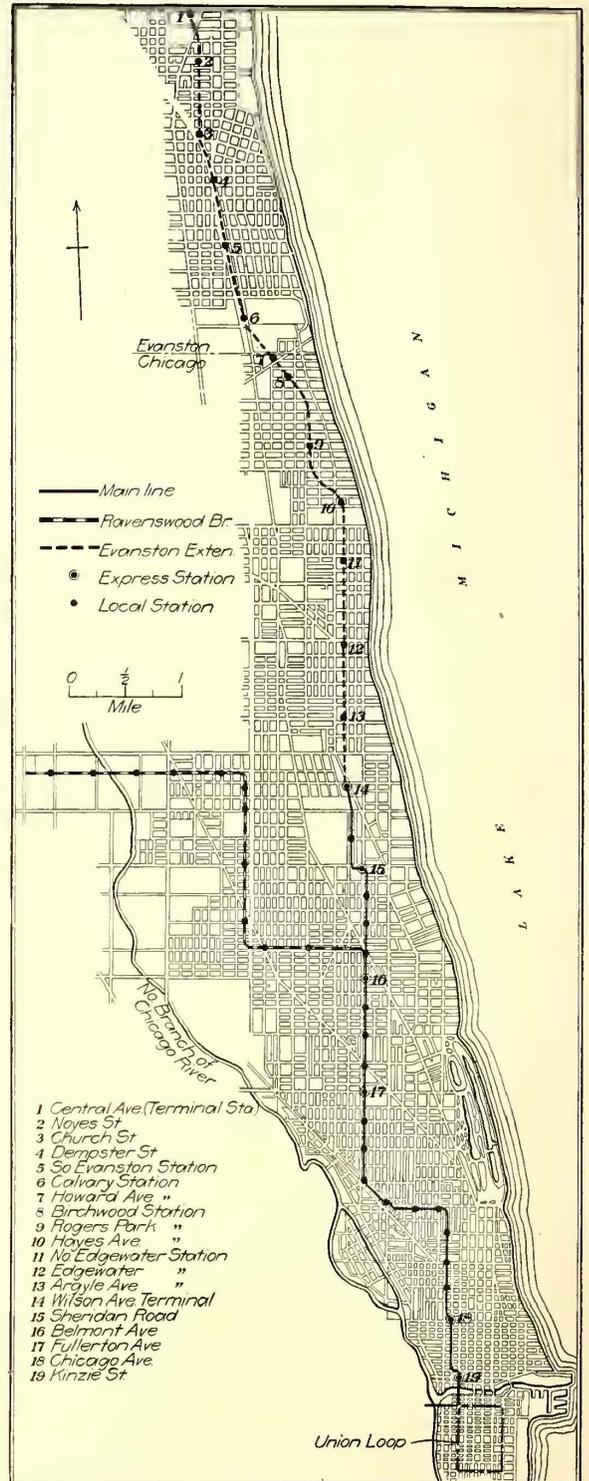


ERECTING STEEL INCLINE STRUCTURE SOUTH OF LAWRENCE AVENUE; NORTHWESTERN ELEVATED EXTENSION TO EVANSTON

character owing to the unsettled conditions arising from the track elevation ordinances pending or already passed. The steam tracks are entirely on the surface but on private right-of-way, except for a short stretch in Rogers Park. All street crossings are at grade. An ordinance has already been passed requiring the elevation of the Chicago & Northwestern and Chicago, Milwaukee & St. Paul tracks and the abolition of all grade street crossings in Evanston north of the Chicago city limits at Howard Avenue. This must be completed by Dec. 31, 1910, but no work has been done on it as yet and nothing will be done for at least another year. Inside the city limits of Chicago, from Howard Avenue south to Lawrence Avenue, no ordinance has yet been drafted requiring the elevation of tracks. The sentiment in Chicago, however, has been strongly in favor of elevation and it will probably be only a question of time until this section, too, must be elevated. The connection

with the existing structure at the Wilson Avenue terminal has been built with this end in view and 1500 ft. of the connecting incline is a permanent steel structure.

A No. 0000 overhead trolley wire will be used after leaving the incline, the wires being supported by span wires strung between wooden poles set at the side of the right-



MAP SHOWING NORTHWESTERN ELEVATED RAILROAD'S EXTENSION TO EVANSTON, ILL.

of-way. The stations are of wood with elevated platforms the height of the car floors, and long enough to accommodate five-car trains. Canopies long enough for three-car trains have been built over one end of the platforms next to the ticket booth. Entrance to the platforms will be from the street crossing at one end through a ticket booth and

shelter house. The railway company has put the track in good surface, renewed old ties and put in such switches and special work as were necessary. The track rails are bonded with No. 0000 flexible mesh bonds, soldered to the head of the rail, but otherwise they have not been changed or moved except to spread them at stations to allow for a platform width of 12 ft.

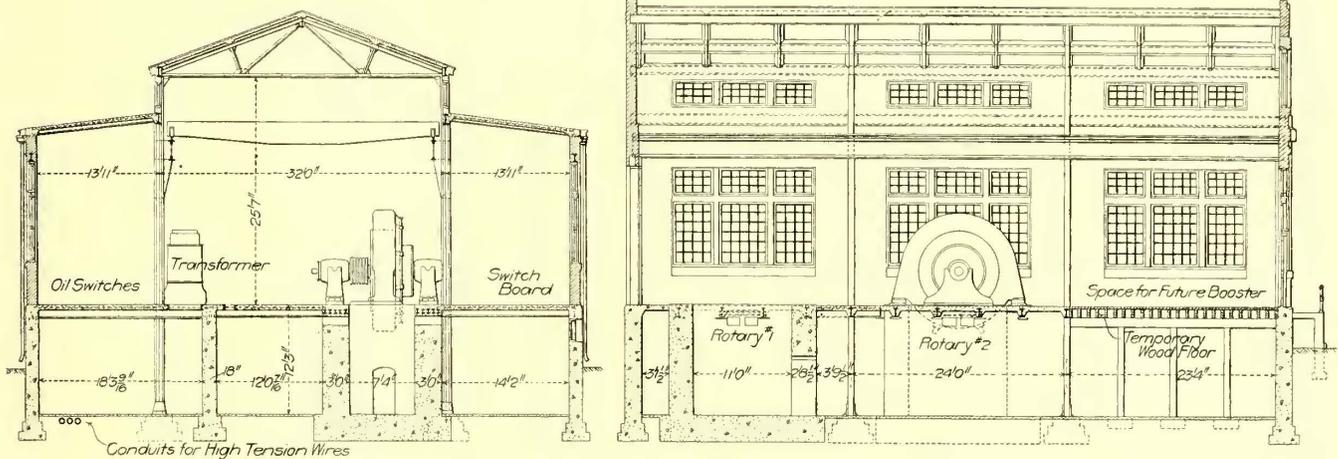
The present Wilson Avenue terminal, where the extension begins, consists of a surface yard and loop, reached by an incline beginning at Montrose Avenue, and a stub terminal on the elevated structure above, which is continued over Wilson Avenue. The incline to the Chicago, Milwaukee & St. Paul tracks connects with the north end of this stub terminal and continues over Evanston Avenue and Leland Avenue to the east side of the Chicago, Milwaukee & St. Paul right-of-way. Here it begins to descend on a 1¼ per cent grade to Lawrence Avenue, where the permanent steel structure ends. A wooden trestle 600 ft. long on a 1.7 per cent grade carries the tracks to the surface just south of Ainslee Avenue, the next intersecting street to the north.

The steel structure between Wilson Avenue and Law-

rence Avenue. With the exception of the Hayes Avenue and Central Avenue stations, which are new, all of these stations were formerly used by the suburban steam trains of the Chicago, Milwaukee & St. Paul. The stations are about half a mile apart. The territory on each side of the line is well built up, but not yet thickly populated. It is growing in population rapidly, however, and will eventually afford almost as much traffic as the region south of Wilson Avenue.

POWER SUPPLY

The extension will be supplied with power from a new substation built at Howard Avenue, which is approximately half-way between terminals. Three-phase alternating current at 20,000 volts will be purchased from the North Shore Electric Company, and will be converted into 600-volt direct current by two 2000-kw rotaries. The building is of brick on concrete foundations with reinforced concrete floors and roof. It is designed to allow for a future extension in the rear to house two more rotaries of the same capacity with the necessary transformers and switches and also a booster set to be used in connection with a 300-cell



CROSS SECTION AND LONGITUDINAL SECTION OF THE HOWARD AVENUE SUBSTATION OF THE NORTHWESTERN ELEVATED RAILROAD, CHICAGO

rence Avenue is essentially the same in details of construction as the structure of the Ravenswood extension of the Northwestern Elevated which was erected in 1906, and the recently completed Stock Yards extension of the South Side Elevated, which was described in the STREET RAILWAY JOURNAL March 7, 1908. It consists of deck plate girder spans with double-column bents and braced towers at every fourth bent. Each track is carried by two longitudinal girders, stiffened with diagonal cross bracing top and bottom. The superstructure consists of 6-in. x 8-in. x 8-ft. long leaf yellow pine sawed ties, spaced 18 in. center to center and hook bolted to the top of flanges of the girders on which they are laid. The outer guard rails are 6-in. x 8-in. timbers laid on edge, and the inner guard rails are 5½-in. x 6-in. timbers. The rails are 80-lb. A. S. C. E. section laid on 6-in. x ¾-in. tie-plates and secured with screw spikes.

The wooden trestle incline is framed of heavy timber bents, spaced 15 ft. apart and supported on concrete foundations. The track ties are bolted to two 8-in. x 16-in. yellow pine sills under each rail. The superstructure is the same as on the steel structure.

There are stations at Argyle, Edgewater, North Edgewater, Hayes Avenue, Roger Park, Birchwood, Calvary Cemetery, South Evanston, Dempster Street, Church Street, Noyes Street and Central Street, which is the terminal in

storage battery if such an auxiliary is ultimately required to handle the load. The building is one story high with a basement below and occupies a space 63 ft. x 74 ft. The operating floor is divided into three bays. In the north bay are the oil switches and circuit breakers; in the middle bay the air-cooled transformers on one side and the two rotaries on the other side, and in the south bay the switchboard. All of the wiring is in the basement and the oil switches, lightning arresters and other high-tension apparatus are mounted in a fireproof concrete air chamber under the operating floor. The transformers are mounted over openings in the floor above and a forced circulation of air is maintained through their windings by blowers creating a pressure in the chamber below. The high-tension mains enter the building from conduits in the street on which the station faces and are carried under the basement floor in ducts to the air chamber in which the switches are mounted. The d.c. feeder cables from the switchboard are carried out through the south wall of the basement. Three 800,000 circ. mil cables lead to the north end and four cables of the same size run south toward Wilson Avenue.

SCHEDULES AND FARES

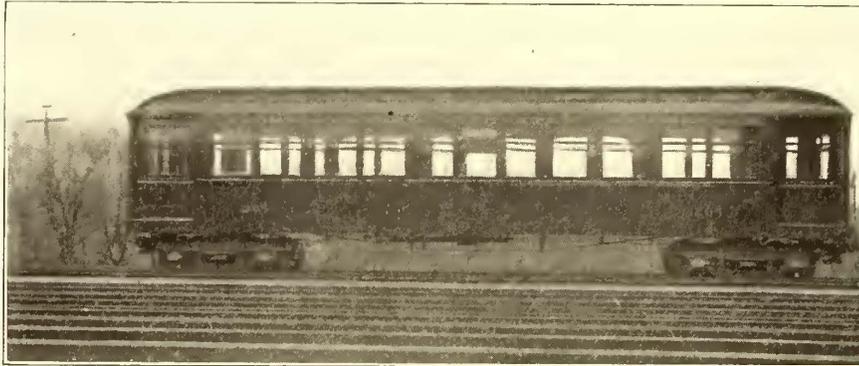
A complete rearrangement of the schedule of the entire line has been worked out to accommodate the extra trains

which will be run over the new extension. Through trains will leave the terminal at Central Avenue, Evanston, every 10 minutes from 6 a. m. until midnight, making all stops to Wilson Avenue. During the rush hours they will run express between Wilson Avenue and the Loop, but between 9 a. m. and 3 p. m. and after 7 p. m. they will run local from Wilson Avenue to Belmont Avenue and then express to the Loop. Between every two Evanston trains one Wilson Avenue Express will be started during the non-rush hours, giving a five-minute service south of Wilson Avenue, and during the rush hours two extra trains will be run, giving a 3 1/3-minute service. The Wilson Avenue expresses will also run local north of Belmont Avenue during the non-

board trains at Calvary and Birchwood stations and will collect a second fare from all passengers riding between those points. Special tickets will be sold for 5 cents at all of the company's stations, including those on the downtown loop, which may be purchased at the time of paying the initial fare and will be good for payment of this second fare; or the passenger may pay cash on the train.

ROLLING STOCK

To handle the large suburban traffic expected with the opening of the new extension the Northwestern Elevated has designed and had built at the Jeffersonville works of the American Car & Foundry Company, 40 trailer cars, and has equipped 20 of its standard motor smoking cars with overhead trolleys. The new trailer cars combine the comfort and attractiveness of interurban cars with the carrying capacity and quick loading and unloading features of the best elevated rolling stock. With a few slight changes in the seating arrangement they could be adapted admirably to regular elevated service, and in the general design of bodies and underframes they are suitable either for motor or trailer cars.

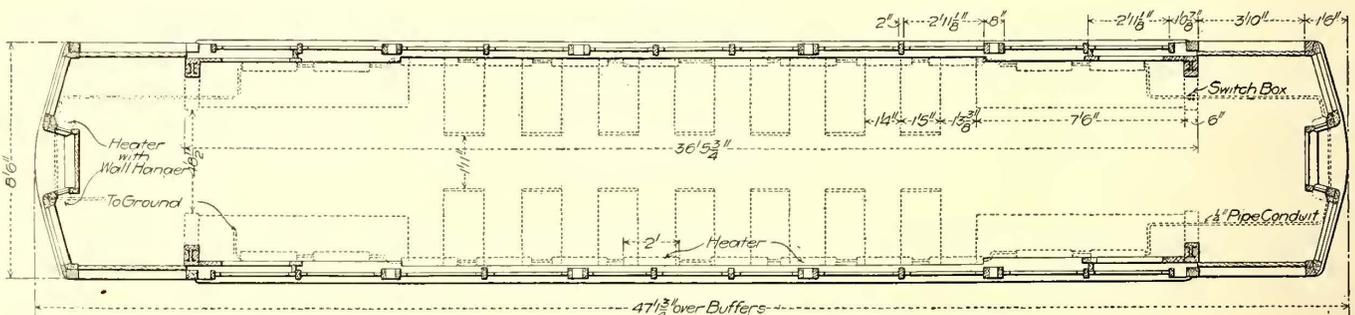


TRAILER CAR FOR EVANSTON SERVICE, NORTHWESTERN ELEVATED

rush hours. In addition to this express service Wilson Avenue local trains will be run at intervals from 4 to 5 minutes. Trains of the Ravenswood branch which now run express south of Belmont Avenue at all hours will run at 5-minute intervals as local trains during the non-rush hours and as express south of Belmont Avenue during the rush hours. This will give a 2 1/2-minute local service and 5-minute express service during the non-rush hours south of Belmont Avenue and a 4-minute local and 2-minute express service during the rush hours.

The cars have an overall length of 47 ft. 1 3/4 in., width over side sheathing, 8 ft. 6 in.; height from top of rail to top of roof, 12 ft. 7 5/8 in. The underframe is of steel and consists of two longitudinal side sills and four intermediate longitudinal sills, all 8-in. 11 1/4-lb. channels, extending from end sill to end sill without splices. The side sills are reinforced with 3-in. x 3-in. x 3/8-in. angles riveted outside along the bottom edge and extending their entire length. In addition they are stiffened by a truss rod 1 1/2 in. in diameter anchored to the bottom flange of the sill just back of the bolsters and supported at the needle beams with truss posts 16 in. deep bolted to the underside of the sills. This gives a lighter and better appearing construction than

The service on the Evanston extension will be started



PLAN OF LATEST CAR ADOPTED BY THE NORTHWESTERN ELEVATED RAILROAD OF CHICAGO

with two-car trains, adding and cutting off additional cars southbound and northbound respectively at Wilson Avenue. The running time between Central Street, Evanston, and Wilson Avenue will be 20 minutes, and from Wilson Avenue to the Loop 20 minutes, with 13 minutes on the Loop. The total time from Evanston to the Loop stations will average therefore about 45 minutes, as against 33 minutes by Chicago & Northwestern suburban trains, which land passengers, however, at Kinzie Street across the river.

deep fish-belly girded sills and permits easy access to any of the electrical or brake apparatus mounted under the floor.

The Northwestern Elevated, under the terms of its franchise, can only charge a 5-cent fare inside the city limits of Chicago, but a 10-cent fare will be charged through passengers to or from stations in Evanston. Collectors will

The bolsters and needle beams are built up around the longitudinal sills. The top member of the bolster is a 9-in. x 3/4-in. plate laid across the top flanges of the sills and bent over at the ends, which are riveted to the webs of the side sills. The bottom member is a similar plate fitted under the intermediate sills and center pin filler casting. Its ends are bent down and riveted to the inside surface of the side sill webs by the same rivets which secure the ends of the upper plate. Diagonal braces of 9-in. x 1/2-in. bars are put in between sills and riveted to short pieces of 3-in. x

3-in. x 3/8-in. angles secured to the webs of the sills. For the needle beams a similar construction is employed, using a 3-in. x 1 1/2-in. bar for the top chord, a 3-in. x 3/8-in. bar



INTERIOR OF NORTHWESTERN ELEVATED TRAILER CAR

for the bottom chord and double diagonal web bracing made of 3-in. x 3/8-in. bars.

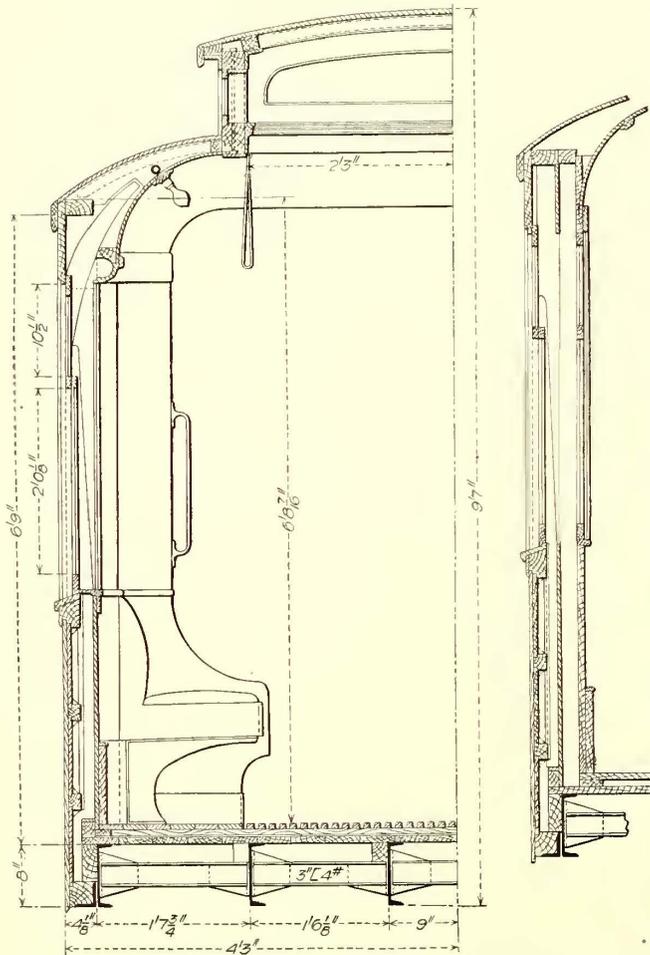
The end construction beyond the bolsters has been given particular attention to provide strength in collisions. The

firmly secured to it with two angle gussets. A plate 16 in. x 1/4 in. cut to fit the contour of the end sill is riveted across the top of the underframe members and a similar plate is riveted under the bottom. This bottom plate has riveted to its inner edge a 3-in. x 1 1/2-in. Z-bar sector which guides and supports the drawbar.

A white oak buffer timber 6 in. thick is securely bolted on the outside face of the end-sill channel. This is made in three pieces, corresponding to the bends in the end sill. The two side pieces are put on first and the middle piece applied with a driving fit at the butt joints, which are made with 2-in. x 3/8-in. steel splines. The outer face of the buffer timber is protected with a 6-in. x 3/8-in. steel plate bent to fit and turned around the ends where it is secured with heavy countersunk screws.

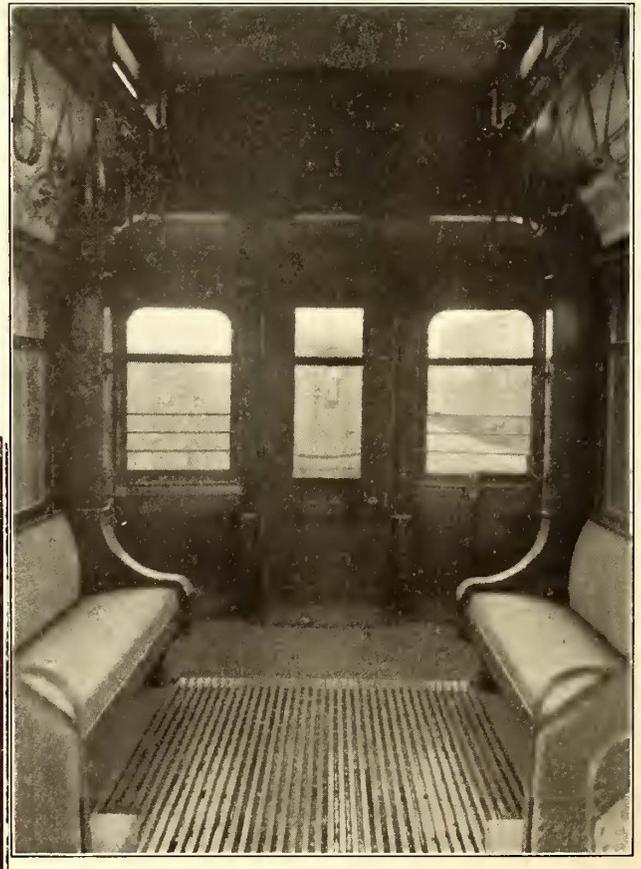
The vestibule framing consists of steel angles sheathed with wood. The corner and end door posts are 3-in. x 3-in. x 1/2-in. angles riveted to the end sill at the bottom and to a curved angle end plate 3 in. x 3 in. x 3/8 in. at the top. This is connected by bent gussets with the angle side plates of the same size which are carried back to the main portal posts. These portal posts are depended upon to offer the principal resistance to telescoping. They consist of two 5-in., 6.5-lb. channels placed back to back and secured at the bottom between two short pieces of 8-in. channels riveted between the side and intermediate sills just in front of the bolster. At the top they are connected by a 5 3/4-in. x 1/2-in. plate extending across the car over the portal opening.

On each side of the car between the corner posts there



TWO PART-SECTIONS OF NORTHWESTERN ELEVATED CAR

end sill is a bent channel with flanges turned in, of the same size and weight as the longitudinal sills. It is chamfered at the ends to fit tight against the ends of the side sills. The intermediate sills are fitted into the end sill and



END PORTAL OF NORTHWESTERN ELEVATED TRAILER CAR

are four compound or panel posts and six single posts. The panel posts are made of two pieces of yellow pine 1 3/4 in. x 3 5/8 in., separated by furring strips gained into the posts and nailed and glued. A 5/8-in. rod ties the plate

and sill together at each of these main posts. The single posts are 2 in. x $3\frac{5}{8}$ in. Between the panel posts and below the windows are $1\frac{1}{4}$ -in. x 4-in. diagonal braces nailed and glued at the ends.

The outside sheathing is applied in two layers. The inner thickness is of $\frac{1}{2}$ -in. dressed boards extending lengthwise of the car, fitted in between and glued and screwed to rebated ash furring strips 2 in. x $1\frac{3}{4}$ in. The outer thickness of 2-in. x $\frac{1}{2}$ -in. boards, tongued and grooved and chamfered, is glued and blind-nailed to the furring and inner sheathing. This construction gives practically a solid car side below the windows with a minimum thickness, but ample stiffness.

The main roof carlines rest on the plates over each intermediate and panel post. They are made up of a $1\frac{1}{4}$ -in. x $\frac{1}{4}$ -in. wrought iron bar forged to the shape of the roof and two white ash strips 1 in. x $1\frac{1}{2}$ in. bolted together with $\frac{1}{4}$ -in. carriage bolts. The ends of the carlines are forged with two lugs at right angles to the bar, forming a foot which is secured to the plate by four $\frac{3}{8}$ -in. bolts. The intermediate carlines are 1-in. x $1\frac{1}{2}$ -in. white ash strips. On the carlines is placed a layer of $\frac{1}{2}$ -in. tongued and grooved roof boards, and on this a single layer of No. 6 cotton duck with a coat of thick white lead between. The canvas is then given two coats of white lead and a third coat of standard body color. Over the end and side doors copper gutters are provided to lead the water away from the openings.

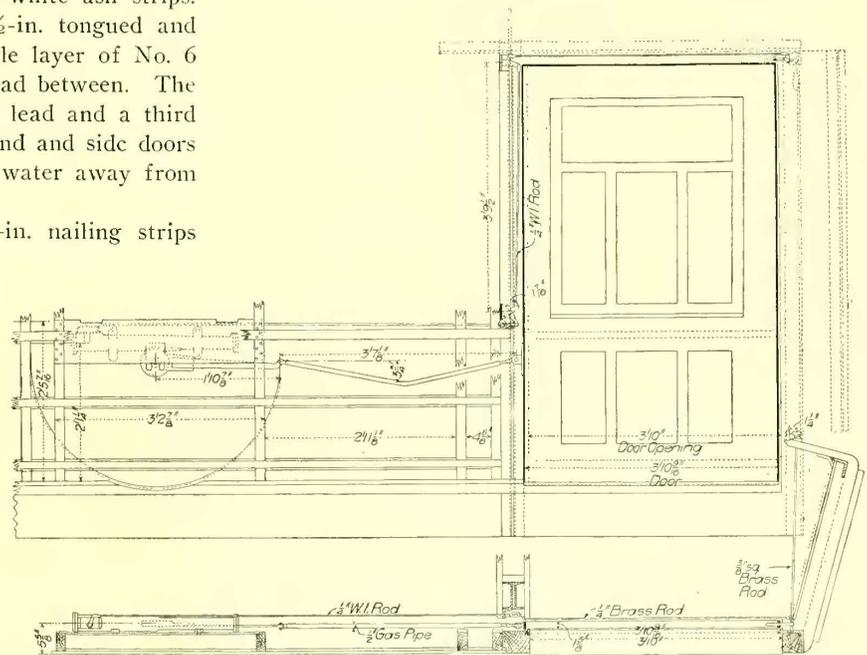
The car floor is laid on 2-in. x $2\frac{1}{2}$ -in. nailing strips bolted to the longitudinal sills and furring strips of the same size laid on top of the 3-in. channel cross-ties in the underframe which are spaced 40 in. apart. It consists of two thicknesses of 1-in. x 4-in. tongued and grooved long-leaf yellow pine, the lower thickness running 45 deg. to the axis of the car. Between the under floor and the finish floor is a layer of best quality hair felt $\frac{1}{4}$ in. thick, compressed in nailing to $\frac{1}{8}$ in. thick. The finish floor is laid in two ways, longitudinally under the seats and crosswise in the aisle. The longitudinal flooring is laid to shims of the same thickness as the flooring in the aisle so as to bring it up flush with the wearing strips laid in the aisle. At the ends of the car on each side the flooring consists of one thickness of boards tapered in thickness from $1\frac{1}{8}$ in. at the inner end to 1 in. at the side door sills.

The interior of the car is finished in solid mahogany of selected color with white maple head lining. The portals at the ends of the car are finished with graceful curves and rounded corners, but no attempt at ornamentation has been made. They give the car the appearance of being much longer than it is and afford no obstruction to entrance or exit.

The side doors in the vestibules have an opening of 44 in. They slide into pockets in the wall of the car back of the longitudinal seats and are operated by compressed air controlled by a valve handle outside of the end door of the vestibule. The doors are of paneled mahogany bound on the edges with a narrow strip of sheet steel to prevent warping. A $1\frac{1}{2}$ -in. x $\frac{3}{4}$ -in. x $\frac{1}{8}$ -in. steel channel is secured to the bottom edge as a guide. It engages with a malleable iron floor plate or door sill in the door opening

and a smaller channel laid on the bottom of the door pocket. The doors are hung on McCabe anti-friction ball-bearing hangers which consist of two spherical rollers running in a cylindrical tube or track. They cannot jam or get out of the track.

The pneumatic door operating device is one patented by J. E. Osmer, master mechanic of the Northwestern Elevated, and was described in the STREET RAILWAY JOURNAL Oct. 13, 1906, and Feb. 9, 1907. It consists of two cylinders in line, one of smaller diameter than the other, and having a common piston. This piston carries a rack, engaging with a geared sector to which is attached the operating arm through a slot in the bottom of the cylinder casting. The valve is located at the end of the larger cylinder. To close the door, air from the control line of the brake system at 70 lb. pressure is admitted to the end of the small or high-pressure cylinder through a supply pipe from the valve. The large cylinder has a free exhaust to the atmosphere through a pin valve which is wide open at the beginning of the stroke. An eccentric on the sector, how-



DETAILS OF DOOR-OPENING MECHANISM

ever, is connected to this pin valve and so adjusted that during the last 6 in. of the movement of the door the pin valve closes and throttles the exhaust of the large cylinder, thereby cushioning the door as it comes against the stop. To open the door, the air supply is cut off and the large and small cylinders are connected by a port in the valve. This allows the volume of high-pressure air in the small cylinder to expand and equalize in the large cylinder. With an equalized pressure on both sides the piston tends to move into the small cylinder because of the difference in area on which the same equalized pressure is applied. As the piston moves toward the end of the small cylinder it blanks the large by-pass port through which the air flows in equalizing, leaving only a small port through which the remainder of the air can pass over to the other side. This gives the same cushion effect at the end of the stroke as the pin valve used with the closing movement.

The cylinders are mounted behind the back cushions of the longitudinal seats and the mechanism is entirely concealed. The valve is moved by a series of rods and bell cranks which are driven by a horizontal shaft extending

tom plate. They rest on triple elliptic springs, which are in turn carried on a spring plank made up of two 3-in. x 3-in. x 6.8-lb. Tees supported by 3-in. x $\frac{7}{8}$ -in. swing links. The wheel base is 6 ft. and the equalizer springs are spaced 3 ft. apart. The axles have journals $3\frac{1}{2}$ in. x 6 in. and the wheels are 31 in. in diameter. The brakes are inside hung without brake beams. An equalizing cross-bar connects the two live levers on the inside end and these are attached at the bottom to push rods connecting to the bottom of two dead levers carrying the other pair of brake heads. The two sets of live and dead levers are connected across by a $\frac{3}{4}$ -in. rod and pipe separator to keep the shoes in line on the wheel treads. The shoes are hung with double links inclined at an angle of 110 deg. with the axis of contact of the shoe on the wheel to compensate for the greater load on the forward wheel in making a stop. The trucks weigh 7800 lb. each and are designed for a center-pin load of 22,500 lb. estimated from a weight of car body of 27,500 lb. and 17,500 lb. of live load.

The bars are equipped with Westinghouse A. H. R. quick-action air brakes with 10-in. x 12-in. cylinders and automatic slack adjusters. Other special equipment includes S. & W. drawbars, Hunter destination signs, Mason safety step treads and Pantasote curtains.

This paper is indebted to Mason B. Starring, president of the Northwestern Elevated, for the information from which this article was prepared.

CAR DESIGN FOR RAPID TRANSIT SERVICE IN NEW YORK

In the STREET RAILWAY JOURNAL for Feb. 29, 1908, an abstract was published of the report of B. J. Arnold to the Public Service Commission of New York City suggesting improvements in the design of subway cars. As will be remembered, Mr. Arnold recommended that instead of single platform doors, double doors separated by a space $48\frac{3}{4}$ in., should be used near the end of each car, one for exit and one for entrance. The width of the present doors of the subway cars is, for wooden cars $38\frac{3}{4}$ in., and for the last type of steel cars $49\frac{11}{16}$ in. Mr. Arnold stated that the estimated cost of changing the present cars to this type of car would be \$2,000 for each steel car and \$1,500 for each wooden car. The report was submitted by the Public Service Commission of the First District to the Interborough Rapid Transit Company for its consideration, and on May 12 and 13 the commission held a hearing to determine whether an order requiring such a change should be passed.

Frank Hedley, general manager of the company, testified that he had estimated that the cost of transforming a steel car in the way suggested would be about the same as that given by Mr. Arnold, \$2,000, but that he estimated that the cost of changing the wooden cars would be \$2,200 instead of \$1,500. This would make the entire cost of changing the 800 cars now in use \$1,800,000.

Several objections to this type of car were presented at the hearing by the company's representatives. The first was that the car would be considerably heavier than those used at present, weighing 3300 lb. more than the wooden cars and 1200 lb. more than the steel cars. The second objection was that the car structurally would not be as strong as the existing cars in spite of its additional weight. From the standpoint of construction, the placing of a second door close to the end of the car body was more undesirable than to have the door in the center of the car.

They also thought that the design would materially not relieve the congestion, as passengers would continue to stand near the inlet door and thus block egress from the car. For example, during the rush hours the passenger boarding an express car at Fourteenth Street would find it almost impossible to work his way through the car to the exit door, as the passengers seek only their individual comfort and can be made to move forward only with great difficulty.

Mr. Arnold's recommendation also included the use of railings, between the openings of which the passengers would gather to enter the express trains. This was based on his observations that the motormen would be able to gage their stops so accurately that the doors would always come opposite these openings. The testimony submitted by the Interborough Rapid Transit Company on this point was that, as a rule, in actual operation, not more than 25 per cent of the motormen could make the stop within 4 ft. of a given point. That is, as the opening between railings was $46\frac{3}{4}$ in., fully 75 per cent of the motormen would not make a satisfactory stop. Another point was that the new design permanently eliminates eight seats, and during the rush hours 12 other seats would be practically unavailable. Even assuming that only eight seats were lost, it would mean that 15 per cent more cars would have to be operated to give the same seating capacity. Under the present schedule, conditions in the subway are so severe that it is very doubtful whether 15 per cent more cars could be operated, not to mention the extraordinary expense for additional rolling stock. Mr. Arnold, in rebuttal, claimed that his observations showed such stops could easily be made by the proposed cars.

Mr. Hedley remarked during the hearing that if he were to build a subway in the light of the experience of the present one, there would be a thousand and one changes in every department of construction and operation, but the problem before his company was to make the best of what it had. He also said the 50 latest steel cars built by the company, and illustrated in the STREET RAILWAY JOURNAL for March 14, had been constructed so that side doors could be introduced if necessary. The cars have two extra wide posts near the middle of the car on each side. The panels between these posts can be removed, leaving a doorway 42 in. wide.

MERCHANTS' EXCURSIONS ON THE ILLINOIS TRACTION SYSTEM

On May 14, the wholesale shoe merchants and manufacturers of St. Louis arranged an excursion from Springfield, Ill., to St. Louis over the lines of the Illinois Traction System for the retail shoe merchants in all of the cities reached by the interurban road as far east as Danville and as far north as Peoria and Bloomington. A special train left Springfield at 8 a. m., arriving at St. Louis at 12 m. Returning, the special train left St. Louis at 6 o'clock and arrived in Springfield at 9:30 p. m. Three hundred retail-merchants were the guests of the wholesalers and manufacturers for the day. Free transportation to Springfield, good on regular trains, was furnished to all merchants living north and east of Springfield on application to the general traffic manager of the Illinois Traction System. This transportation was paid for by the Manufacturers' Association of St. Louis, which also paid the entire expenses of the special excursion train in both directions. The traction company co-operated in every way to make the excursion a success.

THE INDIANAPOLIS, CRAWFORDSVILLE & WESTERN TRACTION SYSTEM

The new line of the Indianapolis, Crawfordsville & Western Traction Company, known as the Ben-Hur route, from Indianapolis, northwest to Crawfordsville, Ind., 45.1 miles, was built for high-speed operation. The maximum

and adjoins the Peoria division of the Big Four. It runs through a rich agricultural territory and reaches the towns of Clermont, Brownsburg, Pittsboro, Raintown, Lizton, Jamestown, New Ross and Linnsburg.

TRACK AND ROADWAY

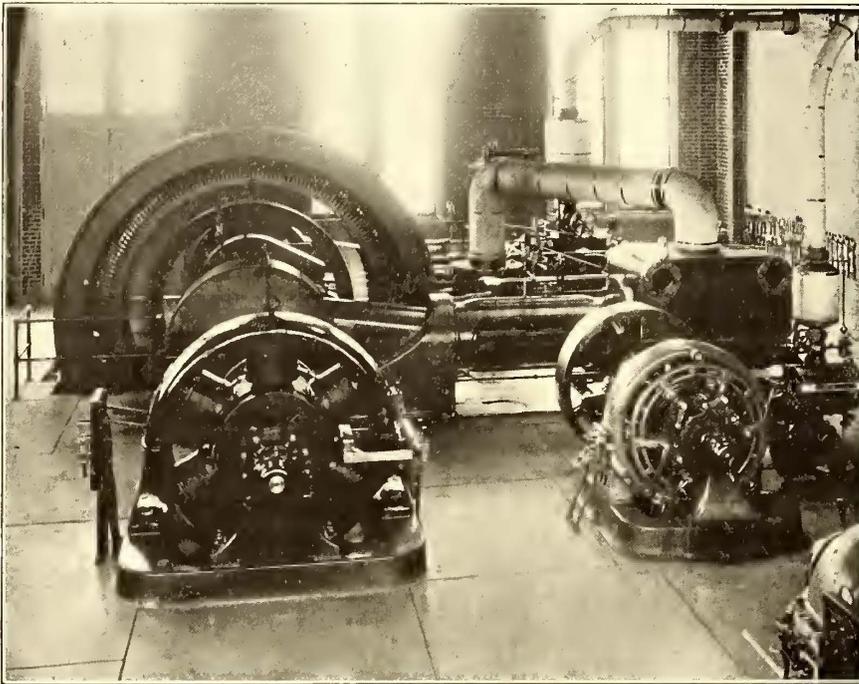
The line is well located, and little heavy grading was required to keep within the maximum gradient of $1\frac{1}{4}$ per cent. Two steel bridges were built over the principal streams crossed, one of 150-ft. span over Big Eagle Creek and one of 108-ft. span over White Lick Creek. These are through trusses of modern design and construction and capable of carrying the heaviest interurban cars. All other waterways are bridged with concrete structures reinforced with Kahn bars. Most of these bridges are of the girder or slab type. Semi-circular concrete arch culverts were put in at two places.

The track is laid with 85-lb. A. S. C. E. section rails from the city limits of Indianapolis to Brownsburg, 12 miles, and with 70-lb. rail for the remainder of the distance to Crawfordsville, 33 miles. The joints are spliced with standard four-bolt angle bars, suspended between ties. The ties are 6 in. x 8 in. x 8 ft. chestnut and oak, laid approximately 2800 to the mile. The line is ballasted with about 2000 cu. yd. of gravel per mile. Stub-end sidings are located approximately $2\frac{1}{2}$ miles apart. The rails are electrically bonded at joints with

250,000 circ. mil copper bonds, part of which are pin connected and part soldered.

POWER STATION

The power station was built at Crawfordsville with the idea of having it centrally located when the contemplated extension west to Danville, Ill., should be built.



ONE OF THE MAIN GENERATOR UNITS IN THE CRAWFORDSVILLE POWER STATION

grade is $1\frac{1}{4}$ per cent, and no curves outside of cities are sharper than 3 deg. 30 min. Adequate power has been provided and the rolling stock is designed for a speed of 60 m.p.h. Limited trains are scheduled to make the trip be-



POWER STATION ON SUGAR CREEK AT CRAWFORDSVILLE

tween terminal stations in Crawfordsville and Indianapolis in 1 hour and 25 minutes, of which 20 minutes is consumed in running 3 miles in Indianapolis. The line is built on private right of way and for most of its length parallels



SHOPS AND CAR BARNS AT CRAWFORDSVILLE

It is a fireproof building, constructed of brick and reinforced concrete with steel skeleton frame. Two transverse walls divide it into three parts—the engine room, boiler room and coal storage bunkers. An unloading track ex-

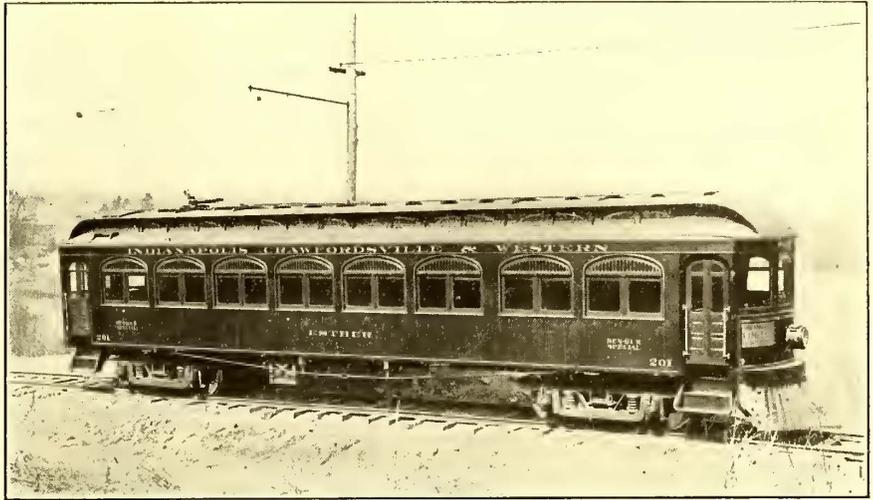
tends into the building over the coal bunkers, and coal delivered in hopper-bottom cars is dumped directly into the storage bins below. From the bunkers, which have a capacity of 600 tons, the coal is delivered immediately in front of the boiler furnaces through arch openings in the wall separating the bunkers from the boiler room. The station is built on the sloping bank of Sugar Creek, and this permitted the unloading track to be run into the building without using a trestle incline.

BOILER ROOM

The boiler room contains four Stirling water-tube boilers, each of which has a heating surface of 3500 sq. ft. They are grouped in pairs on each side of a central space in which are installed the feed-water heater, low-pressure pumps and boiler feed pumps. The furnaces contain extra long grates to permit burning low-grade fuel, which is fired by hand. Uptakes from each boiler connect with a flue extending out through the east wall of the building to the concrete stack. Hand-operated dampers are placed in each uptake. The stack, built by the Weber Company, is reinforced concrete, 8 ft. in diameter, and 175 ft. high. Both the stack and the breeching are of sufficient size to take care of any probable future requirements of the station.

The boiler water supply pumps are installed in duplicate, each pair of ample capacity to handle the entire amount of water required for all four boilers. Cold feed water from the source of supply is pumped by the low-pressure pumps into a Warren-Webster open feed-water heater mounted above the space separating the two banks of boilers. Hot feed water is pumped into the 3½-in. boiler-feed line by the high-pressure feed pumps which draw their supply by gravity from the elevated heater. The low-pressure pumps are of the piston pattern, with cylinders 9 in. and 8 in. x 12 in., while the boiler feed pumps are of the outside center-packed plunger type with cylinders 12 in. and 8 in. x 12 in. Both were furnished by Dean Brothers, Indianapolis. The center drum of each

supported by brackets on the boiler room wall back of the boilers and about 10 ft. above the floor. The header is anchored at the middle bracket and is carried on rollers at the other points of support. A valve in the center of its length divides it into two sections, each supplied by one battery of boilers. An auxiliary steam header 5 in. in diameter and supported over the main header is connected



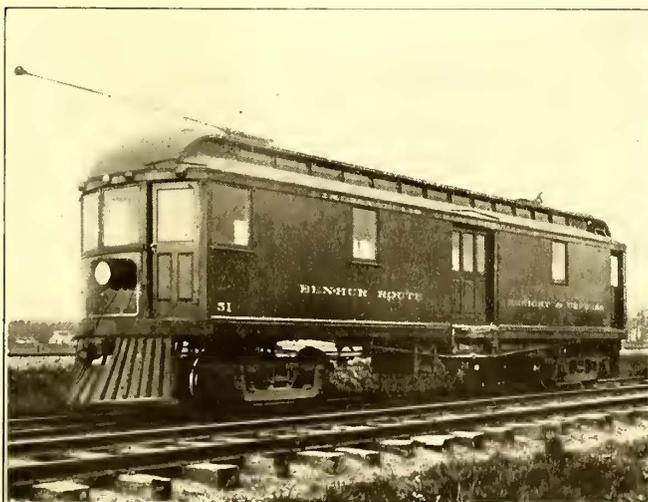
LIMITED CAR

at the ends to each section of the main header. It supplies the exciter engine, boiler pumps and condenser air pumps.

All live steam pipes are covered with Johns-Manville "asbestos-sponge felted" insulation, 1½ in. thick. Exhaust steam pipes are covered with a 1-in. thickness of the same material. All live steam piping and valves were designed for a working pressure of 250 lb. per sq. in.

ENGINE ROOM

The arrangement of the apparatus in the engine room is symmetrical. At each end of the room is a 700-kw horizontal cross-compound engine and direct-connected generator, and between them are the exciter units and a rotary converter. All of the high tension and control apparatus



BAGGAGE AND EXPRESS CAR

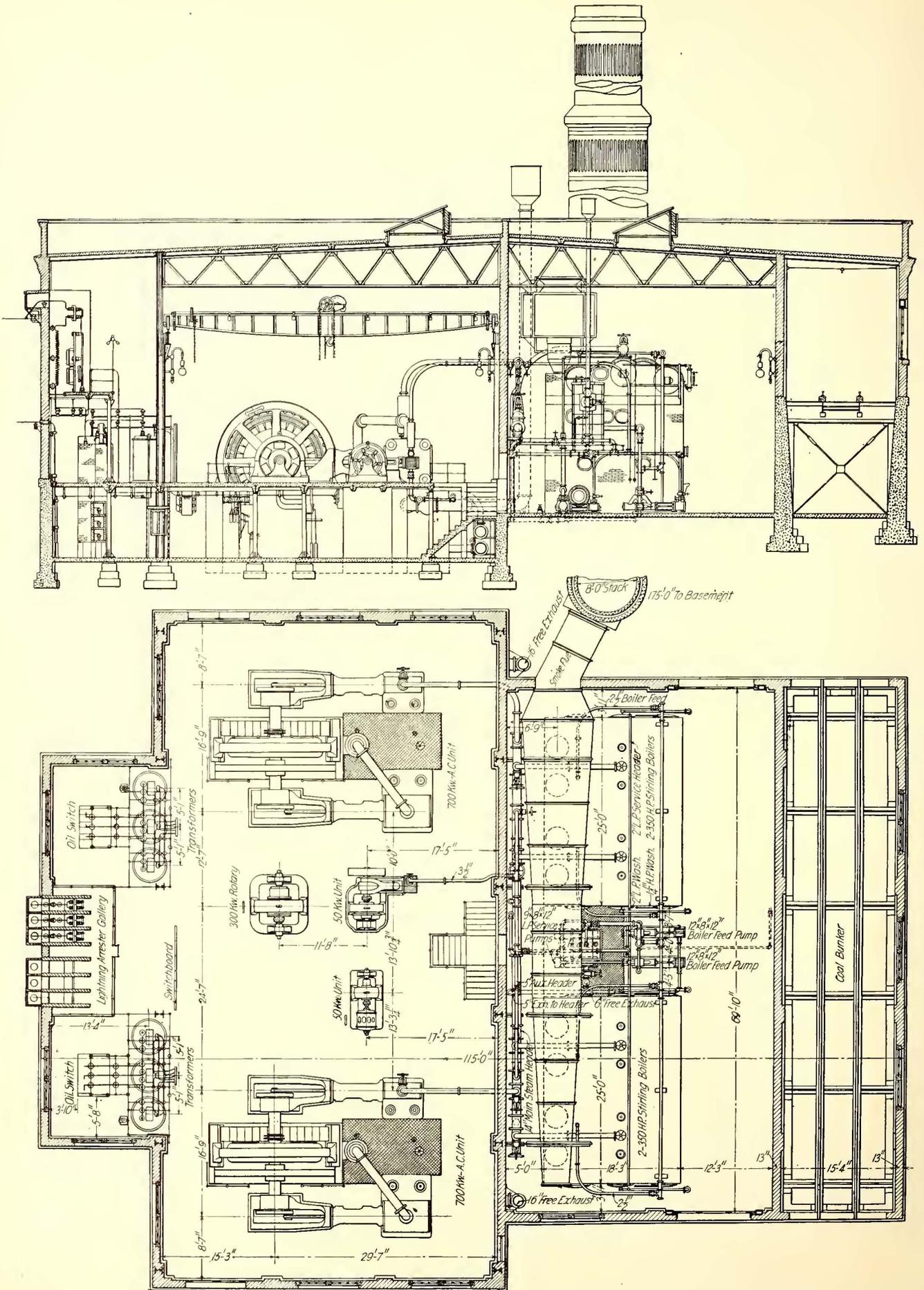


INTERIOR OF LIMITED CAR

boiler is connected to the main feed line with 2½-in. pipe. All boilers are connected to a common blow-off header.

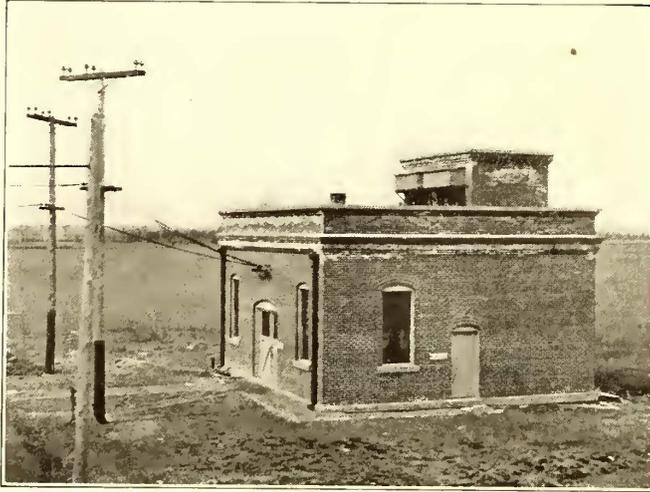
The dry steam drum of each boiler is connected by a 7-in. pipe to the main steam header 14 in. in diameter, which is

is mounted in a bay opposite the space between the generating units and the switchboard is in front of the bay. This arrangement required short steam and electrical connections, and resulted in a station that is almost ideal from



PLAN AND SECTION THROUGH POWER STATION; INDIANAPOLIS, CRAWFORDSVILLE & WESTERN

volts when run at 107 r.p.m. Current for exciting the rotating fields of the generators is obtained either from a 50-kw, 120-volt d.c. generator direct connected to a simple Ideal engine, or from another generator of the same size which is driven by an induction motor supplied with three-phase alternating current from the main generators. The steam-driven exciter unit is used when starting the plant after a complete shut-down, and then the motor-driven unit is cut in after one or both of the main generators are in



SUBSTATION, SHOWING ENTRANCE TOWER FOR TRANSMISSION LINE

full operation. Current for station lighting is also obtained from these exciter units, the steam-driven machine being run for this purpose at night after the plant is shut down.

The main generator leads are carried under the engine room floor on insulated brackets supported from the floor beams to Westinghouse type B, 1200 amp. automatic oil switches, which are operated electrically from the switchboard by A. & J. M. Anderson remote control switch operating devices. The automatic feature of the oil switches is so arranged that it may be thrown out of service when the machines are being synchronized; after synchronism it is of course thrown in service again. The low-tension busbars, which are carried on a steel framework supported on brackets from the floor above, are connected direct to the low potential side of the step-up transformers.

The six step-up transformers, located in groups of three on each side of the switchboard, are of the Allis-Chalmers oil-filled water-cooled type, and have a capacity of 250 kw each. Each set is delta connected and the line potential is stepped up to 33,000 volts. The leads from the high-voltage taps of the transformers pass to Westinghouse type E non-automatic oil switches and then to high-tension buses installed in compartments in a fire-proof structure built of concrete slabs and brick and located in the basement. The buses are of No. 2 copper wire and are supported on three-part Thomas insulators. The bus structure is supported on concrete columns about 2 ft. above the basement floor. With the exception of the high-tension series transformers, all instrument transformers are also installed in the basement. The series transformers for controlling the high-tension switches are placed in brick compartments built in with the oil switch compartments on the engine room floor.

The outgoing high-tension lines are controlled by Westinghouse type C automatic oil switches connected through disconnecting knife switches to the busbars. These lines

are carried up the wall of the building to a concrete steel lightning arrester gallery which is in plain view from all parts of the engine room. On it are installed Westinghouse low equivalent 35,000-volt arresters in separate brick compartments. Provision has been made in the construction of the building for two outgoing transmission lines, but only one line has been installed. The second line will be used to feed the Danville extension of the system when it is built.

Space is provided in the engine room for two rotary converters, but only one has been installed. This is an Allis-Chalmers-Bullock 300-kw, 405-volt a.c., 650-volt d.c. machine, and is connected to the low-tension busbars on the a.c. side and to the trolley feeder bus on the d.c. side. It feeds the trolley line half-way to the first substation, 13 miles distant.

The switchboard built by the Western Electric Company, of Chicago, consists of seven panels of black Monson slate. The high potential circuits are manipulated by means of an auxiliary low potential control system; no high potential wires are carried to the switchboard. The d.c. feeder, d.c. rotary, a.c. rotary and high tension control circuits each occupy one panel, and each of the two generators and the exciter sets have separate panels.

Bare copper wire is used for busbars and in all other places when protected by barriers. Wires not so protected are heavily insulated. High-tension wires are insulated with varnished cambric for 40,000 volts.

Arc lamps hung from ornamental wall brackets are used for lighting. There are four lamps in the boiler room and eight in the engine room. The basement, the rear of the boilers and other parts of the building are lighted by incandescent lamps. All light wires are run in pipe conduit buried in the walls.

The regular operating force in the power station con-



INTERIOR OF SUBSTATION

sists of four men—an engineer, an oiler and two firemen.

LINE AND OVERHEAD CONSTRUCTION

A single line of 40-ft. cypress poles with 9-in. tops carries the telephone, feeder and high-tension wires on two sets of cross-arms and supports the flexible pipe brackets from which the trolley wire is strung. In towns, 60-ft. poles were used to elevate the high-tension wires on the top cross-arm above trees and other obstructions. The butts of poles for 6 ft. from the end, as well as the tops and all cuts and gains for cross-arms, were treated with "avenarius carbolinum."

The high-tension wires are No. 4 B. & S. gage hard drawn copper. They are carried on three-part porcelain

insulators having malleable iron pins and mounted on cross-arms 10 ft. long. The wires are transposed spirally about once every two miles so as to give two complete turns between substations. An extra cross-arm on two adjoining poles is used in making these transpositions.

On the lower cross-arms, which are just above the trolley brackets, a 400,000 circ. mil insulated copper feeder cable is carried on glass insulators. Taps from this cable to the trolley wire are made through an insulated feed span attached to the end of the trolley bracket and to the pole with ball insulators. A specially designed insulated clamp attached to the span wire of the bracket gives added support just inside of the trolley wire.

The trolley wire is No. 000 grooved copper, and is carried by extra heavy galvanized hangers and bronze ears suspended from 10-ft. flexible pipe brackets. The H. W. Johns-Manville Company's molded mica insulation is used on the trolley line, and the brackets, cars and miscellaneous fittings were furnished by the Electric Service Supplies Company.

In addition to the feeder cable, the lower cross-arm carries two No. 9 galvanized iron telephone wires on glass insulators. Jack boxes are mounted on the poles every half mile and at all sidings, and are connected to these wires for use in train dispatching. The telephone lines are run into all passenger stations and substations and terminate in the general offices in Crawfordsville.

At intervals of one-fifth of a mile the pole line is protected against lightning by Garton lightning arresters, which are grounded to the cross-bonds in the track and to galvanized iron pipes driven in the ground.

SUBSTATIONS

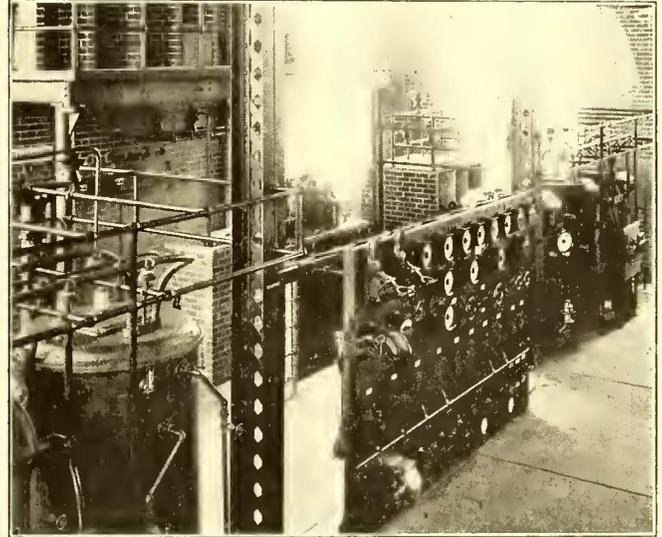
There are three substations on the line, located 13, 26 and 39 miles, respectively, from the power station. The compact arrangement of apparatus and the simplicity and openness of the wiring in them are noteworthy. The buildings are identical. They are of fireproof brick and concrete construction, 32 ft. wide and 36 ft. long. The equipment in each consists of one 300-kw rotary converter, three 110-kw oil insulated transformers, switchboard, re-

insulated leads are carried overhead to the transformers on an iron pipe framework.

The substations are designed to be of ample size to accommodate in the future a complete duplicate set of apparatus.

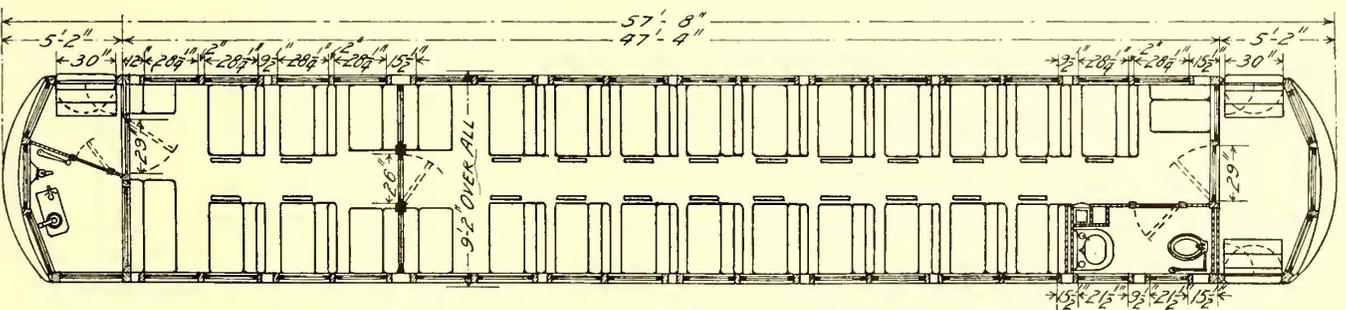
STATIONS

At most of the small towns along the line passenger stations similar to the one built at Brownsburg and shown in one of the engravings have been built. These station build-



SWITCHBOARD AND TRANSFORMERS IN CRAWFORDSVILLE POWER STATION

ings have a passenger waiting room in one end and a freight room in the other end, with an office between the two rooms. The freight room floor is built at the same height as the floors of the express cars to facilitate loading and unloading. A platform has been constructed behind and along one side of the building so that freight for immediate shipment can be loaded on the cars direct without passing through the freight room. A ticket agent is in charge at each of these stations.



FLOOR PLAN OF LIMITED CAR; INDIANAPOLIS, CRAWFORDSVILLE & WESTERN

mote control high-tension oil switches and lightning arresters. The rotaries are duplicates of the machine installed in the power house. All of the apparatus, with the exception of the lightning arrester equipment, is located on the main floor. The lightning arresters are mounted between brick barriers on a gallery under the entrance tower in the roof and are visible from the floor when standing near the rotary or the switchboard. The high-tension wires come into the tower on the roof from the pole line under a concrete bonnet. They then pass through disconnecting knife switches and spiral choke coils and drop to a distant controlled, hand-operated switch mounted in a brick compartment on the floor. From the terminals of this switch in-

At Crawfordsville a long-term lease has been obtained on a two-story brick building near the court house. A siding has been extended into the alley along one side of the building and the lower floor is used as a passenger waiting room, trainmen's room, dispatcher's office and freight room in the rear. On the second floor are the operating offices of the company.

REPAIR SHOPS AND BARN

The shops and car barn are located about one-quarter of a mile from the center of Crawfordsville. The shop building is a brick and concrete structure measuring approximately 120 ft. x 43 ft. A brick partition wall divides the interior into a machine shop and a woodworking and gen-

eral repair shop. Under the track entering the building is a concrete pit about 60 ft. long.

The tool equipment of the shop consists of one of each of the following:

24-in. x 14-ft. extra heavy engine lathe.

18-in. x 8-ft. engine lathe with instantaneous change gears.

18-in. back geared crank shaper.

34-in. drill press.

15-in. drill press.

34-in. hand saw.

Power back saw.

Grindstone.

Emery grinder.

Variety saw bench, with boring attachment.

All the machinery is driven by an Allis-Chalmers-Bullock direct-current motor.

Adjoining the shop is a car barn large enough to house



STATION AT BROWNSBURG

all of the company's equipment. It is a frame structure, sheathed with corrugated galvanized iron.

CAR EQUIPMENT

The rolling stock consists of eight passenger cars and two baggage cars, all of which were built by the Jewett Car Company. Six of the eight passenger cars are designed for local service and the other two for limited service. The local and limited cars are of the same size, 57 ft. 8 in. long, 9 ft. 2 in. wide and 9 ft. 9 in. high from underside of sills to top of roof. This extra width permits seats 40 in. long to be used with an 18-in. center aisle between. Both types of cars are finished in inlaid mahogany, with double windows surmounted by arches of leaded art glass. The seats are Hale & Kilburn's non-reversible type, and in the main compartments are upholstered in green plush and in the smoking compartments in leather.

The limited cars are divided into a smoking compartment in front, from which a clear view ahead can be had, and a main compartment in the rear. Local cars have a baggage compartment in front of the smoking compartments; no baggage is carried on limited cars. All cars are provided with a toilet room equipped with a sanitary water-flushed closet and on the limited cars a lavatory is provided in addition. The toilet rooms are finished in white enamel. The exterior of the limited cars is finished in French carmine; but the local cars are painted standard Pullman body color.

The equipment and trucks of all cars, including the baggage cars, are identical. Each car has four Allis-Chalmers-Bullock 75-hp motors with Allis-Chalmers controllers de-

signed for a speed of 60 m.p.h. All wiring is carried in iron pipe conduit.

The trucks are of the Baldwin Locomotive Works M. C. B. type with 7-ft. wheel base and triple elliptic springs to insure easy riding. The journals are 5 in. x 9 in. and the axles are 6 in. in diameter at the center and 7 in. at the wheel seat. Standard rolled steel wheels 37¼ in. in diameter with 3½-in. treads and 7/8-in. flanges are used. The passenger cars are equipped with Christensen straight air apparatus, but the baggage cars have combination straight and automatic air equipments. Local cars are heated with Peter Smith hot-water heaters, while the limited cars are provided with Consolidated electric heaters. The passenger cars have Van Dorn No. 21 drawbars; the baggage cars, however, are equipped with Janney automatic couplers.

ORGANIZATION

The Indianapolis, Crawfordsville & Western Traction Company was incorporated in 1903 under the laws of the State of Indiana, as the Consolidated Traction Company. The name was changed in 1906.

The officers of the company are: A. A. Barnes, Indianapolis, president; Eli P. Baker, Crawfordsville, vice-president; Oliver P. Ensley, Indianapolis, treasurer; Edward Hawkins, Indianapolis, secretary.

The property is controlled by a board of five managing trustees, consisting of Sterling R. Holt, Indianapolis, chairman; Edward Hawkins, Indianapolis, secretary; A. E. Reynolds and C. N. Van Cleave, Crawfordsville, Ind., and A. M. Hewes, Chicago.

The Moore-Mansfield Construction Company, of Indianapolis, carried out the contract for grading, construction of bridges, track laying and ballasting, and the Electrical Installation Company, of Chicago, acted as engineers and contractors for the complete construction and equipment of the power station, substations, shop, overhead trolley and transmission lines and rolling stock.

THE BRITISH WESTINGHOUSE YEAR

A revival in business is recorded in the first annual report of the reconstructed British Westinghouse Company. The accounts for the year ended July 31, 1906, disclosed a trading profit of only £7,567, and, after providing for interest and other charges, the debit balance of £15,407 brought in was increased to £102,942. The directors were constrained to reorganize the company's finances with a view to putting the undertaking on a reasonably sound basis. Reconstruction proposals involving the writing down of the share capital by £1,375,000 were submitted and accepted, and the company was enabled to make a fresh start. The ending of the company's financial year was subsequently altered from July 31 to Dec. 31, and the accounts now issued accordingly cover the year ended Dec. 31 last. Compared with the results obtained in the last previous completed year of the company's operations, the outcome of the past 12 months' working reveals a marked improvement. As against the trading profit of £7,567 secured in 1905-6, a surplus of £92,383 was obtained in the year 1907. Interest on debentures and loans now requires £64,033, as against £52,375 in 1905-6, but on the other hand, it is not necessary this time to provide for the adjustment of working assets, which had to be written down by £42,790 in 1905-6. The only corresponding charge on this occasion is an appropriation of £17,009 for sundry depreciations not ascertained at the time of the reconstruction. The net result of last year's operations is a surplus of £11,341, as compared with a deficiency of £87,535 in 1905-6.

THE CAR EQUIPMENT DEPARTMENT OF THE INTERBOROUGH RAPID TRANSIT COMPANY—MISCELLANEOUS MAINTENANCE SHOP COSTS AND PAINTING PRACTICE

The subject of general maintenance as treated by the car equipment department of the Interborough Rapid Transit Company was considered at length in the STREET RAILWAY JOURNAL of April 25 so far as general equipment and methods were concerned. Through lack of space, however, only the following costs could be given in that article: Taking motor and trailer trucks from the car body to the truck shop; removal of motors and armatures from truck; the turning of steel-tired wheels; and the renewal of armature bearings. These costs were offered to show what some of the department's methods mean when translated to the common idiom of dollars and cents; and incidentally these figures proved the thoroughness of a system in which the cost of every process is calculated with as much care as in the largest manufactory.

Of the additional figures presented herewith, the first relate to the comparative costs of renewing the 34-in. motor and 31-in. trailer subway wheels at the 148th Street shops; the second series of costs are devoted entirely to the detail labor and material costs for rewinding the railway motor and compressor armatures and manufacturing Westinghouse No. 86-B armature coils with old or new copper. All the rewinding and manufacturing are done at the Ninety-eighth Street shops. This practice of the department in making certain classes of apparatus in whole or in part is not pursued merely to save money, but also to avoid delays and to be absolutely certain that the material and workmanship are what the hard operating conditions demand.

COST PER PAIR FOR RENEWING 34-IN. ROLLED STEEL MOTOR WHEELS.

Pressing off wheels	\$0.20
Boring wheels and facing hubs .....	.50
Turning hubs, counter boring for wheel lathe chuck jaws, and facing hub on other side	1.10
Pressing on wheels, shrinking on rings, gear and gear rim .....	.43
Total	\$2.23

COST PER PAIR FOR RENEWING 31-IN. ROLLED STEEL TRAILER WHEELS.

Pressing off wheels	\$0.20
Facing and boring wheels, and counter boring for wheel lathe chuck jaws .....	.30
Pressing on wheels .....	.25
Total	\$0.75

COST OF REWINDING ONE G.E. 69 ARMATURE.

LABOR.	
Stripping and cleaning commutator	\$4.25
Filing and insulating core, ready to wind	1.00
Assembling, soldering front and back, cleaning commutator and testing	7.50
Banding	1.40
Turning commutator .....	.25
Slotting commutator .....	.45
Total cost of labor	\$14.85

MATERIAL.	
Micanite insulation for core end casting P. E.	\$5.10
2 lb. micanite, .015 in., @ \$1.87½	3.75
2 lb. flexible mica, .015 in., @ \$1.12	2.24
1 lb. 1½ in. x 5 in. white mica @ \$1.71	1.71
10 lb. ½ and ½ solder @ .18¾	1.88
2 lb. ¾-in. friction tape @ .32 .....	.64
1 pint orange shellac @ \$2.30 per gal. ....	.29
1 set micanite pieces over bars P. E., 8 pcs. @ .45	3.60
10 lb. .072 banding wire @ .17	1.70
5 lb. .057 leatheroid @ .20	1.00
1 sheet tin for clips, @ .04 .....	.04
Total cost of material	\$21.95
Total	\$36.80

COST OF REWINDING ONE CHRISTENSEN COMPRESSOR ARMATURE B-2.

LABOR.	
Stripping	\$0.30
Pulling off commutator, sawing out slots and clearing	1.00
Insulating core, winding, connecting, soldering and banding	3.00
Turning commutator .....	.03
Total cost of labor	\$4.33
MATERIAL.	
¼ lb. solder @ .18¾	\$0.05
¼ lb. 1½ in. x 5 in. white mica @ \$1.71 .....	.43
½ yd. red paper @ .06½ .....	.02
Total cost of material .....	.50
Total	\$4.83

COST OF REWINDING ONE G.E. 66 ARMATURE.

LABOR.	
Stripping and clearing commutator	\$4.25
Filing and insulating core, ready to wind	1.00
Assembling, soldering front and back, clearing commutator and testing	8.00
Banding	1.40
Turning commutator .....	.25
Slotting commutator .....	.45
Total cost of labor	\$15.35

MATERIAL.	
Micanite insulation for core end casting P. E.	\$5.10
2 lb. micanite, .015 in., @ \$1.87½	3.75
2 lb. flexible mica, .015 in., @ \$1.12	2.24
1 lb. 1½ in. x 5 in. white mica @ \$1.71	1.71
1 set micanite pieces over bars P. E.	3.60
1 set micanite pieces between lower bars C. E.	5.75
10 lb. ½ and ½ solder, @ .18¾	1.88
2 lb. friction tape @ .32 .....	.64
1 pint orange shellac @ .29 .....	.29
10 lb. .072 steel banding wire @ .17	1.70
5 lb. .057 leatheroid @ .20	1.00
1 sheet tin for clips @ .04 .....	.04
Total cost of material	\$27.70
Total	\$43.05

COST OF REWINDING ONE G. E. C. P-14 COMPRESSOR ARMATURE.

LABOR.	
Stripping and cleaning commutator	\$0.90
Filing and insulating core .....	.60
Assembling, connecting and soldering	3.00
Hoods and bands .....	.60
Turning commutator .....	.05
Total cost of labor	\$5.15

MATERIAL.	
2 yd. Empire cloth @ .2142	\$0.43
6 yd. red paper @ .06½ .....	.39
1 lb. horn fiber paper, .010 in., @ .25 .....	.25
1½ lb. solder @ .18¾ .....	.28
1 lb. ¾-in. friction tape @ .32 .....	.32
1 yd. drilling @ .08 .....	.08
2 lb. .032 in. steel band wire @ .17 .....	.34
1 pint shellac @ \$2.30 per gal. ....	.29
Total cost of material	\$2.38

Total \$7.53

COST OF REWINDING ONE WESTINGHOUSE 86-B ARMATURE.

LABOR.	
Stripping, cleaning commutator and clearing for short circuits	\$3.00
Filing and insulating core, ready to wind	1.50
Assembling, driving wedges, soldering, cleaning up commutator and clearing for short circuits	6.00
Banding	1.40
Turning commutator .....	.25
Slotting .....	.45
Total cost of labor	\$12.60

MATERIAL.	
5 yd. Empire cloth @ .2142	\$1.07
4 lb. flexible mica, .015 in., @ \$1.12	4.48
½ lb. micanite, .015 in. @ \$1.87½ .....	.94
1 lb. 1½ in. x 5 in. white mica @ \$1.71	1.71
3 lb. ¾ in. friction tape @ .32 .....	.96
8 lb. ½ and ½ solder, @ .18¾	1.50
2 lb. horn fiber paper, .010 in. @ .25 .....	.50
1 qt. orange shellac @ \$2.30 per gal. ....	.58
10 lb. .072 in. steel banding wire @ .17	1.70
5 lb. .057 in. leatheroid @ .20	1.00
1 sheet tin for clips, @ .04 .....	.04
Total cost of material	\$14.48
Total	\$27.08

COST OF MANUFACTURING ONE SET WESTINGHOUSE 86-B ARMATURE COILS.

MATERIAL.

*189 lb. copper from old coils @ .12 (scrap value).....	\$22.68
6.8 lb. 3/4-in. Linotape @ .70.....	4.76
.1 gal. Le Page's glue @ \$2.25.....	.23
2.6 lb. .005-in. flexible mica @ .50.....	1.30
3.1 lb. .008-in. flexible mica @ .50.....	1.55
.2 lb. .025-in micanite @ \$1.50.....	.30
2.9 gr. yd. 1-in. linen tape @ .588.....	1.71
2.4 gr. yd. 3/4-in. linen tape @ .50.....	1.20
1 gal. denatured alcohol @ .37.....	.04
.8 cans potash @ .046.....	.04
1.3 lb. 1/2 & 1/2 solder @ .20.....	.26
.4 gal. .07-B air drying Japan @ .45.....	.18
.1 lb. .015-in. micanite @ \$1.50.....	.15
.1 lb. rosin @ .04.....	.01
.7 yd. cheesecloth @ .02875.....	.02
1.6 lb. .005 gray horn fiber @ .25.....	.40

\$34.83

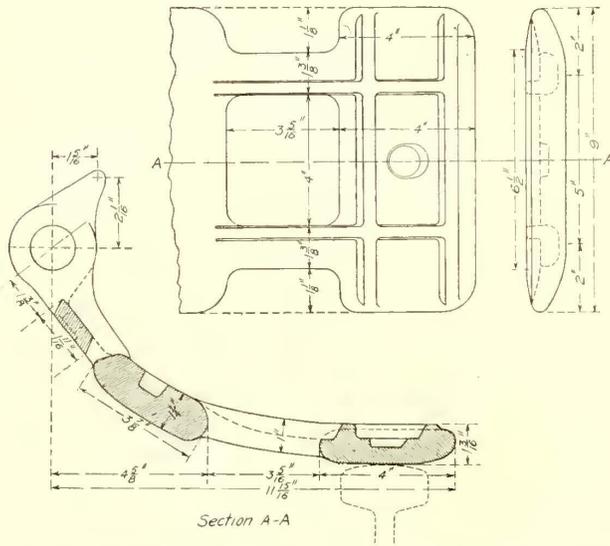
Labor, including foreman 23.17

Total \$58.00

*Using new copper increases cost of material about \$12 per set.

CONTACT SHOE DATA

The third-rail contact shoe used on the elevated division is of the double-link suspension, plain overrunning gravity type which has been in successful use since 1901; the subway shoe, as shown in the accompanying drawing, is of the Potter two-bearing type, arranged for running over the head of the contact rail in the underground section of the subway division and over the head of the contact rail in the



PLAN AND SECTION OF SUBWAY DIVISION THIRD-RAIL SHOE

viaduct section. The accompanying figures are for the year ending Dec. 31, 1907, and afford an interesting comparison between the subway and elevated costs for similar items:

	Subway.	Elevated.
Average life in contact shoe-miles.....	45,720	56,008
Average cost per 1000 contact shoe-miles.....	\$.02322	\$.01241

PAINTING PRACTICE

The Interborough Rapid Transit Company has been operating steel cars for nearly four years, during which period they have received the same complex and expensive treatment as the wooden coaches. The company has come to the conclusion, however, that as these cars are of steel and are operated underground for the greater part of their runs, there is no valid reason why they should be maintained differently from any other metal structures which retain their strength indefinitely if properly painted to resist oxidation. Experiments are therefore being conducted with a first-class oil paint with a view to determining the economies to be obtained over the present method.

Another important departure in subway car painting which has already produced a great saving has resulted from the elimination of fancy striping, lettering and numbering. The body color is confined to the use of Tuscan red and the car number placed on a side window at the end. This unique practice is now being extended to the Manhattan elevated cars.

Before going into the details of the painting as followed on the wooden cars, it is appropriate to mention the department's policy in the important matters of testing, purchasing and applying paints according to certain classifications. In the first place, all new bidders who wish to supply car paints and varnish must submit samples and prices to the railway company's purchasing agent. The latter then removes from the submitted specimens all marks indicating the name of the manufacturer, and after giving them private identification numbers sends the samples to the car equipment department for trial. The tests usually include the painting and varnishing of sample panels as well as complete car equipments, according to the company's standards, and exposing them to regular service conditions for about one year. The results are then communicated to the purchasing agent as relating to panels or cars numbered so and so, and the latter, if the maker's price is satisfactory, then authorizes the car equipment department to place the successful manufacturers on the preferred list in future specifications. The advantage of this method in eliminating all possibility of favoritism by those responsible for the acceptance or rejection of material is too evident to require comment. It is customary to buy all paints ready mixed, as experience has demonstrated that this is more satisfactory than the varying mixing methods of individual shop painters.

PAINTING

All general painting of cars is done in the Ninety-eighth Street shop. Painting records and records of inspection for painting are kept in the main office on a sheet showing the date the car was last in the paint shop, the date last inspected, the date it should be sent to the paint shop and the class of painting for which it is due. With regard to the condition of the paint, the cars are graded in four classes, as follows:

Class A—To be burned off and repainted from the wood up.

Class B—To be scrubbed thoroughly, cut in, lettering and striping touched up and varnished.

Class C—Sash to be removed, burned off and painted; otherwise same as class B.

Class D—Car to be scrubbed and varnished.

As no hard and fast line can be drawn between these four classes, good judgment dictates that the grading should not be left to one man, especially if the responsible individual were the painting foreman, since his natural bias would make him either wasteful or too sparing. Inspections are made on the road from time to time, and the cars are brought in on predetermined dates, as their condition requires. The cars when brought into the shop are finally classified by a committee of three, consisting of the general foremen of painting, carpentry and electrical repairs, each of these men naturally looking at the problem from a different viewpoint.

When cars are brought in for painting they are run into a portion of the general repair shop containing five six-car tracks. Here the regular trucks are replaced by shop trucks and taken to the truck repair shop. Any required carpentry work is then done on the car bodies, all trimmings stripped off and the sash and doors removed. Sash needing repairs

are taken to the mill and afterward all are painted and placed in order in racks corresponding to car positions on the tracks. To prevent the possibility of confusion, all sash and blinds are stamped with the car number and the sash position. After the carpentry on the car bodies is finished the cars are hauled on the shop trucks to the paint shop. When the painting is completed the cars are returned to the repair shop and mounted on trucks for service.

In painting cars from the wood up, the method is:

- 1st Day—Primer.
- 2d Day—Second coat.
- 3d Day—Putty.
- 4th Day—Surfacer, first coat.
- 5th Day—Surfacer, second coat.
- 6th Day—Surfacer, third coat.
- 7th Day—Rubbing pumice stone and water.
- 8th Day—First coat body color.
- 9th Day—Second coat body color.
- 10th Day—First coat varnish.
- 11th Day—Drying.
- 12th Day—Second coat varnish.
- 13th Day—Drying.
- 14th Day—In service.

Cars sent in under Class B are got out in four days. They are scrubbed the first day, cut in the second, varnished the third and allowed to dry on the fourth day. Cars under Classes B, C and D usually are not dismounted and are kept in a separate section. The first work done on such cars is to paint the platform gates, railings and other parts which the clothes of passengers are liable to touch. This detail is worth more than passing notice as showing how good judgment in the painting department can eliminate many petty lawsuits for stained dresses, etc.

The interiors of all cars brought into the shop are scrubbed down, the headlining painted when necessary and the curtains or blinds cleaned. The floor and roof are painted and the shoe beams treated with insulating paint. The trucks and the interiors of the control apparatus cases are painted when the car is in for general repairs.

Seats for Class A rolling stock are removed from the cars and after thorough cleaning are coated with a drying enamel which will not soften under the heat of the human body. The rattan gets its first coat of paint after five or six years and is then painted every 14 months.

PIECEWORK PAINTING

An important feature of the paint shop is the use of the piecework system which was adopted in 1905. A saving of 25 per cent in cost of painting work has been accomplished, while the amounts earned by the men have increased an average of 20 per cent. The success of this scheme for remuneration proved conclusively that when day payment was in vogue a great deal of time was wasted by the men because they had no incentive for exerting themselves. Now there is no shirking by anybody, and, in fact, many of the employees are eager to begin before regular working hours and cut down their lunch period to earn more money. The tendency to skimp work under the piecework system is effectually checked by the painting inspectors, who can order a workman to do over on his own time any job below the standard.

As there are so many interurban railways in addition to elevated railways operating similar rolling stock, the piecework schedule for the Manhattan wooden car is reproduced in full. To be sure, this schedule is based on cars running on an elevated structure and in accordance with the specific labor conditions of New York City, but others may find this list a good relative basis for the different classes of labor needed in a thorough painting job.

SCHEDULE OF PIECEWORK PRICES FOR PAINTING MANHATTAN WOODEN CARS.

Contract Numbers.	Price.
BLINDS	
1. Enameling one side, per coat, each.....	\$.01
2. Painting one side, per coat, each.....	.01
3. Scrubbing two sides, per set of 64.....	.50
4. Scrubbing two sides, per set of 72.....	.55
5. Scrubbing two sides, per set of 84.....	.60
6. Handling and putting in loft after scrubbing for painting, per set.....	.05
BODY EXTERIOR	
10. Blacking off underneath, including all ironwork, except rheostats, contactors, fuse boxes, etc., motor car.....	1.25
11. Blacking off underneath, including all ironwork, trailer car.....	.75
12. Burning off, including exterior doors.....	5.00
13. Carrying window stops to loft.....	.05
14. Cleaning exterior with oil cleaner.....	1.15
15. Cutting in body color, including upper and lower sash.....	2.50
16. Lettering and numbering, motor car, complete.....	1.20
17. Lettering and numbering, trailer car, complete.....	1.00
18. Numbers applied, large (side and end), per figure.....	.03
19. Numbers applied, small (over doors), per figure.....	.02
20. Painting body color, per coat.....	.75
21. Painting guide coat.....	.75
22. Painting lead color, per coat.....	.75
23. Painting priming coat.....	.75
24. Painting rough stuff, per coat.....	.75
25. Painting window stops and casings off car, per set.....	.20
26. Plastering, including door posts and belt rails.....	1.50
27. Puttying.....	.60
28. Re-edging letters and numbers, complete.....	6.00
29. Rubbing rough stuff.....	1.00
30. Restripping black lines.....	1.00
31. Restripping gold color lines.....	1.25
32. Scrubbing window stops and casings off car, per set.....	.10
33. Sandpapering and reputtying on burned-off cars.....	.75
34. Sandpapering after burning off.....	2.00
35. Sandpapering and puttying on cut in cars.....	.50
36. Striping gold color and black lines.....	2.25
37. Staining and shellacking window stops and casings, per set.....	.25
38. Touching up body, including sash.....	.90
39. Touching up lettering and numbers.....	.20
40. Touching up striping.....	.35
41. Varnishing, per coat, including sash.....	.90
42. Varnishing window stops and casings off car, per set.....	.15
43. Washing and scrubbing for painting and varnishing, including glass.....	2.00
44. Painting rheostats, contactors, fuse boxes, etc.....	.25
DECKS	
50. Painting one coat enamel, including blacking nosings.....	.25
DOORS (OFF CAR)	
51. Burning off one side, each.....	.10
52. Graining, per side.....	.15
53. Filling, per side, each.....	.10
54. Painting, per side, per coat.....	.04
55. Puttying, per side.....	.08
56. Rubbing rough stuff.....	.15
57. Rubbing varnish, per side.....	.06
58. Sandpapering, per side.....	.03
59. Scrubbing, per side.....	.03
60. Shellacking, per side.....	.03
61. Staining, per side.....	.03
62. Varnishing, per side, per coat.....	.06
FLOORS	
65. Cleaning and sweeping.....	.20
66. Painting, per coat.....	.25
INTERIOR	
67. Cleaning and oiling curtains, per car.....	.20
68. Cleaning and bleaching hand straps, per car.....	.25
69. Cleaning and wiping interior and exterior of finished cars.....	.20
70. Filling, new.....	1.50
71. Filling, shellacking and puttying in part.....	.30
72. Painting headlining and side lining, enamel.....	1.00
73. Painting headlining and side lining, lead color, including puttying.....	.75
74. Shellacking and puttying, complete.....	1.40
75. Sandpapering, bleaching and varnishing, in part.....	.25
76. Scrubbing, complete, and washing windows.....	1.50
77. Touching up after trimmers.....	.50
78. Varnishing, complete, per coat, including sandpapering.....	1.50
79. Varnishing headlining, complete, per coat.....	.45
IRONWORK EXTERIOR	
85. Cleaning and scraping all gates, fences, rails and buffer plates.....	.15
86. Enameling all gates, fences, rails and buffer plates.....	.50
MARKERS, ETC	
89. Painting markers, including cleaning lenses, bronzing headlights, painting platform plates, piping and controllers, per car.....	.80
ROOF	
92. Painting canvas, per coat.....	.25
93. Painting canvas, new, per coat.....	.35
SASH (OFF CAR)	
Deck Sash	
95. Burning off one side, each.....	.01
96. Cleaning glass outside, per car.....	.25
97. Filling one side, each.....	.01
98. Painting one side, per coat, each.....	.01
99. Puttying two sides, each.....	.01
100. Sandpapering one side, each.....	.01
101. Staining, one side, each.....	.01
102. Varnishing one side, per coat, each.....	.01
Body Sash, Upper and Lower	
104. Burning off one side, each.....	.01
105. Cleaning glass, per car.....	.75
106. Cleaning embossed glass with acid, per car.....	.75
107. Filling one side, each.....	.01
108. Handling and placing in loft after scrubbing for painting, per set.....	.05
109. Painting, per coat, one side, each, glass out.....	.00½
110. Painting, per coat, one side, each, glass in.....	.01
111. Puttying, outside, glass out, each.....	.00½
112. Puttying, outside, glass in, each.....	.01
113. Plastering one side, each.....	.02
114. Rubbing varnish, one side, each, glass out.....	.00½

Contract Numbers.	Price.
115. Rubbing varnish, one side, each, glass in.....	\$0.01
116. Sandpapering, one side, each, glass out.....	.00½
117. Sandpapering, one side, each, glass in.....	.00¼
118. Scrubbing, both sides, including glass, per set of 64.....	.50
119. Scrubbing, both sides, including glass, per set of 72.....	.55
120. Scrubbing, both sides, including glass, per set of 84.....	.60
121. Staining one side, each, glass out.....	.00½
122. Staining one side, each, glass in.....	.01
123. Shellacking one side, each, glass out.....	.00½
124. Shellacking one side, each, glass in.....	.01
125. Varnishing one side, each, glass out.....	.00½
126. Varnishing one side, each, glass in.....	.01
SEATS	
130. Beating seats and backs, per set.....	.05
131. Enameling seats and backs, per coat, per set.....	.40
132. Handling seats and backs and putting in loft after scrubbing for painting, per set.....	.10
133. Scrubbing seats and backs, per set.....	.40
134. Varnishing seats and backs, complete, per set.....	.35
TRUCKS	
137. Cleaning and painting, in part.....	.10
138. Painting, per coat, including blacking shoe beams, motor.....	.20
139. Painting, per coat, including blacking shoe beams, trailer.....	.15
140. Scraping and cleaning for painting.....	.15

SCHEDULE OF PIECEWORK PRICES FOR MISCELLANEOUS WORK

Contract Numbers.	Price.
800. Painting drawbar links, all kinds, each.....	.01
801. Numbering emergency links, per figure.....	.00½
802. Painting single exit gates, off car, per coat.....	.04
803. Painting single safety gates, off car, per coat.....	.04
804. Painting single end fence, complete, off car, per coat.....	.04
805. Painting tail lamps, each.....	.10
806. Painting destination signs, Manhattan, per coat.....	.02½
807. Removing old paint, cleaning and sandpapering Manhattan destination signs, each.....	.02
808. Lettering Manhattan destination signs, each.....	.10
809. Painting, stenciling and varnishing contactor signs, each.....	.01½
810. Painting advertising bands, per 100.....	.20
811. Staining and varnishing advertising bands, per 100.....	.25
SUBWAY DESTINATION SIGNS	
812. Sandpapering and coating, each.....	.01
813. Varnishing, each.....	.01
814. Lettering, each.....	.20
815. Cleaning and bronzing whistles, each.....	.01
NOTICE FRAMES	
816. Scrubbing, each.....	.00½
817. Painting, each.....	.00½
818. Varnishing, each.....	.00½

SAVING TIME AT STUB TERMINALS

During the few days following the Chelsea fire the traffic of sightseers on the East Boston line of the Boston Elevated Railway was so great as to call for special provisions for loading and dispatching cars at the Court Street station of the East Boston tunnel. Practically all the cars running on this line are of the company's semi-convertible easy access type, with pneumatically operated doors on each side of each vestibule. The usual routine followed at the stub terminal at the end of the route is for the motorman to bring the car to a stop with the air brakes; then to set up the hand brakes tight enough to hold the car; then make another service application of the air to see that sufficient pressure is maintained to hold the brakes tightly. The motorman then sees that all cocks are set properly for changing ends, and makes the necessary final adjustments in the vestibule. He then removes brake and controller handles and goes to the front end of the car. The fender is then adjusted, and the motorman, having entered the front vestibule, attaches his handles, throwing the motorman's valve to service position. He then adjusts the cocks in the air-brake pipes, noting that the gage shows proper pressure, attends to the door cocks, gives the conductor two bells to release the hand brakes and stands in readiness to proceed on signal. The conductor attends to the trolley, one fender and tail lights if any. During a stop, the doors on one side of the car are opened first to let out alighting passengers, and boarding passengers are not allowed on until the doors are clear.

During the congested period mentioned six men were with one extra man in the toll booth. The saving in time effected enabled the company to pass a maximum of 76 cars per hour through the tunnel against the more usual maximum of 60 per hour.

CONFERENCE ON STANDARD ACCOUNTS WITH THE INTERSTATE COMMERCE COMMISSION

Upon the invitation of the Bureau of Statistics and Accounts of the Interstate Commerce Commission, an important conference between Government and State commissions, on the one hand, and committees representing the street railway companies, on the other hand, was held May 11-13 at the New Willard Hotel, Washington. Those in attendance at the meeting were: Prof. H. C. Adams and Messrs. Sweeney and Seymour, representing the Interstate Commerce Commission; Messrs. Meyers and Weber, representing the Public Service Commission of the First and Second Districts of New York; Gen. Geo. H. Harries, of Washington; C. S. Sergeant, of Boston; Arthur W. Brady, of Anderson; George W. Bacon, of New York, and C. Loomis Allen, of Syracuse, representing the committees on standard classification and depreciation of the American Street & Interurban Railway Association; and W. F. Ham, of Washington; H. L. Wilson, of Boston; W. B. Brockway, of New York, and W. H. Forse, Jr., of Anderson, representing the American Street & Interurban Railway Accountants' Association. The conference succeeded in finding a very satisfactory solution of the problems of classification and depreciation, questions which have been agitating the street railway interests for so long a time. A draft will be found below of the account headings of classification as adopted for each of the three divisions into which the street railways are to be divided.

In order that this classification may be as useful and as accurate as possible, the text describing each of these accounts is to be written by the representatives of the classification committee of the Accountants' Association, who were present at this Washington conference. They met in Atlantic City May 18 and expected to complete the classification before final adjournment, although probably no changes will be made in the accounting headings as published.

It should be understood, and this point was explained at the meeting, that the proposed classification must be submitted to the railroad commissions of the various States for formal approval before it will be actually adopted by the Interstate Commerce Commission for interstate roads, but as most of these commissions are already committed to the adoption of a classification when and as proposed by the Interstate Commerce Commission, it seems safe to say that there will be few if any changes. Each commission may adopt the classification at any date fixed by it, but the Interstate Commerce Commission purposes adopting it beginning Oct. 1, 1908. The Public Service Commission for the Second District of the State of New York will probably adopt it for the period beginning July 1, 1908.

The question of depreciation is a large one under any circumstances, and as the conditions in the different States are so diverse, the Interstate Commerce Commission has decided not to accept the responsibility of ordering the electric railway companies to keep accounts for depreciation. Instead, it has taken the position that the order for the use of depreciation accounts is to come from the State commissions where such are desired and not from the Interstate Commerce Commission. This in effect means that the commission which is more nearly in touch with the conditions as they exist in each State must be the first to make the move of requiring these accounts. When a sufficient number of States demand maintenance of depreciation accounts the Interstate Commerce Commission will then require the keeping of such accounts for those roads which come under its jurisdiction.

A part of the work accomplished at the conference was a consideration of the replies, nearly 300 in number, which had been received from the companies of the United States regarding the proposed classification as published in Accounting Series Circular No. 20. The commission had carefully tabulated and compiled these replies in such a useful manner that the value of the opinions thus gained by the replies of the companies was immediately apparent and all those participating in the conference were impressed with the sincerity of the replies. Most of the letters showed the marks of careful work and the accumulative effect of the answers to some of the questions was impressive alike to the commission and representatives of the companies.

It seemed to be the opinion of those present that the classification as adopted will best fit the needs and the experience of the companies as set forth in the replies. The headings follow:

TENTATIVE CLASSIFICATION OF OPERATING EXPENSES OF ELECTRIC RAILWAYS APPROVED BY CONFERENCE IN WASHINGTON, MAY 12-13, 1908. (SUBJECT TO APPROVAL OF STATE RAILROAD COMMISSIONS FOR USE IN INDIVIDUAL STATES).

CLASSES OF ELECTRIC RAILWAYS.

- Class A. Annual Gross Revenue—\$1,000,000 and over.
- Class B. Annual Gross Revenue—\$250,000 to \$1,000,000.
- Class C. Annual Gross Revenue—Under \$250,000.

GENERAL ACCOUNTS.

- I. Maintenance, Way and Structures.
- II. Maintenance, Equipment.
- III. Traffic.
- IV. Conducting Transportation.
- V. General and Miscellaneous.

PRIMARY ACCOUNTS.

	ACCOUNT NUMBERS FOR GRADES.		
	A	B	C
I. Maintenance, Way and Structures.			
Superintendence of Way and Structures.....	1	1	1
Maintenance of Way.....			2
Maintenance of Roadway and Track.....		2	
Maintenance of Ballast.....	2		
Maintenance of Ties.....	3		
Maintenance of Rails.....	4		
Maintenance of Rail Fastenings and Joints.....	5		
Maintenance of Special Work.....	6		
Maintenance of Underground Construction.....	7		
Maintenance of Roadway and Track Labor.....	8		
Maintenance of Paving.....	9		
Miscellaneous Roadway and Track Expenses.....	10		
Cleaning and Sanding Track.....	11		
Removal of Snow, Ice and Sand.....	12		
Other Maintenance of Way.....		3	
Maintenance of Tunnels.....	13		
Maintenance of Elevated Structures and Foundations.....	14		
Maintenance of Bridges, Trestles and Culverts... 15			
Maintenance of Crossings, Fences, Cattle Guards and Signs.....	16		
Maintenance of Signals and Interlocking System. 17			
Maintenance of Telephone and Telegraph System. 18			
Other Miscellaneous Way Expenses.....	19		
Maintenance of Electric Lines.....		3	
Maintenance of Poles and Fixtures.....	20	4	
Maintenance of Underground Conduits.....	21	5	
Maintenance of Transmission System.....	22	6	
Maintenance of Distribution System.....	23	7	
Miscellaneous Electric Line Expenses.....	24	8	
Maintenance of Buildings and Structures.....	25	9	4
Other Operations—Debit.....	26	10	5
Other Operations—Credit.....	27	11	6
Depreciation of Way and Structures (see text).. 28		12	7
II. Maintenance of Equipment.			
Superintendence of Equipment.....	29	13	8
Maintenance of Power Equipment.....			9
Maintenance of Power Plant Equipment.....	30	14	
Maintenance of Substation Equipment.....	31	15	
Maintenance of Cars and Locomotives.....		16	10

ACCOUNT NUMBERS FOR GRADES.

	FOR GRADES.	
	A	B C
Maintenance of Passenger and Combination Cars.. 32		
Maintenance of Freight, Express and Mail Cars.. 33		
Maintenance of Locomotives.....	34	
Maintenance of Service Cars.....	35	
Maintenance of Electric Equipment of Cars and Locomotives.....	17	11
Maintenance of Electric Equipment of Cars.....	36	
Maintenance of Equipment of Locomotives.....	37	
Miscellaneous Equipment Expense.....	18	12
Shop Machinery and Tools.....	38	
Shop Expenses.....	39	
Horses and Vehicles.....	40	
Other Miscellaneous Equipment Expenses.....	41	
Other Operations—Debit.....	42	19 13
Other Operations—Credit.....	43	20 14
Depreciation of Equipment (see text).....	44	21 15
III. Traffic.		
Traffic Expenses.....	22	16
Superintendence and Solicitation.....	45	
Advertising.....	46	
Miscellaneous Traffic Expenses.....	47	
IV. Conducting Transportation.		
Superintendence of Transportation.....	48	23 17
Group I—Power.		
Power Plant Employees.....	49	24 18
Substation Employees.....	50	25 19
Fuel for Power.....	51	26 20
Other Power Supplies and Expenses.....		21
Water for Power.....	52	27
Lubricants for Power.....	53	28
Miscellaneous Power Plant Supplies and Expenses	54	29
Substation Supplies and Expenses.....	55	30
Power Purchased.....	56	31 22
Power Exchanged—Balance.....	57	32 23
Other Operations—Debit.....	58	33 24
Other Operations—Credit.....	59	34 25
Group II—Operation of Cars.		
Conductors, Motormen and Trainmen.....		26
Passenger Conductors, Motormen and Trainmen. 60		35
Freight and Express Conductors, Motormen and Trainmen.....	61	36
Miscellaneous Transportation Expenses.....		27
Miscellaneous Car Service, Employees and Expenses.....		37
Miscellaneous Car Service, Employees.....	62	
Miscellaneous Car Service Expenses.....	63	
Station Employees and Expenses.....		38
Station Employees.....	64	
Station Expenses.....	65	
Car-House Employees and Expenses.....		39
Car-House Employees.....	66	
Car-House Expenses.....	67	
Signal, Interlocking, Telephone and Telegraph Systems.....		40
Operation of Signal and Interlocking System.... 68		
Operation of Telephone and Telegraph System... 69		
Express and Freight Collections and Delivery.... 70		41
Loss and Damage.....	71	42
Other Transportation Expenses.....	72	43
V. General and Miscellaneous.		
General Expenses.....		28
Salaries and Expenses of General Officers and General Office Clerks.....		44
Salaries and Expenses of General Officers.....	73	
Salaries and Expenses of General Office Clerks... 74		
General Office Supplies and Expenses.....	75	45
Law Expenses.....	76	46
Relief Department Expenses.....	77	47
Pensions.....	78	48
Miscellaneous General Expenses.....	79	49
Other Operations—Debit.....	80	50 29
Other Operations—Credit.....	81	51 30
*Injuries and Damages.....	82	52 31
*Insurance.....	83	53 32
*Stationery and Printing.....	84	54 33
*Store and Stable Expenses.....		34
*Store Expenses.....	85	55
*Stable Expenses.....	86	56

*Rent of Tracks and Terminals.....	87	57	35
*Rent of Equipment.....	88	58	36

NOTE: It should be understood that the above titles are to be used in reporting to the Interstate Commerce Commission. The various State commissions and the companies themselves may keep such additional sub-accounts of each of these primary accounts as they desire; as for instance, the companies may desire to separate the account, Passenger Conductors, Motormen and Trainmen, into the different kinds of service, and this they may do if combined for purposes of the report.

*Carriers are at liberty to distribute items covered by these accounts among the various operating accounts concerned, but all reports to the Interstate Commerce Commission must agree with the accounts which are prescribed; for instance, the account Stable Expenses may be divided by the carrier among the proper accounts benefited, but in making the report to the commission, these items must be again gathered together and reported as classified.

DEPRECIATION.

In the classification of operating expenses for electric railways provision is to be made for two depreciation accounts, one under maintenance of way and structures, and one under maintenance of equipment. It is understood, however, that the order for the use of these accounts is to come from the State commissions, and not from the Interstate Commerce Commission, in all States where State commissions have jurisdiction over electric lines. In case a State refrains from requiring that use be made of the depreciation accounts, appropriate repair accounts should be so extended as to include charges for renewals. Alternate texts should be provided for these repair accounts, and there should be included in the order of the State commissions, a specific statement as to which of these alternate provisions should be followed. In reports from interstate carriers to the Interstate Commerce Commission, it is understood that, for the present, the order of the State commission, in which the major portion of the business of the corporation lies, shall control.

TENTATIVE CLASSIFICATION OF OPERATING REVENUES OF ELECTRIC RAILWAYS, TO BE KEPT BY COMPANIES OF ALL GRADES.

GENERAL ACCOUNTS.

- I. Revenue from Transportation.
- II. Revenue from Operation other than Transportation.

PRIMARY ACCOUNTS.

- I. Revenue from Transportation.
 1. Passenger Revenue.
 2. Baggage Revenue.
 3. Parlor and Chair Car Revenue.
 4. Mail Revenue.
 5. Express Revenue.
 6. Milk Revenue.
 7. Freight Revenue.
 8. Switching Revenue.
 9. Miscellaneous Transportation Revenue.
- II. Revenue from Operation other than Transportation.
 10. Station and Car Privileges.
 11. Parcel Room Receipts.
 12. Storage.
 13. Car Service.
 14. Telegraph and Telephone Service.
 15. Rents of Tracks and Terminals.
 16. Rents of Equipment.
 17. Rents of Buildings and other Property.
 18. Power.
 19. Miscellaneous.

TENTATIVE CLASSIFICATION OF EXPENDITURES FOR ROAD AND EQUIPMENT OF ELECTRIC ROAD TO BE KEPT BY COMPANIES OF ALL GRADES.

GENERAL ACCOUNTS.

- I. Road.
- II. Equipment.
- III. General Expenditures.

PRIMARY ACCOUNTS.

- I. Road.
 1. Engineering and Superintendence.
 2. Right of Way.
 3. Other Land Used in Electric Railway Operations.

4. Grading.
5. Ballast.
6. Ties.
7. Rails, Rail Fastenings and Joints.
8. Special Work.
9. Underground Construction.
10. Paving.
11. Track Laying and Surfacing.
12. Roadway Tools.
13. Tunnels.
14. Elevated Structure and Foundations.
15. Bridges, Trestles and Culverts.
16. Crossings, Fences, Cattle Guards and Signs.
17. Interlocking and other Signal Apparatus.
18. Telegraph and Telephone Lines.
19. High Tension Transmission Lines.
20. Low Tension Transmission Lines.
21. Track Bonding.
22. Power Plant Buildings.
23. Substation Buildings.
24. General Office Buildings.
25. Shops and Car Houses.
26. Stations, Waiting Rooms and Miscellaneous Buildings.
27. Docks and Wharves.
28. Power Plant Equipment.
29. Substation Equipment.
30. Shop Equipment.
31. Miscellaneous Equipment of Stationary plants.
32. Cost of Road Purchased.
- II. *Equipment.*
 33. Cars.
 34. Locomotives.
 35. Electric Equipment of Cars and Locomotives.
 36. Other Rail Equipment.
 37. Miscellaneous Equipment.
- III. *General Expenditures.*
 38. Law Expenses.
 39. Interest and Commissions.
 40. Injuries and Damages.
 41. Taxes.
 42. Miscellaneous.

STATION STOPS ON SURFACE LINES IN BOSTON

That it is possible to attempt more stops than are consistent with the schedule has been demonstrated by the Boston Elevated Railway Company since placing its semi-convertible cars in service on the Clarendon Hill-Highland Avenue line in Somerville. These cars operate through a thickly settled district, between Davis Square in West Somerville and the Sullivan Square Terminal. Since they were introduced it has been found that the trip between termini oftener consumed half an hour than 20 minutes; and as a remedy the company has cut out nine stops. The city blocks in Boston and the suburban cities vary greatly in length and are without the uniformity found in the newer cities. As a result the custom of having the cars stop at every intersecting street often brings stops so near together that the motorman finds it impossible to speed up between. Further, the opening and closing of the car doors and steps, which are operated by compressed air, adds to the delay. Naturally the change was opposed at first, but the opposition is rapidly being overcome and the plan of operation may be extended to other parts of the system where similar conditions prevail.

ELECTRIC RAILWAYS IN HOLLAND

The Dutch Government has granted a concession to the Amsterdam & North Holland Electric Tramway Company to build and operate an electric railway system in Holland. The route will be nearly 50 kilometers, running from Amsterdam North through Zaandam to Krommenie from Zaandijk to Wyk-aan-Zee, and Wormerveer to Purmerend. The Holland Development Company, of Amsterdam, will build the entire system.

FOURTH ANNUAL CONVENTION OF THE SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION

The fourth annual convention of the Southwestern Electrical & Gas Association was held in El Paso, Tex., at the St. Regis Hotel, on May 7, 8 and 9. The sessions were well attended, there being over 140 persons present, of whom 27 were ladies. Thirty-six companies were also added to the membership roll at this meeting.

THURSDAY SESSION

The initial meeting was opened on Thursday morning, May 7, by President H. T. Edgar, with an introduction of Hon. Joseph U. Sweeney, mayor of El Paso, who made the address of welcome. The response to the mayor's welcome was made by H. S. Cooper, general manager of the Galveston Electric Company. The president then made his annual address, in which he made the following suggestions for improving the usefulness of the association:

That the executive committee meet at least twice a year and that full reports of such meetings be sent to every member of the association.

That the secretary continue to compile and classify statements from the members showing the amount of annual taxes and donations paid by them, thereby having available a record of three years' taxes for presentation to the legislature meeting in January, 1909.

That the proceedings of past meetings be printed and bound in book form and distributed to the members, in addition to the bound report of this meeting.

That provision should be made hereafter for the free display of exhibits and the facilities be made public four months before the annual convention.

That the secretary be authorized to appoint an assistant to maintain the records and a permanent office in Dallas, this assistant to be paid out of the latter's salary.

That certificates of membership be furnished to the members with request that the latter frame them for display in their offices.

That a committee of four, consisting of one gas, one electric light, one telephone and one electric railway man be appointed to foster closer relations with similar bodies.

In conclusion, President Edgar stated that members desiring data on municipal ownership could obtain the same from the secretary and suggested that future legislative committees be appointed by the executive committee rather than by the association at large.

Mr. Kellogg moved that a committee of five be appointed by the chair to carry out the president's recommendations. This motion was carried. The regular program then began with the reading by C. H. Ladd of the paper on "Track Construction," written by Mark Lowd, of the Stone & Webster Engineering Corporation. This paper is published on page 864 of this issue. Mr. Lowd's contribution was discussed by Messrs. Ladd, Kellogg, Edgar, Brown and Cooper. The last speaker moved that a committee be appointed on the subject of T-rail standardization and that said committee should report its findings to the next convention of the national association. This motion was carried. After the appointment of committees on nomination, president's address and thanks, a paper on "Testing and Proving Gas Meters" was read by J. A. Myler, Jr. After a discussion of this paper the committee adjourned to 2:30 p. m.

The afternoon session began with a discussion on "What Policy Should Be Pursued by Public Service Corporations in Making Extensions?" and was followed by a consideration of the question box prepared by Samuel Kahn. An abstract of the question box appears on page 865 of this number.

FRIDAY SESSION

The first order of business on Friday morning was the paper on "Gas Producers and Gas Engines," by W. B.

Tuttle, vice-president and general manager of the San Antonio Traction Company. Owing to the absence of the author this contribution was read by Mr. Kahn. Mr. Tuttle's paper was published in the May 16 issue of the STREET RAILWAY JOURNAL, on page 824. Prof. E. P. Schoch, of the University of Texas, then read "A Review of the Present Practice and Economics of Wood Preservation," as published in the STREET RAILWAY JOURNAL of May 16, on page 821. This paper aroused a great deal of interest and was discussed for over an hour.

Mr. Cooper followed with the report of the committee on T-rail standardization. This report recommended that the secretary write to the national association, stating the attitude of the Southwestern Association in favor of a standard high T-rail and suggesting that the national body obtain expressions from all the minor associations on this subject. This motion was carried and the secretary was instructed accordingly.

The afternoon session opened with a further discussion of the question box, automotoneers, arc headlights and meters being taken up in order. On recommendation of the executive committee, Prof. Eugene P. Schoch was elected to honorary membership. The meeting was then turned over to the supply men under the chairmanship of Samuel Hobson. Later the members inspected the exhibits.

SATURDAY SESSION

The Saturday morning session was opened with a paper on "Electric Illuminants and Their Efficiency," by C. W. Kellogg, Jr. After the discussion on this paper President Edgar introduced B. V. Swenson, secretary of the American Street & Interurban Railway Association. Mr. Swenson urged closer co-operation with the national body, reviewed the work of the latter and expressed his appreciation of what the Southwestern Association has done to solve problems of local character in a way impossible in the larger organization.

Invitations for the next meeting of the association were received from Houston, Beaumont, Amarillo, Fort Worth, Yoakum and Dallas.

The committee appointed to act on the suggestions in the president's address recommended that these suggestions be carried out. The reading of the treasurer's report showed a balance of \$887.86 in the treasury. The nominating committee then reported the following ticket, which was unanimously elected:

President, R. B. Stichter, of the Dallas Securities Company.

First vice-president, W. B. Tuttle, vice-president and general manager San Antonio Traction Company.

Second vice-president, W. B. Head.

Third vice-president, Joseph E. Carroll, of Beaumont.

Secretary, J. A. Myler, Jr., of Dallas.

Treasurer, A. E. Judge, president and general manager Tyler Electric Light & Power Company, Tyler, Tex.

Executive committee, H. T. Edgar, Fort Worth; H. M. Moore, Austin; E. L. Wells, Taylor; F. M. Lege, Jr., Galveston; A. E. Judge, Tyler.

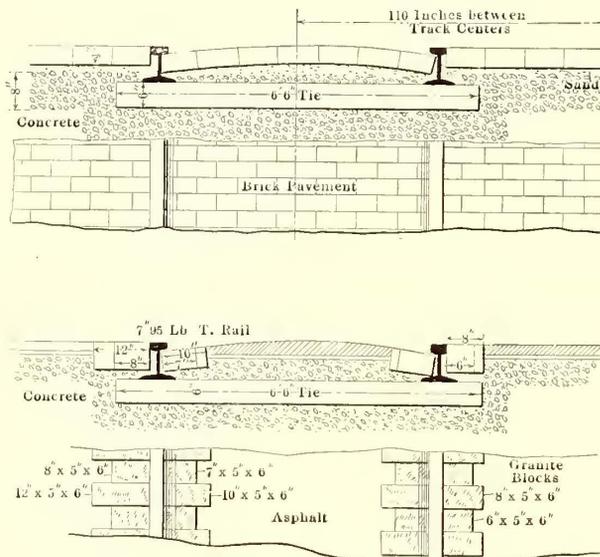
The entertainments, which were provided by the El Paso Electric Company, included a tally-ho ride through El Paso and Juarez, Mex., for the visiting ladies on Thursday afternoon; a visit to the largest smelter in the United States in special cars on Thursday evening; a trolley ride and luncheon at the Country Club for visiting ladies on Friday afternoon, and a reception and band concert at Fort Bliss on Saturday afternoon. On Friday evening there was a "Rejuvenation of the Sons of Jove."

TRACK CONSTRUCTION*

BY MARK LOWD

It is the intention of this article to deal briefly with T-rail construction in paved streets, this being the type of construction which the writer believes to be the best for the operating companies from the standpoint of first cost and economy of operation. In many cities the type of rail is designated by ordinance, which unfortunately in most cases specifies grooved rail. These ordinances were largely the result of a lack of attention and inexperience on the part of the railway companies in the early days of electric traction.

Emerging from the days of the horse car to the heavier electric car, the railways were confronted with the problem



DETAILS OF T-RAIL CONSTRUCTION FOR CITY STREETS

of securing a rail suitable for the new conditions confronting them. The old "strap" rail, the light T-rail, and the light girder rail were all found inadequate, it being impossible to maintain either a satisfactory rail or a well kept pavement. The manufacturers gave us the girder rail of greater height and weight, in various forms, and the grooved rail, also of greater weight. It is probable that the first good results in paved streets were obtained by the use of the girder and grooved rails, and this is the principal reason that so many cities demand the use of such rails.

With the increase in weight and height of the T-rail occasioned by the needs of the steam railroads for heavier rail to meet the requirements of high speed and greater weights, there came an opportunity to demonstrate that the T-rail could be used in any kind of a paved street with excellent results, both in regard to car operation and maintenance of roadway.

The T-rail has many advantages over either the girder or grooved types, and no disadvantages that are known to the writer.

It is preferred for the following reasons:

1. It is designed on better mechanical lines; there is no eccentric loading as in the case of the grooved rail.
2. There is no excessive waste of metal when heavy traffic and large wheel flanges are to be considered. In many cities grooved rails weighing from 125 lb. to 150 lb. per yard have been used, where an 80-lb. or 90-lb. T-rail would have been sufficient.
3. The flangeway is always ready for an increase in size

of wheel flanges of the local cars, or for the interurban car with the large flanges necessary for high-speed work.

4. The T-rail is not as noisy.
5. Car wheel maintenance is less.
6. The T-rail has a longer life, particularly at the joint, which is the vital point of any rail.
7. It is more easily handled, and high-priced shop curves are unnecessary.

Considerable discussion has taken place on the question of the use of standard T section instead of the high T or Shanghai. The standard section has the advantage of lower cost, being some \$8 a ton less than the high T, so that for the same money one can get a heavier rail by the use of the standard section. But with any character of paving the height of the rail should be considered first, and unless an excessively heavy standard rail is used, say from 90 lb. to 100 lb. per yard, which in most cases is unnecessary, the needed height can be obtained by using a lighter section of high T-rail.

A 7-in. T-rail is recommended as giving the necessary height. The base of the rail can be well imbedded in the concrete, thus increasing the rigidity of the rail and preventing to a great extent the loosening of spikes and other fastenings. Even with the use of a 90-lb. standard section, the necessary height to give the best results can hardly be obtained.

It is admitted that the standard section is mechanically stronger and has more metal in the head, with consequently a slightly longer life, but after considerable experience with many kinds of pavement, the writer believes that the 7-in. T-rail meets every requirement. In this connection attention is called to the fact that the use of the 7-in. T-rail was recommended by the committee on rails at the 1907 convention of the American Street & Interurban Railway Association.

METHOD OF CONSTRUCTION

Both tie construction and stringer construction may be used with the concrete foundation, though the concrete stringer construction should not be used unless the sub-grade is well drained and of good hard sand or gravel. Tie construction is always reliable, and will be considered in this article, time and space preventing a discussion of the stringer.

SUB-GRADE

The sub-grade should be well drained; this is very important, but in some places local conditions make it nearly impossible. The sub-grade should be well tamped or rolled; tile and gravel drains connecting to sewers or other outlets should be used when necessary to improve drainage.

TIES

Ties should be of good sound timber, untreated if completely encased in concrete, spaced on 3-ft. centers, using a brace tie plate on every third tie. This will do away with the use of the tie rod, which is objectionable where brick or stone paving is used.

CONCRETE

Concrete should be made of one part of best quality Portland cement, four parts of clean sharp sand, and seven parts of clean gravel or crushed stone, and should be allowed to set at least seven days. If, on account of operating conditions, it is necessary to use the track sooner—and this condition is frequently met with—see that the track is solidly blocked up and double the proportion of cement. Don't hurry operation over fresh concrete if it can be avoided. Many a track has been ruined by too early use.

The concrete should not be less than 6 in. in depth under the ties, and should extend around and above the ties, com-

*Paper presented at meeting of the Southwestern Gas & Electrical Association, El Paso, Tex., May 7, 8 and 9.

pletely encasing them and the base of rail. Carry the concrete as high as the paving brick or block will permit, leaving $\frac{1}{2}$ in. to $\frac{3}{4}$ in. for cushion. A 2-in. cushion, commonly used, is unnecessary, and the space had better be occupied by concrete. Put the concrete in place as wet as it can be handled without losing the cement by washing away. It will flush better around the ties and rail and will produce the best results. Tamping concrete under the ties and rail is an uncertain problem depending too much on the human element.

RAILS

Rails should be 60 ft. in length; these cost \$2 more per ton than the 30-ft. length, but this is offset by the saving in number of joints and bonds. Even if the difference in price was much greater, the immense advantage of elimination of one-half the joints and bonds, which spell trouble with a big T, fully warrants the increased cost of the 60-ft. rail over the 30-ft.

The weight of rail should be governed by the traffic, and it is important to consider the team traffic as well as the car operation and weights. Heavy trucking will affect the condition of the rail to a great extent, and a heavier rail is necessary in streets where the team traffic is considerable than in a street where the car service and weights are the same, but where there is little teaming. Of course, it is very difficult to determine what the future car operation or team travel may be in many cases, but as a general proposition, the experienced manager can judge what the travel is likely to be for many years to come. For residential streets, or other streets where light travel can be reasonably expected, a 70-lb., 7-in. T-rail is suitable. In streets where travel of all classes is heavy, or likely to be in a short time, the 80-lb., 7-in. T-rail should be used. Where extreme conditions of car and team traffic prevail, as in the business centers of large cities, it would be advisable to use a 95-lb., 7-in. T-rail.

JOINTS AND BONDS

This is the vital part of the track, and it must be remembered that the life of the rail is governed by the life of the joint. Likewise, the condition of the joint is responsible to a great extent for the condition of the bond. It is extremely difficult to maintain any kind of a bond at a loose joint. The angle bar is not much better than the ancient fishplate, and in every case a "Continuous" joint should be used in preference to the angle bar, which is so much in evidence on bad joints.

There are several types of soldered and compressed terminal bonds which may be used with good results, though local conditions must be considered in connection with the selection of bonds. Conditions of soil and climate have rendered the use of soldered bonds impracticable in a few instances. A concealed bond applied to the web of the rail, under the joint plate, gives general satisfaction, and is not easily stolen.

SPECIAL WORK

For any kind of traffic the hardened center work, which is made by several reliable concerns, is the best and most economical in the end. Built up or home-made special work is only temporary construction at the best.

BOLTS AND SPIKES

One-inch bolts of the best quality, and spikes 9/16 in. x 5 in., of good material, should be used with all weights of rail recommended.

PAVING

A good vitrified brick or paving block makes a most satisfactory form of pavement, especially in the South and Southwestern country. If asphalt or bitulithic pavement is

used, do not under any circumstances permit the asphalt or bitulithic to be laid against the rail. Use a brick or stone liner against the rail. This will not only permit the tightening of a joint-bolt or the renewal of a bond without disturbing the adjoining pavement, but will also make a more durable job. The use of the special or "nosed" brick is unnecessary and rather unsatisfactory. The regular brick laid as shown in the accompanying cross-section of T-rail construction will give far better results. This construction has been used with great success in Milwaukee and other cities. A rich cement grout makes the most satisfactory filler for brick or stone pavement.

COST

The cost of track with this form of construction, the paving requirements being 8 ft. in width, will run from \$5.25 to \$6.75 per lineal foot of single track, varying with the cost of material, weight of rail, wages and character of labor, and local conditions on each job. There are a few cities having a good sandy soil, where excellent results have been obtained in brick paved streets without the use of concrete foundation. This is very satisfactory in residential streets, but is not advisable in the important business thoroughfares.

QUESTION BOX OF THE SOUTHWESTERN ELECTRICAL & GAS ASSOCIATION*

C-1. What effect does the injection of heated air over the fire have on smoke prevention or on fuel economy and what temperature must the injected air have in order to produce the best results?

Air is essential and best admitted through the grate bars to the furnace in innumerable fine jets, since gas and air mix only gradually. Air in bulk mixes only superficially with gas, and, by abstracting heat, cools the furnace. Gases to be thoroughly burned in the furnace must be intercepted at the start, else the combination, which is at best gradually, will not be completed in season. A proper amount of air entering the furnace above the fuel in small quantities assists somewhat in the combustion of the gases, but a great quantity is detrimental and injurious. I think if the fuel is not put in too thick a layer no necessity for such introduction of air is necessary. There are certain practical objections to heating the air supply for boiler furnaces. First, for every 480 deg. F. of added heat its bulk is enlarged by the amount of its original volume, so that at 3000 deg., the heat of the interior of the furnace, it has six times its original volume. It is consequently more unmanageable; and as its contained oxygen retains the same weight, its mixture with the gas becomes more difficult, while when mixed it can only do the same work as before. I think it would be much better to condense the air than to expand it. Next, if heated by passing through flame or over burning coal, the air will be robbed of a greater or less part of its vital oxygen. This is a positive loss.—J. B. Baltimore, Hillsboro.

Has a beneficial effect and should have a temperature of not less than 2400 deg. where coal is used. Will prevent smoke under proper conditions, but furnaces of this kind are rather expensive, and the same or better results can be obtained by other arrangements.—A. C. Stucky, San Antonio.

C-6. What is the saving in one of the modern waste-cleaning machines?

I know of no more modern waste-cleaning machine other than the one I am using. I made it and never saw one like

*Abstract of Question Box presented at the El Paso meeting of the Southwestern Electrical & Gas Association, May 7, 8 and 9.

it, and will explain it to any one interested. My oil and waste cost for February, 1907, was \$13.15, and with this machine, for February, 1908, it was \$3.25, cost of lubricants and waste, including engine and cylinder oil, which is $\frac{1}{8}$ mill per kilowatt or $\frac{1}{2}$ cent per hour for 24-hour service.—E. D. Kelly, Hillsboro.

The saving due to the machine of the Oil & Waste Saving Machine Company should be about 30 per cent in oil and about 50 per cent in waste.—El Paso Electric Railway Company.

Have obtained 80 per cent with centrifugal machine.—J. R. Cox, Fort Worth.

G-1. If the length and size of the top of a pole is decided upon what specifications further should be given to obtain a reasonably straight and round pole?

We specify that white cedar poles must conform to the specifications of the Northwestern Cedarmen's Association, as follows:

"Poles must be cut from live growing timber, peeled and reasonably well proportioned for their length. Tops must be reasonably sound and, when seasoned, must measure as follows: Five-in. poles, 15-in. circumference; 6-in. poles, 18½-in. circumference; 7-in. poles, 22-in. circumference, and 8-in. poles, 25-in. circumference at top end.

"On poles 4 in., 16 ft. and 18 ft. long, a one-way sweep of 4 in. and on poles 4 in., 20 ft. and 25 ft. long, a one-way sweep of 5 in. is allowable. On sizes 5 in., 25 ft. and upward, one-way sweep, allowable not exceeding 1 in. for every 5 ft.; for example, in a 25-ft. pole, sweep not to exceed 5 in., and in a 40-ft. pole, 8 in.; in longer lengths, 1 in. additional sweep permissible for each additional 5 ft. in length. Measurement for sweep shall be taken as follows: That part of the pole when in the ground (6 ft.) not being taken into account in arriving at sweep, tightly stretch a tape line on the side of the pole where the sweep is greatest, from a point 6 ft. from butt to the upper surface at top, and having so done, measure widest point from tape to surface of pole. If, for illustration, upon a 25-ft. pole said widest point does not exceed 5 in., said pole comes within the meaning of these specifications. Butt rot in the center, including small ring rot outside of the center, total rot must not exceed 10 per cent of the area of the butt. Butt rot of a character which plainly seriously impairs the strength of the pole above ground is a defect. Wind twist is not a defect unless very unsightly and exaggerated. Rough knots, if sound and trimmed smooth, are not a defect."

Experienced users have realized that rot as found in cedar poles is an incident of growth and not of decay; the latter indicated by the fact that the rot does not spread after the tree has been cut and that, thereafter, cedar is the most durable timber procurable for pole purposes.—W. W. Reed, Houston.

N-1. Can the largest cities of Texas profitably build their own cars if these cars are double-truck, semi-convertible type of the latest model?

The largest city in Texas, San Antonio, has tried building its own cars and found it unprofitable. If lumber-yard ash, oak and other lumber is used, cars will shrink and become loose, and to provide sheds and dry kilns to have your hard-wood seasoned as it should be would be an expense and an outlay far in excess of a regular car builder's profit.—T. C. Brown, San Antonio.

N-18. What is the better practice to use, solid or split axle gears, and why?

Under ordinary conditions split axle gears are preferable. The chief argument in their favor being that they can be

removed without disturbing the wheel. The new four-bolt gear has proved more satisfactory than the old eight-bolt type.—W. L. Weston, Fort Worth.

Solid, by all means, as they eliminate all possibilities of broken bolts in gearing and can be installed at less expense than split gears.—V. W. Berry, Dallas.

Solid gears, for the advantage over split gears in not getting loose on the axle, and I would recommend them for that reason.—G. H. Clifford, Fort Worth.

N-23. What can be done to decrease the number of cars pulled in daily for equipment failures?

Have one or more car inspectors out on the road. The writer has had such a man for the past four months, and he has decreased the pull-ins two-thirds. This man has nothing to do with schedules and discipline except the abuse of equipment by motormen. This he reports to the superintendent of transportation. The saving of shedmen's wages by making such a change, to say nothing of the interruption of traffic, more than pays the inspector's wages.—T. C. Brown, San Antonio.

More careful and rigid inspection, better education of trainmen and by keeping systematic records of causes of failures.—V. W. Berry, Dallas.

Special attention to brush holders and spacing of same.—M. Miers, Houston.

O-23. Porcelain and glass-break strains are much cheaper than wood and composition break strains. What arguments are there in using a wood or composition break strain in a 600-volt trolley system?

Wood strain insulators possess the advantage that they are not easily broken. Have tested them wet up to 10,000 volts, using hydrant water. Leakage was very slight at 10,000 volts. Rain is generally pure, and pure water being a non-conductor, the properly filled hardwood strain insulator has a good field of usefulness.—J. R. Cox, Fort Worth.

The advantage of a wood break strain is that in case of mechanical failure the break is plainly apparent, and no grounding of span or guy results through the device itself, which could happen with glass, porcelain or composition.—C. W. Davis, Dallas.

The newest form of porcelain break strains are the most satisfactory thing for this purpose.—El Paso Electric Railway Company.

Have been using glass strain insulators for four years and find them without an equal for this climate.—Flint McGregor, Houston.

P-6. To what extent should street inspectors look up accidents for the claim department?

Inspectors should not be permitted to do anything but inspect. If you require and have a claim department you should have sufficient force to tend to that department. However, when a serious accident occurs an inspector should go to the place of the accident at once to see that the schedule is maintained, and, of course, when there, if he can get the names of any witnesses that had not been procured by the conductor, he should do so, and caution the motorman not to talk. This is a caution that it seems has to be repeated many times.—T. C. Brown, San Antonio.

Inspectors should give every assistance to the claim department in looking up accidents, as this will put them in a position to judge for themselves whether or not the trainmen are at fault, and if the inspectors are educated along these lines it keeps them on the lookout for witnesses, and as they are with the crews the most of the time they can often get very valuable information if interested in this line of the work.—G. H. Clifford, Fort Worth.

REINFORCED CONCRETE PILES AND TIES

At the May 15 meeting of the New York Railroad Club, A. C. Chenoweth presented a paper on "Reinforced Concrete as a Substitute for Wooden Piles and Cross Ties or Sleepers." Mr. Chenoweth's method of constructing concrete piles eliminates the use of forms, as the pile is made simply by rolling a sheet of concrete and metal netting into a solid cylinder. The diameters of the reinforcing rods have been determined for all lengths up to 61 ft., also the ratio of the diameter of the pile to the length of pile by actual experiments. The author gave some instances proving the remarkable ability of reinforced piles to withstand the hardest kind of treatment in transportation and

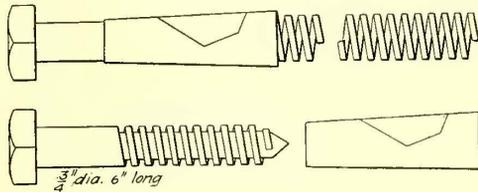


FIG. 1.—DEVICE FOR FASTENING RAIL

handling, aside from their great ability to withstand the pile-driver.

The reinforcing of concrete to resist impact suggested to Mr. Chenoweth the same form of construction for railroad ties or sleepers. Among the places where he has installed such ties are the Scully yards of the Pennsylvania Railroad West of Pittsburg, the Dyckman Street station of the Interborough Rapid Transit Company of New York and the Walnut Street line of the Philadelphia Rapid Transit Company.

This tie is made in the same way as the pile, being practically a roll made up of a sheet of concrete and metal netting. The roll is placed in a form and squared by pressure and a mixture of sand and cement. The holes for the fastening device are made by steel pins being pressed through the tie by means of a templet, the pins being withdrawn before the tie hardens. The device for fastening the rail, as shown in Fig. 1, is a small shell of galvanized steel coiled into a hollow frustum of a cone. A spiral

pany has a single-rail signal system in addition to the return circuit.

The Philadelphia installation is on Walnut Street, west of the Schuylkill River bridge, in a district where there are two lines of cars running on about 3 minutes' headway most of the day and about 1 3/4 minutes' headway during the rush hours. In October, 1906, the company rebuilt a stretch of this track, using 301 Chenoweth ties spaced 2-ft. centers. They are laid in a dirt foundation and carry a 141-lb. Trilby rail rolled for the transit company by the Lorain Steel Company. At present the railway's engineers cannot offer any opinion on the comparative value of these ties, but as they expect to do some resurfacing on that section in the near future, they will be in position to secure some data after digging up the tracks.

The blocks used on the electric railway installations have shown no deterioration. However, the blocks used on the steam road at Scully had to be renewed, as the rail cut into them in a very short time. Mr. Chenoweth suggested that a steel tie plate be placed on top of the block. The plates were ordered, but not before some of the wooden blocks had been cut through, leaving the rail to pound upon the concrete tie. The effect was to damage the tie under the rail, which was observed on four, or about 2 per cent of the ties. This Scully track deserves some notice. There was no indication of any track force ever having given it much attention, as it was used to transport loaded freight and coal cars from and to the Carnegie Steel Works every five minutes, day and night. The rail was light; cross-ties were placed 22 in. from center to center; splice bars fastened to rail with four bolts, never tight; joints working loose, ballasted with column and ashes. Under these conditions the lifetime of a wooden tie was from 6 to 18 months. This is where the test was given to this form of reinforced concrete tie. They are still in the track. The fastening of the rail used was as described.

After Mr. Chenoweth had read his paper the chair called upon several well-known concrete engineers and contractors, some of whom showed lantern slides of a large number of reinforced concrete structures of different kinds. The main points brought out in these talks were the fire-proof qualities of concrete, the speed of erection and the great variety of treatment possible.

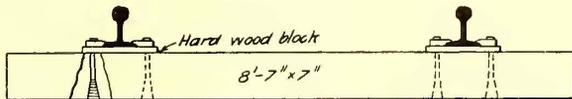


FIG. 2.—SHELL WITH SPRING INSERTED IN CONICAL HOLE AT BOTTOM

spring of proper pitch to mesh with threads of a 3/4-in. commercial lag screw is inserted into the large end of the cone. The shell with the spring is inserted in the conical hole at the bottom of the tie, as indicated in Fig. 2. The lag screw is then passed through a clipping engaging the flange of the rail and screws into the spiral spring until the rail is tightly clamped to the tie. In practice a hard wooden block is placed below the rail to deaden the shock.

The ties installed for the Interborough Rapid Transit Company have been down two years, but as very few trains were operated beyond Dyckman Street up to within the last six months, they have not been subjected to severe service for more than that period. These ties are laid in ballast on a solid structure, and hence are not subject to tipping, sinking or other movements which might occur if they were laid in the ground. Owing to the metal in the ties, they are insulated from the rails, as the com-

BRAZILIAN NORTHWEST RAILROAD

The Brazilian Northwest Railroad, work on which was started two years ago by a French company, under present plans promises to surpass any railway enterprise undertaken in South America in recent years. The road will cross the Parana River within a few miles of its junction with the River Tiete. These rivers are broken by waterfalls having a volume rivaling Niagara Falls. This location is said to offer opportunities for twin cities on the South American continent which possibly might outrival the great commercial centers on the Mississippi. There are now 110 miles in operation over a territory which two years ago was virgin and scarcely well explored. Surveys have been completed to the point where the road is to cross the Parana River, which forms the boundary line between the state of Sao Paulo and the state of Matto Grasso. With the prevailing high prices for coal it is not likely that the splendid opportunities for water power will be neglected, both in reference to the railroad and to light and power for the adjacent districts, which the falls are more than ample to supply.

BRIEF ON ACCOUNTING PRESENTED TO THE PUBLIC SERVICE COMMISSION IN NEW YORK

The Street Railway Association of the State of New York has presented to the Public Service Commission of the Second District a brief on the proposed establishment of a uniform system of accounting based upon Circular No. 20 of the Interstate Commerce Commission. The statement was prepared by the committee appointed to do so at the quarterly meeting of the association at Albany, March 18, and was submitted to the commission last week. Six points are made in the brief, as follows:

Point I. Neither the Federal statute nor the State statute requires, by a fair construction, that the accounting of all common carriers should be uniform and identical, and the marked distinction in the methods of construction and operation of steam or general railroads and street or electric railroads renders the same system of classification of accounts for both kinds of railways incongruous and objectionable.

Point II. The steam railroad classification upon which the tentative classification is based has not been wholly satisfactory, and is about to be substantially amended.

Point III. The primary operating expense accounts in the tentative classification are unduly extended beyond the point of practical benefit for any electric railroad, and its adoption would cause peculiar and unnecessary hardships upon the smaller roads affected, if the keeping of 116 primary accounts shall be incumbent upon all lines having a gross annual revenue of \$50,000 or over.

Point IV. The substance and character of the criticisms made under the preceding point in respect to the primary operating expense accounts are largely applicable to the tentative classification of expenditures for road and equipment.

Point V. The joint facilities accounts involve expense and detail out of proportion to the statistical value of the results, and although the principle involved may be correct in theory, its use would produce inaccuracies in practice because of actual conditions.

Point VI. The mandatory and arbitrary charges for depreciation contained in the tentative classification should not be required.

The arguments on the five first points were based on the tentative classification proposed in Accounting Series No. 20 and show its inapplicability to electric railway conditions.

On the subject of depreciation the brief points out that the history of American railroads has been a story of increasing earnings, largely due to the up-building of the country. While this progression continued it was not thought essential to keep from the owners of the property that return upon their investment which the net earnings and actual increase in the value of the property apparently warranted. Electric railroads, which are not even yet far beyond the threshold of their development, have naturally, and it is believed rightfully, followed the same practice. Charges of depreciation when made are of necessity arbitrary, and the extent of the charges to meet actual depreciation will vary, as they are dependent upon a large number of conditions. At the same time there has often been a concurrent appreciation in value of a large part of the property.

The committee believes that the mandatory establishment of depreciation accounts would have a discouraging effect upon the development of electric railways, as especially during the early life of an electric road the earnings are not large. Sixty-one of the 72 companies in the Second District in New York State paid no dividends during the year ended June 30, 1906, and the dividends paid were moderate in amount. The effect of charging off a sum for depreciation might give any railroad company a credit and reputation for stability, but this would not overcome in the minds of investors the fact that a deficit is

shown or that dividends heretofore paid have been discontinued.

The committee does not deny that possible benefits may accrue to the street railway companies in their relation to the public from the keeping of some depreciation account, but believes that it should be a permissive depreciation account to be treated as a deduction from income. The depreciation charges in the classification given in Circular No. 20 are divided among six accounts, which are further subdivided into numerous separate accounts, totalizing 74 in all. It is believed that these separate accounts would be based on estimates only and would be of a theoretical structure, which in actual practice is more than likely to collapse. It is further stated that the prices of equipment and material vary greatly in different years, and this would further complicate the situation. The report continues:

"Under full and complete maintenance charges it might be fairly said that there could be no depreciation, and the inevitable result of fixed depreciation charges along the lines of the tentative classification will be to prevent the prompt adoption of the newest methods and equipment because of the existence of the depreciation accounts. It cannot be claimed that fixed monthly charges for depreciation are theoretically correct since that part of depreciation which is due to use is greatest when use and earnings are the greatest, and since use in each month is not constant and uniform, by the same sign depreciation due to use is greatest in the month when use and earnings are greatest. All depreciation is, of course, not due to use, and the above argument would not apply to depreciation due to lapse of time, obsolescence, casualty and other causes unrelated to actual use. A single depreciation account or fund, established and continued as the condition of the railroad and the judgment of its directors might require, created and used for the replacement of all or any portion of the property according to the judgment of those intrusted with its management, is all that ought, from any point of view, to be included in any classification imposed or adopted by governmental officials.

"The question of depreciation is one of policy and of judgment, and not one of accounting. The duties of accounting officers should be confined to keeping accurate and intelligent accounts of transactions in business and of the assets and liabilities of the companies. Accounts are records of the past and present, while depreciation deals largely with the future. The establishment of any depreciation accounts at the present time is revolutionary enough. Some companies have taken steps in the direction of the establishment of such accounts. They are for the most part the older and better established railways, and the charges in these instances for depreciation have been usually based upon a percentage of the gross revenue."

The committee in conclusion urges that the postponement of the determination upon this exceedingly important subject, in view of existing financial conditions, is highly desirable, and that a gradual evolution, rather than a radical revolution, in treating and disposing of the matter of depreciation will be for the ultimate benefit of all and presents the correct method of solving the problem.

By a decision of the upper branch of the New York State Supreme Court, the Interborough Rapid Transit Company, of New York City, has a right to sell its surplus power, even though conveyed through ducts owned by the city. This decision overrules that of a lower court against the railway.

CORRECTION OF STORAGE BATTERY TROUBLES

BY A STORAGE BATTERY ATTENDANT

Although various articles have appeared in the technical papers on storage batteries, I do not remember having seen one to tell the operator whose duty it is to keep watch on those silent cells, what the actual treatment is when certain symptoms appear. Storage batteries have become an important factor in every railway and lighting station and their use is being appreciated more each year by companies whose object is to give uninterrupted service and produce satisfied looks on the faces of their shareholders. To-day it is as much the duty of an electrical engineer to be able to direct the repair or remedy to any part of a storage battery, as it is when any other source of power in his station requires his experienced services at the time of a breakdown.

In all large battery installations the makers issue printed instructions or typewritten rules to the operators who look after the battery, viz: take the hourly gravity readings, the voltage and gravity readings of the entire battery during the weekly overcharge. These instructions tell you little more than "never let the battery voltage go below so and so volts"; "do not charge at a higher rate than so and so amperes"; "always add pure water to make up for evaporation," etc.

If all goes well that is all that would be necessary to know in the majority of plants operating to-day. But at times trouble occurs when the services of a battery expert may not be available. Hence the following hints should prove of some value in the emergencies enumerated hereafter.

LEAKY CELLS

Wipe the outside of cell thoroughly dry. Place some heavy wrapping paper on the floor or skid beneath the cell. As the acid drops on the paper it may help to locate on which side of the cell the hole can be found. Place a hydrometer in the cell and note the reading; also that of the adjoining cell. If the gravity varies directly with the adjoining cell the leak may be looked for at or near the top of the cell. If gravity continues to drop, the leak may be looked for at or near the bottom. Allow acid to drop $\frac{1}{2}$ in. below the top of the plates and if the leak continues you may know it is below that line. If the leak subsides look for a hole above that line. When located burn it up with a hydrogen flame, or if this is not available use a soldering iron to close the hole; paint it with thick asphaltum and allow to dry before refilling the cell.

If the hole is found in bottom of tank disconnect or cut out all of the plates from the busbar, distributing the negatives in adjacent cells to keep them from the air. If this is not possible place them in a wooden box filled with pure water. The positives can be placed in the open air wherever convenient. Repair the leak in the same manner as described before.

It is possible that a cell may not show a leak until some months after the battery has been in operation.

DROP IN GRAVITY

Drop in gravity can be caused by two or more plates being short-circuited. Take a battery inspection lamp and put down inside of cell. Look carefully between each plate for particles of scale or for a buckled plate touching the adjoining one. If scale is found, dislodge it by working the board separator up and down, or with a thin piece of board if the separators are of glass or rubber. If the short-circuit is caused by a buckled plate, cut it out and

place between two boards and with a press or weights straighten it. Do not attempt to pound it.

If nothing is found between the plates in the electrolyte, look carefully for small pieces of lead between the plate lugs on top of the glass which support the plates. Sometimes there are small pieces left on one plate by the lead burner. The cell will test out all right before the acid is dumped, but after the battery is in commission the moisture closes the partly made circuit between the two plates.

After you have cleared the short-circuit note the gravity. If it does not rise with the other cells disconnect it and charge up separately at one half the normal rate for, say, 16 hours. This should bring it to within a few points of the other cells. A short-circuited cell can always be detected by its failure to boil while being overcharged.

LEAKAGE

It is possible that if the cells are not carefully wiped off after each overcharge a moisture path will be made to ground, and in this way slowly discharge any number of cells. Remedy this by testing for ground and locate the cell by the one showing the least deflection on voltmeter.

Foreign matter in electrolyte.—This can be detected by (1) drop in gravity, (2) sulphating of positives, (3) unhealthy color of positive and negative plates. The test is as follows:

Iron.—Take a small quantity of the electrolyte, add a few drops of nitric acid and heat; when cold add a few drops of solution of potassium sulphocyanide. The presence of iron will be shown by a deep red color.

Copper and arsenic.—To a fresh solution of hydrogen sulphide add an equal quantity of the electrolyte, which must be diluted far enough so that it shows no white precipitate is thrown down. A black precipitate generally shows the presence of copper; a yellow precipitate shows the presence of arsenic.

Nitric Acid.—Make up a solution as follows: $\frac{1}{2}$ gm. diphenylamine, 100 cc strong sulphuric acid, 20 cc of water. To a small quantity of this solution in a test tube add a small quantity of the electrolyte which has been in use. The presence of nitric acid will be shown by the appearance of a blue color.

Hydrochloric acid or chlorine.—To a small quantity of the electrolyte add two or three drops of nitric acid, heat this in a test tube and let it cool. Add two or three drops of nitrate of silver. If a curdy white precipitate forms add an excess of ammonia, and if this dissolves the precipitate hydrochloric acid is present.

Should any of the above be found in a cell, immediately syphon out the electrolyte, wash plates thoroughly and then put in new acid.

PROPOSED RAILWAY DEVELOPMENT IN ITALY

A bill was recently introduced in the Italian Parliament which provides for an extensive plan of new railway construction. The contemplated lines from Rome to Naples, Bologna to Florence and Genoa to Milan are the most important. They are intended for fast passenger traffic and, in all probability, will be operated by electricity. They will be double and follow the shortest routes. The roads to be built will be about 1000 miles long and cost over \$100,000,000. The bill also provides for better facilities for tramway and motor car lines in the shape of increased subsidies to private enterprises. It is believed in Rome that the measure will be passed.

FINANCIAL INTELLIGENCE

WALL STREET, May 20, 1908.

The Stock and Money Markets

The upward movement in securities values on the Stock Exchange, which was under way at the close of last week, made further progress during the present week, prices for many issues reaching the highest levels on the movement. Trading was upon a broader scale, more issues being traded in than for a long time past, and the total transactions on several occasions were the largest for several years. The most striking feature of the situation was the extreme ease in the local money market. The completion of the repayment of \$45,000,000 government money to the Federal treasury by the National banks, and the continued outflow of gold to Paris and Berlin were made without causing the slightest disturbance in rates for money. On the contrary, interest charges for all classes of accommodation worked easier, the rate for day to day money declining to 1 per cent, the lowest for the year, while asking rates for time loans were reduced $\frac{1}{4}$ per cent. Six months' money, which carries the borrower over the November election, waned at $3\frac{1}{2}$ per cent, as against $3\frac{3}{4}$ per cent asked a week ago, but the banks and other lenders found it practically impossible to place funds for the other maturities at prevailing rates. The position of the Clearing House institution was further strengthened, despite the extraordinary demands above referred to, and the surplus reserve now amounts approximately to \$65,000,000.

The almost unprecedented monetary situation enabled railroads and other corporations to obtain all the fresh capital needed for the present, and during the past week several new short-time note and bond issues were announced. The Southern Railway Company, through its financial agents, is offering \$15,000,000 6 per cent three-year notes, and it is reported that negotiations have been about completed for the extension of \$4,545,000 6 per cent Interborough-Metropolitan notes maturing the latter part of this month. In addition to the above the Manhattan Elevated Railway Company will, it is understood, issue \$10,818,000 bonds for the purpose of refunding the Metropolitan Elevated Railway bonds, which mature on July 1 next. Full details of the flotation of this proposed issue have not been determined, but it is understood that the new issue will be handled by the bankers who made such a decided success of the recent issue of Interborough notes. Other contributing factors to the buoyancy in the stock market were the declaration of the regular dividends on Union and Southern Pacific stocks, indicating as it does that railway managers expect a decided improvement in traffic, and in general business conditions in the not distant future. As a matter of fact, there are already signs of an improvement in general conditions. Large producers of copper report an increased demand for the metal, both from domestic and foreign consumers, and this has been reflected in an advance of $\frac{1}{4}$ c. a pound in the red metal. Some improvement is reported in the dry goods trade, and also in the iron and steel industries, all of which helped to bring about a much healthier feeling in financial circles. The purchases of high-grade stocks and bonds by investors continued upon a large scale, and the volume of business transacted by the commission houses was considerably larger, indicating that the outside public have at last entered the market on a much larger scale. Not only have the high-grade issues been pushed forward during the week, but many of the low-price railway shares and the so-called specialties have developed considerable activity and have participated in the general upward movement.

The strength of the general market was reflected to a very large extent in the local traction group. The demand for these issues have been quite active of late, and as a result prices for them have advanced materially. Brooklyn Rapid Transit stock and bonds were notably strong features of the week's movement.

Philadelphia

Trading in the local traction issues were upon a somewhat larger scale during the past week. More issues were dealt in than for some time past, and the individual totals were considerably larger than in recent markets. During the early part of the week, the upward movement continued, new high records for the present movement being established in several issues, but at the high levels more or less realizing developed, resulting in an irregular price movement. Philadelphia Rapid Transit was by far the most active issue of the group, and also sustained the greatest decline in price. After holding firm for several days around $18\frac{1}{4}$, it dropped to $17\frac{1}{4}$, and after a feeble call it again reacted and closed at $16\frac{1}{2}$. Union Traction moved in sympathy with Philadelphia Rapid Transit, the price declining from $55\frac{3}{4}$ to $54\frac{1}{2}$. Philadelphia Traction, however, was conspicuously strong, advancing from 91 to 92. American Railways moved up to $44\frac{3}{8}$, and Consolidated Traction of New Jersey sold at 71. Frankfort & Southwark Passenger rose 6 points to 397, and United Companies of New Jersey was firm at 242. Philadelphia Company common sold at $39\frac{1}{2}$ and the preferred at $40\frac{1}{2}$ and 41.

Chicago

A reactionary tendency developed in the Chicago tractions during the week, several of the leading issues sustaining sharp losses. Chicago City Railway stock, which sold at 175 at the close a week ago, dropped to 165, while West Chicago receipts lost 2 points to 29. North Chicago receipts were steady at 45. In the Elevated issues the general trend of prices was upward, South Side advancing to 62, and the 4 per cent bonds to $94\frac{3}{8}$. Metropolitan common advanced to 18, and the preferred to 54, while the gold extension 4s and the gold 4s sold at $84\frac{1}{4}$ and $87\frac{1}{2}$ respectively. The directors of the Metropolitan Company met early in the week, but took no action in the matter of resuming dividends on the preferred stock. A number of the directors are said to be in favor of waiting until the autumn before acting in the matter. It is also said that the extension bonds will be disposed of, as the money is needed to meet the principal and interest of the floating debt. Other transactions included Northwest Elevated at 55, Union Traction receipts at $3\frac{1}{2}$ and Chicago & Oak Park at $2\frac{1}{2}$.

Other Traction Securities

There was a better inquiry for the high-grade street railway bonds in the Baltimore market, and consequently higher prices prevailed. The demand for United Railway 4s was particularly active and carried the price of these up a full point to $86\frac{1}{2}$. The incomes and the funding 5s also participated in the upward movement, the former selling as high as 53, while the latter advanced $1\frac{1}{2}$ to 79. The stock was fractionally better at 11. Other transactions were: Washington City & Suburban 5s at 99, Charleston City Railway 5s at 100, and Norfolk Railway & Light 5s at 90. The Boston market was comparatively quiet, but prices generally held firm. Boston Elevated jumped nearly 3 points to $135\frac{1}{4}$ on light purchases. Boston & Suburban advanced to $11\frac{1}{4}$ and the preferred from 52 to 54. Boston & Worcester sold at 11, West End at 83 @ 85 and the preferred at 100. Massachusetts Electric sold at $9\frac{1}{2}$ @ 10 and the preferred dropped from 44 to 42.

Security Quotations

The following table shows the present quotations for the leading traction stocks and the active bonds as compared with last week:

	May 12.	May 19.
American Railways.....	44 $\frac{1}{2}$	44 $\frac{1}{2}$
Boston Elevated.....	135	134
Brooklyn Rapid Transit.....	50 $\frac{1}{4}$	50
Chicago City.....	170	160
Cleveland Electric.....	52 $\frac{3}{4}$	52 $\frac{3}{8}$
Consolidated Traction of New Jersey.....	70	70
Detroit United.....	35	35
Interborough-Metropolitan.....	11 $\frac{3}{8}$	11 $\frac{3}{4}$
Interborough-Metropolitan (preferred).....	31 $\frac{3}{8}$	31 $\frac{1}{2}$
International Traction (common).....	33	33
International Traction (preferred).....	55	55
Manhattan Railway.....	135 $\frac{1}{4}$	136

	May 12.	May 19.
Massachusetts Elcc. Co. (common).....	9½	9½
Massachusetts Elec. Co. (preferred).....	44½	42
Metropolitan Elevated, Chicago (common).....	a18	17
Metropolitan Elevated, Chicago (preferred).....	a49¾	53
Metropolitan Street.....	29	—
North American.....	61¾	59
Philadelphia Company (common).....	39	39½
Philadelphia Rapid Transit.....	18	16
Philadelphia Traction.....	90	91
Public Service Corporation, certificates.....	68	69
Public Service Corporation, 5 per cent notes.....	90	95
Twin City, Minneapolis (common).....	—	91
Union Traction (Philadelphia).....	55½	53¾

a Asked.

Metals

Some improvement is reported in the iron and steel situation. In certain lines the demand shows an increase, and the belief prevails that conditions will improve from now on. Copper metal ruled firmer at an advance of ¼c. in all grades. Lake is quoted at 12¾ @ 12¾c. and Electrolytic at 12½ @ 12¾c.

STRIKE UNLIKELY IN CHICAGO

Application for an injunction restraining the union of employees of the Chicago Railways Company from threatening the company with a strike, which was brought by eight non-union employees, was denied Tuesday by Judge Walker. A conference was arranged for Wednesday between President Roach and the Union officers, including President Mahon, of the Amalgamated Association of Street and Interurban Workers of the United States, and at the time of going to press a strike seemed improbable.

NEW HAVEN REPORT FOR QUARTER

The report of the New York, New Haven & Hartford Railroad Company for the quarter ending March 31, 1908, shows gross earnings of \$10,913,741, a decrease of \$1,756,268, as compared with the corresponding quarter of 1907. The operating expenses were \$8,880,113, a decrease of \$619,530. The net earnings from operation were \$2,033,627, a decrease of \$1,136,737. Income from other sources than operation increased \$1,183,631. Interest, rentals and taxes increased \$1,064,841. The deficit for the quarter this year was \$668,837 against a surplus of \$349,109 for the same quarter of 1907, a decrease in net income of \$1,017,947. The figures for 1908 are based on the classification adopted by the Interstate Commerce Commission July 1, 1907, which materially affects comparison with 1907, especially in the items "Income from other sources" and "Interest, rentals, taxes, etc." Operating expenses for this year include charges for depreciation on equipment, no similar charges appearing in the corresponding quarter of 1907.

TOLEDO COMPANY AND CITY REACH AGREEMENT

The litigation between the Toledo Railways & Light Company and the city of Toledo will be settled as soon as the City Council approves the adjustments reached by a special committee of that body and representatives of the company. An ordinance has been prepared embodying the terms of the settlement. Under this the city will receive \$242,612.45, and at the same time all debts due the city from the company will be wiped out. The claims of the city consisted of \$516,861.50 as a balance for paving 77 streets, \$2,101.15 damages to fire department apparatus and \$32,802.89 as 1 per cent of the gross earnings accrued on certain lines under franchises granted to David Robinson and the Toledo Electric Street Railway Company, with interest to March 1, 1908. This makes a total of \$551,765.54. The claims of the company consisted of \$59,126.58 due the Toledo Gas, Light & Coke Company as a balance on street lighting; \$4,839.96 as a balance due the Western Electric Light Company as a balance on street lighting; \$497.60, the balance due for bridge and other lights; \$1,911.09, the balance due the Toledo Railways & Light Company for bridge, market, park, police station and other lighting; \$182,364.05, due the same company for street lighting, and \$32,317.30 due for lighting and payable Sept. 1, 1908. The total is \$281,784.51. The exact difference between these is \$269,981.03, but the committee has agreed to accept \$242,612.45 after deducting all the claims of the company.

Beginning March 1, 1909, the city shall be paid \$50,000 every six months until the debt is cancelled, but the company is given the right to settle in cash at any time. The balance will draw 6 per cent interest. In addition, all the suits brought by the city and the company shall be dismissed and all the penalties shall be stricken from the books. The directors of the Toledo Railway & Light Company have approved the settlement.

SALE OF DETROIT, FLINT & SAGINAW RAILWAY

The Detroit Trust Company, of Detroit, Mich., trustee under a mortgage given by the Detroit, Flint & Saginaw Railway on Dec. 1, 1903, has foreclosed the mortgage, and a decree of foreclosure signed by Judge Charles H. Wisner for the Circuit Court of the County of Genesee has been entered and the sale of the road ordered for June 18.

The Detroit, Flint & Saginaw Railway was incorporated to build an electric railway from Saginaw to Flint, but only 11 miles of road were built out of Saginaw, and this portion has been operated by the Detroit Trust Company as receiver. The company has a power plant and car barn at Bridgeport, but its offices are in the Beringer Building, Saginaw. The property to be offered for sale by the receiver consists not only of the physical property now being operated on a profitable basis, but all of the franchises for the construction of the balance of the right of way from the present terminus of the road through the townships of Bridgeport, Frankenmuth, Birch Run, Vienna, Mt. Morris, Genesee, Burton and Flint, and ordinances granting a franchise to the company by the villages of Mt. Morris and Clio and the city of Flint. As originally proposed, the road would be about 35 miles long and serve, directly and indirectly, a population of about 112,000 people. The receiver's report shows that for the first year, which ended Nov. 20, 1907, the road earned over and above all operation expenses and exclusive of fixed charges \$7,777.93, although only 11.81 miles were in operation and only passenger cars were in service. The first five months of the receiver's second year of operation, which ended April 20, 1907, show an increase in receipts of 7¾ per cent over the same period for the first year.

FINDING OF ARBITRATORS IN PITTSBURG WAGE DISPUTE

The board of arbitration chosen to settle the dispute between the Pittsburg Railways Company and its conductors and motormen regarding the reduction of wages by the company handed down a decision Thursday, May 14, in which it is agreed by the board that a reduction of ½ cent an hour in the wages of the men will be reasonable.

The arbitration board in adjusting the differences between the company and its employees over the threatened reduction in wages, split the difference involved in the dispute and determined that the men should accept a reduction. Calvin Wyatt, representing the employees, would not join in the decision. Judge J. J. Miller and M. K. McMullin, the latter the company's representative, signed the finding. It read as follows:

To the Officers of the Pittsburg Railways Company and the Committee of Conductors' and Motormen's Association.

Gentlemen: The majority of arbitrators, after a careful consideration of all the evidence, having especially in view the fact that in the last five months there has been a deficit of \$292,549 in car fares, compared with the five months of the year previous; that the wages of conductors and motormen were raised 2 cents per hour one year ago, based on the prosperous condition then existing; that the reduction in the number of cars in present operation and consequent decrease in the amount of wages paid, does not decrease the expenses of operation in proportion to the deficit; believing further that the exorbitant cost of living at present is on a fictitious basis and will decrease before the present business conditions obtain their standing of a year ago, we are of the opinion that in all fairness some modification should be made in the demands of both sides.

We therefore split the difference of contention into one-half and fix the rate of reduction at ½ cent per hour. This to control from May 9, 1908, to April 20, 1909.

J. J. MILLER,
M. K. McMULLIN,

Pittsburg, May 14, 1908.
The men have agreed to abide by the decision.

REPORT OF THE RECEIVER OF THE THIRD AVENUE RAILROAD

The report of Receiver Whitridge, of the Third Avenue Railroad, of New York, to which reference was made in the STREET RAILWAY JOURNAL last week, contains recommendations of the receiver regarding the rehabilitation of the property, and comments on operating methods that are very interesting. For instance, Mr. Whitridge refers to the measures taken at the instance of the court regarding the discontinuing of certain transfers. Despite the fact that transfers were discontinued between the Third Avenue Company and the Metropolitan Street Railway Company, the receipts have not increased, as the number of passengers has fallen off 60,000 per day. Mr. Whitridge first refers to the physical condition of the property. This, he says, in some respects is very bad. He refers to the expenditure of \$135,000 for fire apparatus, and says he hopes soon to have the property in condition to meet the requirements of the underwriters. Continuing, Mr. Whitridge says in part:

Car Repairs.—It has been the practice to detach the motors and controllers from the open cars at the expiration of the summer season and install them on the closed cars, and at the beginning of the summer to reverse that operation. This, I believe, is extravagant, and I ordered a sufficient number of new motors and controllers (50) to fully equip every car in the system. The work upon all of the open cars has been nearly completed, and, judging from that, I estimate the total cost of putting all the cars in order, including the new motors, and other electrical equipment, to be approximately \$300,000.

Repair to Track.—Altogether there will be needed for the track this year, and to be spent as soon as possible, about \$436,000, and thereafter with a liberal allowance for maintenance, I think no further expenditure will be necessary for some years to come.

Buildings.—At 129th Street and Third Avenue there is, in front of the car barn, a building used as a hotel, and several tumble-down stores or saloons. These buildings are all in an undesirable condition, and, as they would need very considerable repairs in any event, I propose to clean out the main building, which is used as a hotel, and construct inside the present walls proper offices for the accommodation of the Third Avenue and other lines. This whole improvement will cost nearly \$106,000. The substation at Bayard Street was intended to be the basis of a nine-story building. Plans were drawn for it, and the one story, now completed, together with the enormous cellar, was constructed in accordance with those plans. The new Manhattan Bridge will have its New York terminus immediately across the Bowery, and I am of the opinion that the carrying out of the original plans in respect to this building will be a profitable investment. I hope I may be able to find somebody to take a lease of it for a long period of time and construct the building. The architects estimate the cost of this building to be approximately \$483,000.

Power.—I have agreed to make a contract with the receivers of the New York City Railway Company in respect to the supply of power from the power-house controlled by them at Ninety-sixth Street and First Avenue, and the power-house at 216th Street, owned by the Third Avenue, which will avoid the large expenditure necessary to make the Third Avenue road electrically independent.

With the growth of the Bronx and the probable increase in the amount of power which will be used by the Union Railway and its connecting lines, and the probable increase in the amount of power used by the Metropolitan lines, it seems probable that some increase in the plant at 216th Street, or the expenditure necessary to make the Third Avenue completely independent, will be necessary within the next few years.

I think it desirable immediately to build a new substation for the use of the Union Railway at 161st Street, which will cost about \$225,000, and likewise a new substation in the neighborhood of the Kingsbridge plant, which will cost a similar sum. Certain repairs at the Bayard Street, Sixty-fifth Street and 129th Street substations are also necessary, at a cost of about \$109,000.

Cars.—I believe it to be desirable to purchase within the next 12 months, in addition to the 75 cars already purchased, 250 to 300 new cars. I can do this on a car trust basis at 6 per cent, running over a period of 10 years. It is, however, undoubtedly more economical to raise the money and pay for the same at once. The money needed for this purpose may amount to \$1,500,000. Whether the kind of cars to be purchased should be of the present "Pay-as-You-Enter" type is by no means certain.

THE FORTY-SECOND STREET, MANHATTANVILLE & ST. NICHOLAS AVENUE RAILWAY COMPANY.

Its track is in fair condition, but an expenditure of \$30,000 will be necessary at once to take the place of the maintenance expenditures which should have occurred during the last few years, and almost \$4,000 must be expended on the building at 177 Manhattan Street.

THE DRY DOCK, EAST BROADWAY & BATTERY RAILROAD.

This is in the same condition, but needs not more than \$10,000 immediately expended on it. The rebuilding of the barn in Fourteenth Street, burned a year ago, will cost about \$80,000, but this can be done from the insurance money. Neither of these railways owns any cars or has any means of supplying power, and their cars are furnished by the Third

Avenue Railroad on the rental basis, and the power is included within the contract above referred to made with the New York City Railway receivers.

THE UNION RAILWAY.

This and the connecting lines cover 105 miles of streets—most of it double track—in excellent condition, as respects the track. It furnishes cars and power to the Westchester Electric Railway and to the Yonkers, Tarrytown and Southern Boulevard railway companies. Many of these cars are small and out of date, and within a very few years a very considerable number of cars of a more modern type will be needed. I propose, in case the purchase of the new cars above referred to for the Third Avenue is authorized, that many of the present double-truck cars in use upon that road should be equipped for trolley service and transferred to the Union Railway.

I recommend that the plans in respect to the barn in Pelham be carried out, at a cost of about \$225,000, which will give to this part of the system adequate storage for all of its cars and proper shops for their maintenance, which is at present very much needed.

The Union Railway has a franchise for building a line on the Bronx and Pelham Parkway. The 5½ miles of this road can be completed for something like \$250,000, which would, if built, be an exceedingly good-paying line.

SUMMARY.

The several amounts which ought to be expended, it will be perceived, are as follows:

Supplies	\$50,000
Sprinkling apparatus.....	135,000
Repairs to cars.....	300,000
Repairs to track.....	436,000
Repairs to buildings.....	151,000
Office building.....	106,000
Repairs to substations.....	109,000
Union substation.....	225,000
Kingsbridge substation.....	225,000
New cars ordered.....	300,000
Forty-second Street track.....	30,000
Forty-second Street buildings.....	4,000
Dry Dock track.....	10,000
Union Railway and car barn and shops.....	225,000
New construction—Bronx and Pelham Parkway.....	250,000
New rolling stock.....	1,500,000
Total	\$4,056,000

UNDERLYING CHARGES.

In addition to the money to be expended as herein stated, there are certain obligations of these roads not in default upon which the interest must be paid. The following statement shows these obligations and the amounts necessary to meet the interest upon them, aggregating \$572,000 annually:

Companies.	Bonds.	Rate of Interest.	Rate of Interest.	When due.
Third Ave. R. R. Co.....	\$5,000,000	5%	\$125,000	Jan. July
42d St., M. & St. N. Ave. Ry..	1,200,000	6%	36,000	Mar. Sept.
Dry Dock, E. B. & B. R. R. Co.	950,000	5%	23,750	June Dec.
Union Railway Co.....	2,000,000	5%	50,000	Feb. Aug.
*Southern Boulevard Ry.....	250,000	5%	6,250	Jan. July
*Westchester Electric R. R....	500,000	5%	12,500	Jan. July
*Yonkers R. R.....	1,000,000	5%	25,000	Apr. Oct.
*Tarrytown, W. P. & M. Ry..	300,000	5%	7,500	Mar. Sept.

*Guaranteed by the Union Railway Co.

RECEIVER'S CERTIFICATES.

I intend to ask the Court for authority to issue \$2,500,000 of receiver's certificates, payable within one year and bearing interest at the rate of 6 per cent. With those and the earnings from the property I think I can do all of the work and make all the payments which I have herein enumerated. It may be desirable to issue a certain number of certificates of the Union Railway, to an amount necessary to pay for the car barns, the Bronx and Pelham Parkway construction and for the power station, not exceeding in all, however, \$750,000, which could later be taken up by the Third Avenue certificates; or it may be desirable, while having authority to issue certificates for the Union Railway, as above mentioned, as I already have authority to issue certificates for the Forty-second Street and the Dry Dock Railways, of which I have not availed myself, to issue Third Avenue certificates for the whole amount of \$2,500,000 directly, as the bankers may prefer those to certificates of the other roads. If the certificates of those subordinate lines could be used permanently the Third Avenue certificates should be diminished *pro tanto*, but in any case only certificates for \$2,500,000 for one year will be outstanding.

TAXES.

The special franchise tax has not been paid upon the Third Avenue Railroad, except for the first year since the law went into force, and the unpaid taxes for eight years aggregate on their face about \$1,200,000. The taxes upon the other lines, also unpaid, amount to approximately \$100,000 for the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway Company, \$120,000 for the Dry Dock, East Broadway & Battery Railroad Company and \$180,000 for the Union Railway. Under the Metropolitan management all these franchise taxes have been in

litigation during the whole period, and that litigation has been carried on in the name of the Third Avenue Railroad Company and of the Union Railway Company. Whether those cases should continue to be conducted for the benefit of all the railroads formerly controlled by the New York City Railway Company on joint account, or whether the Third Avenue should assume sole control of the litigation, in respect to its own taxes, is a question under consideration. Whatever else may not be covered by the contract of lease to the New York City Railway Company, the taxes were so covered and ought to have been paid by the Metropolitan and the New York City Railway Companies. Whether the Court will hold the amount of those taxes to be a lien on the Metropolitan property, or a preferred claim on any part of its proceeds, I do not know. I venture, however, to think that, in any case, the cash proceeds of the operation of the Third Avenue road, which were collected by the receivers of the New York City Railway and by that company from the date of the last payment under the lease down to Jan. 12, should be paid to me in cash, less the amount of the operation of the Third Avenue Railroad.

PROCEEDS OF BONDS.

On taking charge of the property I ascertained from the bankers that the proceeds of Third Avenue 4 per cent bonds had been paid over by them to the company in three checks, as follows: One drawn on the National City Bank for \$17,000,000; one on the National Bank of Commerce for \$17,564,444.44, and one for \$1,943,000. I instructed my auditor to make an examination as to the disposition of these moneys, and I hand you his report herewith. From that it is apparent that a large part of the money—over twenty millions—had been expended prior to the lease to the Metropolitan, upon work, part of which appears to have been done by contract, for which the contractor was paid 15 per cent on cost.

As respects the balance of the money, whether it was wisely and honestly expended or not, I have not found, and no one has furnished me with any evidence of misappropriation, waste or peculation. I believe, generally speaking, that everything which has been done can be traced, but to endeavor to track the whole of the money expended since the lease would cost possibly \$200,000. There would be no certainty, after I had tracked it, that I should be able to recover any part of it for the bondholders or the company. Under these circumstances I deem it my duty not to undertake any suits or proceedings of any kind in respect to the expenditure of this money.

MOTORS.

On the horse-car lines of the Dry Dock and Forty-second Street roads a self-propelling car would give ideal service. I have four or five different concerns examining this matter, and hope to get an experimental car at a moderate cost for this purpose.

ACCIDENTS.

The amount of money paid for accidents on the Third Avenue Railroad from the time of my appointment as receiver to May 1 is \$6,201.58. In approximately the same period last year the amount of money paid by the Third Avenue Division of the Metropolitan was \$84,492.35, and the number of suits started was 112.

TRANSFERS.

In accordance with the opinion of the Court, I abolished transfers between the Third Avenue and the Metropolitan lines on April 11. The result, to some extent, has been disappointing, as the number of passengers carried has fallen off, during the first few days, something like 60,000 a day. The receipts, however, remain about what they were, and I am hopeful that a part, at least, of the passengers who have abandoned us will return to the Third Avenue system. I am also presenting a petition to the Court for permission to abolish transfers in the Bronx and with the Manhattan Elevated Company, and believe it will be profitable.

ADVERTISING.

I have made a contract with the Railway Advertising Company for a period of years, on the Third Avenue system, for \$85,000 a year for the first six years, and thereafter 50 per cent of the gross receipts, with a guaranteed minimum of \$100,000 a year.

ACCOUNTS.

The repairs to cars are now being done in the shops of the company, and, as the repairs to cars, to tracks, to the buildings and to the tracks are all now being charged to operating expenses, it is practically impossible to form any just judgment of the earnings of the properties. I expect to complete these repairs by Oct. 1, and after these extraordinary expenditures mentioned in this memorandum have been made it will be possible to start a proper system of accounts, to decide upon a proper allowance for maintenance, renewals and repairs, and to begin, in short, to make a record which will enable the owners of the company to know what it will earn as a basis for reorganization, although before that event can take place there must, of course, some arrangement be made in respect to the taxes and the amount of liability therefor, which has to be assumed by the Third Avenue Railroad Company and the other lines.

The report is closed with the correspondence between the receiver and the Public Service Commission regarding the orders of that body to the company concerning the operation of the property.

The Pittsburg Railways Company is planning to try some pay-as-you-enter cars of a novel type.

ANOTHER PUBLIC SERVICE CORPORATION LINE EQUIPPED WITH PAY-AS-YOU-ENTER CARS

The Public Service Corporation of New Jersey has equipped another of its Newark lines with pay-as-you-enter cars. It is the Roseville line, which runs from the heart of the city to the city limits, and over which about 20 minutes are consumed in making the run. In all, about 15 or 18 cars are operated regularly over the line, and on Sunday 9 of the pay-as-you-enter type were placed in operation. On Tuesday the full complement of pay-as-you-enter cars was installed, so that now both the Broad Street and the Roseville lines are equipped with the cars. At present 53 of the cars are being operated on the former line, making 68 to 70 cars of the type in regular operation.

PASSING ON THE QUESTION OF ADEQUATE SERVICE IN BOSTON

A finding by the Massachusetts Railroad Commission denying a petition for increased service on the Charlestown surface lines of the Boston Elevated Railway Company, officially recognizes the fact that there is a point in urban transportation development beyond which it is inadvisable to add more cars.

The complainants, members of the Charlestown Improvement Association, took the ground that since their district had had the advantages of "L" service, the service on the surface lines had been curtailed until "long and vexatious delays" resulted. They suggested as a remedy a belt line, on which cars should be kept moving in both directions around the triangle of which the angles are at City Square, Sullivan Square terminal, and the corner of Chelsea and Bunker Hill Streets. The first two points at stations for the "L" and the idea was that the local circuit on the surface would give more frequent and quicker facilities between the "L" and various streets not conveniently near its stations.

The Railroad Commissioners forthwith made an investigation, and found that the surface cars in the territory where the complaint originated were operated as follows:

Main Street Lines.	Cars Per Hour.			Total per day.
	A. M.	Normal.	P. M.	
Winter Hill to Dudley Street.....	6	6	6	114
Sullivan Square to South Station via Washington and Beech Streets.....	6	6 and 3	6	88
Everett and Sullivan Sq. to City Point... 3	3	3	3	52
Malden and Sullivan Square to Scollay Square Subway	3	3	3	43
Total via Main Street.....	18	18 and 15	18	297
Bunker Hill Street Lines.				
Sullivan Square to Jamaica Plain.....	6	6	6	106
Sullivan Square to Summer and Washington Streets	6	—	6	18
Sullivan Sq. to Scollay Sq. Subway... 7	6	6	6	106
Total via Bunker Hill Street.....	19	12	20	230

The commissioners were convinced that if the cars called for by the schedule could be kept on time, the result would be reasonable surface accommodation. Difficulties were noted; but in the end the board worked out the following:

By reason, however, of the frequent opening of the draw span of the Charlestown bridge; the operation of trains at grade at the crossing of the Boston & Main Railroad near Sullivan Square; and congested highway traffic at the so-called "rush hours" of the day on Main Street, delays in surface car operation are unavoidable. The unsatisfactory conditions are not due to an insufficient number of cars, but the impossibility under present physical conditions of maintaining schedules. The company admits that, owing to the Boston streets being occupied by cars operated to so many different points in the city, it is practically impossible to have its cars arrive out at City Square on an even headway. This fact is further evidenced by complaint concerning surface car connections in the late afternoon with elevated stations in Charlestown.

The installation of an additional line would tend, in the opinion of the Board, to further congest the traffic. A careful study of the surface car traffic tables furnished by the company are convincing upon this point. A so-called belt line, if installed, might possibly be operated without being subject to bridge and grade crossing delays, but in order so to do, cars on the belt line would be obliged, near City and Sullivan Squares, to make a crossover against traffic, reversing trolley poles and stalling cars. To undertake to do this at points as congested as these are with frequent car service and heavy teaming, would further disarrange existing schedules. The only feasible way by which a belt line, properly so termed, could be successfully operated would be by the acquisition of new locations by the company near City and Sullivan Squares, involving grants of location and the construction of special work for trackage.

The Board is unable to recommend this action to the company, in view of the situation as a whole, and especially in view of the service as at present rendered.

It is hoped that the completion of the Washington Street subway with a consequent rearrangement of operation may relieve the situation. In the meantime, the Board will exercise a careful oversight of conditions within the Charlestown district, and recommends to the company that earnest endeavor be constantly made to minimize, so far as possible, surface car delays in that area; but it must be realized that physical conditions may cause many unavoidable delays, for which neither the residents of Charlestown nor the company are primarily responsible.

For the Board,
(Signed) CHARLES E. MANN, Clerk.

DATA SHEETS ON INSPECTION AND MAINTENANCE PRACTICE SENT OUT BY THE ENGINEERING ASSOCIATION

The American Street & Interurban Railway Engineering Association's committee on maintenance and inspection of electrical equipment has sent to the general managers and master mechanics of member companies a set of data sheets which, if conscientiously filled out by the recipients, will afford a valuable repository of American car-house and repair-shop practice on all classes of urban and interurban electric railways.

One division of the work to which special attention will be paid is the "Organization of Car House Forces and Rules Governing Inspection." Owing to the wide diversity of car-house conditions, it has been thought desirable to sub-divide the subject as follows:

A. The city car house, where the cars handled are surface cars principally in city service.

B. The interurban car house, where the greater portion of the cars handled are in high-speed interurban service.

C. The combined city and interurban car house, where both city and interurban cars are handled and the volume and importance of each class of business are somewhere near equal.

D. The small car house, the headquarters of the small road or the small outlying car house of larger systems, city, interurban, or the two combined, requiring small force, with organization and methods peculiar to the small car house.

E. The third-rail car house of the city and suburban, elevated, subway or electrified steam railroad type.

The members are asked to fill out a data sheet for each class of car houses, selecting a typical set of conditions and outlining the most efficient organization and methods for each type of car house.

The Data Sheets 1-A, 1-B, 1-C, 1-D and 1-E are intended to apply to the inspection barn, its forces, organization and methods, rather than to the repair shop where general overhauling and heavy repairs are undertaken. Where inspection and running repairs are performed under the same roof as the general shop work, a line should be drawn as sharply as conditions will permit between inspection with running repairs on the one hand and heavy repairs on the other. Data Sheet 1-B, reproduced herewith, is typical of the car-house inquiries.

Another subject on which detailed information is desired is outlined on Data Sheet No. 2. This sheet mentions the recommendations of the committee made at last convention and asks to what extent they have been carried out and what amendment or modification they require for future practice.

The balance of the data sheets are self explanatory. In addition to replies to the questions asked, the committee would be glad to receive helpful suggestions on the subject in general, as well as photographs, drawings or descriptions of home-made tools or other devices which make for the economical maintenance of electrical equipment.

As the committee is required to have its report in print much earlier than in former years, prompt reply is earnestly requested. All sheets should be forwarded to the chairman, L. L. Smith, master mechanic of the Chicago & Milwaukee Electric Railroad Company, Highwood, Ill.

DATA SHEET 1-B—THE INTERURBAN CAR HOUSE. ORGANIZATION OF CAR HOUSE FORCES AND RULES GOVERNING INSPECTION.

Total cars operated out of car house; typical interurban car; number and kind of controller; type of control; type of brakes; what inspection is made in day time? what inspection is made at night? do inspectors make light repairs? what light repairs are made? what interval between inspection of control, interurban cars; brakes inspected and adjusted; commutators, brushes and holders; trolley wheels (also oiled); circuit breakers (also tested); lightning arresters?

Do you change armatures at this car house? how many per month? Do you change wheels at this car house? how many per month? Please attach list showing how many men of each classification (by this is meant motor inspectors, oilers, carpenters, or whatever may be their designation) are employed on the day and night forces. What rules do you have governing the work of inspection? Do you depend upon inspection for removal of armatures and fields, or do you give them a practical test; if the latter, how often?

DATA SHEET 2—RECOMMENDATIONS MADE BY COMMITTEE IN REPORT TO THE CONVENTION OF 1907. EXTENT TO WHICH THEY HAVE BEEN ADOPTED.

Committee recommended that control "K" type be overhauled each 60,000 miles. Do you approve this? To what extent have you followed this recommendation? What suggestions have you to make?

Committee recommended that multiple unit control "M" type should be overhauled each 60,000 miles. Do you approve this? To what extent have you followed this recommendation?

Committee recommended that multiple unit control electro-pneumatic

type be overhauled every 60,000 miles. Do you approve this? To what extent have you followed this recommendation?

Committee recommended use of slack adjusters. Do you approve this? To what extent have you followed this recommendation?

Committee recommended car wiring in iron conduit. Do you approve this? To what extent have you followed this recommendation?

Committee recommended that cars be properly equipped with lightning arresters. Do you approve this? To what extent have you followed this recommendation?

Have you a reliable arrester? If so, describe it.

Committee recommended cotton-covered wire with varnished cambric insulation for armature coils, when ultimate rise is less than 65 deg. C. Do you approve this? To what extent have you followed this recommendation?

Committee recommended asbestos covering where ultimate temperature rise is 65 deg. to 100 deg. C. Do you approve this? To what extent have you followed this recommendation?

Committee recommended a. c. transformer tests on armature for short circuits. Do you approve this? To what extent have you followed this recommendation?

Committee recommended full load a. c. be applied to bar-wound armatures through their brushes. Armatures to be outside of shells. Do you approve of this? To what extent have you followed this recommendation?

Committee recommended varnished cambric insulated armature bar for quick repairs. Do you approve this? To what extent have you followed this recommendation?

Committee recommended break-down test on armature for roads using trolley wire. Do you approve this? To what extent have you followed this recommendation?

Committee recommended break-down test on armature for roads using third-rail. Do you approve this? To what extent have you followed this recommendation?

Committee recommended hard drawn copper for commutator. Do you approve this? To what extent have you followed this recommendation?

Committee recommended high grade band wire. Do you approve this? To what extent have you followed this recommendation?

Committee recommended pure tin solder on band wire. Do you approve this? To what extent have you followed this recommendation?

Committee recommended asbestos-covered wire for high-temperature fields. Do you approve this? To what extent have you followed this recommendation?

Committee recommended impregnating field coils with solid compound. Do you approve this? To what extent have you followed this recommendation?

What percentage of coils do you reclaim by this process? What percentage of carbonized field coils do you reclaim?

Committee recommended impregnating asbestos-covered field coils with solid compound. Do you approve this? To what extent have you followed this recommendation?

Committee recommended use of a. c. test fields for short circuits. Do you approve this? To what extent have you followed this recommendation?

Committee recommended insulation break-down test for fields. Do you approve this? To what extent have you followed this recommendation?

What have you done to prevent the fast feeding of controllers?

Committee recommended grooving of mica in commutators to overcome trouble with high mica. Do you approve this? To what extent have you followed this recommendation?

What specifications have you for gears and pinions? Do you inspect gears and pinions when received from manufacturer? When do you reject gears and pinions?

DATA SHEET 3—MILEAGE VS. TIME INSPECTION.

Are you overhauling on the mileage or time basis? Why do you overhaul on the mileage (or time) basis?

Are you inspecting on the mileage or time basis? Why do you inspect on the mileage (or time) basis?

AIR COMPRESSORS.

How many air compressors have you on your equipment? How often do you overhaul them? What does the overhauling consist of? How often do you inspect air compressors? What does the inspection consist of?

Remarks.

DATA SHEET 4.—INSULATING PAINTS AND COMPOUNDS.

What insulating paint, varnish and compound do you use? Baking? Air drying? Oil and waterproof? Solid compound? What results do you have? What tests do you give each?

ARMATURE AND AXLE LINERS.

Armature liners—babbitt lined—mileage? Formula of babbitt used? Do you think there would be any advantage in substituting brass (babbitt lined) for cast iron on old motors, and if so, what advantage? Do you use brass armature liners? What advantage do you claim? Mileage? Axle liners—babbitt lined—mileage? Formula of babbitt used? Do you prefer brass or babbitt liner on motors under 60 hp? Over 60 hp? Mileage on brass axle liners? Formula for brass axle liners?

DATA SHEET 5—TROLLEY WHEELS.

Average weight of city cars and interurban cars. Average speed of city cars and interurban cars. Average hp of motors, city cars and interurban cars. City cars—diameter of trolley wheel over all; depth of groove; style of groove; diameter of axle; length of hub; weight of wheel; kind of bushing used; method of lubrication; mileage.

Interurban cars—diameter of trolley wheel over all; depth of groove; style of groove; diameter of axle; length of hub; weight of wheel; kind of bushing; method of lubrication; mileage.

Formula for metal for city trolley wheels.

Formula for interurban trolley wheels.

Harps—city and interurban—give weight, type and make, if standard; if not, sketch if possible. City.

DATA SHEET 6—LUBRICATION.

What kind of bearings are used in journal boxes? Are they babbitt lined? Of what material are your motor axle bearings? Armature bearings?

Is grease or oil used in journal bearings? Motor axle bearings? Do you use oil cups instead of grease in older type of motors? If so, do you get good results? What type of oil cup do you use; give description or sketch.

How often do you lubricate your journal bearings? Motor axle bearings? What mileage do you get between lubrication on journal bearings? Motor axle bearings? Armature bearings?

Do you specify the amount of oil or grease that shall be used on each

type of car? If so, what is the amount on two-motor cars? Four-motor cars? Is it your opinion that it would be good practice to allow oilers a certain amount of oil for each car, specifying the amount for each type?

The gear lubricant which you are using comes under which of these classifications: (a) Heavy oil or fat grease (containing no graphite)? (b) Adhesive Gear Compound (non-fatty)? (c) Graphite grease? Is the presence of wood pulp, cork chips or similar substances in gear lubricant desirable? What difference, if any, in rapidity of gear and pinion wear with different types of lubricants have you observed?

How much is used each time it is applied to the following horse-power motors? 25; 50; 75; 100; 125; how often or what mileage between applications?

ATTEMPT TO DEFRAUD RAILWAY PUNISHED IN SEATTLE

With the sentencing of Mrs. Mary Vinette to two months' imprisonment for attempting to defraud the Seattle Electric Company, by means of a fake claim, one of the most remarkable criminal actions of this nature ever tried in the Northwest was recently brought to a close. On Nov. 11, 1907, a youth, Carl Windell, was slightly injured in a collision between two cars on the lines of the Seattle Electric Company, and after several days had elapsed, began to exhibit signs of insanity. A number of local alienists were consulted by the boy's parents and the attorneys in whose hands the case had been placed, and after a searching examination, under which the boy submitted without a tremor to such tests as having pins stuck under his finger nails, etc., the examining physicians gave it as their opinions that the affliction was what is known as traumatic hysteria. Following this it was given out that the boy was a physical and mental wreck and a claim for \$8,000 was made against the company. The officials of the company were not satisfied, however, and determined to make further inquiry before offering settlement. Detectives were put on the case and it was learned that Mrs. Vinette, a neighbor of the Windells, had been systematically coaching the boy with a view of deceiving the medical examiners and obtaining heavy damages: Acting on this and other information, the boy was subjected to further examination, under which he finally broke down and confessed his part to the conspiracy. Other revelations quickly followed, which led to the arrest and conviction of Mrs. Vinette. How the lad managed to endure the searching examination and physical pain to which he was subjected, to the extent of baffling the alienists, is a mystery. It was the opinion of the company's claim agent and neighbors of the accused woman that she exerted hypnotic influence. Certain it is that the Windell family was completely under her influence and had agreed to aid by every conceivable means in furthering the deception and to give Mrs. Vinette a liberal per cent of any damages which might be recovered. While the sentence was not as severe as desired, it is hoped that, together with the publicity given the affair by the local press, it will be a salutary lesson to fakers of this character.

BOSTON SUBURBAN COMPANY COMPLETES FREIGHT RIGHTS

Difficulties noted recently in the STREET RAILWAY JOURNAL with reference to the two companies of the Boston Suburban Electric Companies system, which attempted to secure grants of trolley freight rights from the town of Framingham, Mass., have now been satisfactorily adjusted, and local grants for both the Middlesex & Boston Street Railway and the Natick & Cochituate Street Railway have within a few days been formally approved by the Railroad Commission. These grants complete a considerable chain of freight rights stretching back over the different lines of the Newton system toward Boston; but the companies have not yet attempted any general institution of freight service.

Practically the only competitor now in sight for electric railway freight business in this territory is the Boston & Worcester Street Railway, which is in the similar position of having obtained its rights, but is waiting for arrangements to be perfected for handling freight in and out of its terminal cities. The Boston Suburban system differs from the Boston & Worcester Company, however, in having its lines admirably adapted to serve as feeders and distributors for the principal steam railroad in these towns, namely, the Boston & Albany division of the New York Central; and it is expected that no small part of the Boston Suburban system's electric freight activity will be in

carrying goods in bulk between the steam road and the numerous scattered industrial and mercantile establishments in its territory. The electric railway company experimented in Waltham with the hauling of the steam road's freight cars over the street railway tracks to the doors of a certain large factory there, but the scheme was not a success, owing to the physical differences between the systems. It is expected, however, that a scheme will be worked out whereby the freight involved at this and other similar points will be handled in the street railway company's cars. Since the original hitch in the Framingham grants was certain phrasing that retained final control over the service for the local board, thus shutting out the railroad commissioners, it is interesting to note that the grant as finally approved is based on the understanding that "the facilities by which and the manner in which the business is conducted shall be subject to the supervision and regulation of that Board, from time to time as the public interests may require."

STRIKE ON ALL THE LINES OF THE MUNICIPAL TRACTION IN CLEVELAND

Saturday morning the conductors and motormen went on a strike on all the lines of the Municipal Traction Company. At a meeting the night before the men voted to take this action, construing the failure of the arbitrator appointed by the company to appear at the conference arranged for that day to mean that the company was not sincere in its agreement to arbitrate the differences that had arisen over the wage contract with the Cleveland Electric Railway Company. The lines on the West Side were completely tied up, while only a few cars were in operation on any of the others. Employees on the original lines of the Municipal Traction Company were not asked to participate in the strike and no attempt was made to stop them from operating.

The cause of the strike, it was stated, was the failure of the company to have its member of the arbitration committee on hand or make some arrangement for an extension of the time before 1.30 Friday, the date agreed upon for the report. The company had named S. H. Tolles, law partner of F. H. Goff, but he was not in the city and it is said was not notified of his appointment until he returned to the city, after the expiration of the time mentioned. General Meyer, whom the men had chosen as a member of the arbitration committee, decided that he could not act after the expiration of the time set, unless he was again authorized to do so. No action was taken toward that end, but at night the question was voted upon by the men. President DuPont says the time for the report of the arbitration committee did not expire until Friday night. Just how this difference in understanding arose was not made clear.

Monday and Tuesday dynamite was found in various parts of the city, and Tuesday night the first serious shooting occurred on the west side, four persons being badly hurt. From the start of the strike until Tuesday afternoon no cars have run in Lakewood, just west of the city. On the afternoon of the day mentioned, guarded by special police, several Clifton Boulevard cars were sent to Rocky River. There had been more or less trouble in Lakewood from the time the first car reached the village at 2 p. m. When the third car arrived the wire was cut in two places and the car was surrounded by a crowd of over 300. The crew ran into the car for protection. The crowd stormed the car, but could not enter. After the fight the car was set on fire and the Lakewood Fire Department had to be called.

At noon, Wednesday, the executive committee representing the men were considering a proposition from Mr. Du Pont for a settlement of the trouble, which is said to have included an offer to reinstate 75 per cent of the strikers on condition that they rank below new men, the men who remained at work to retain their runs. All other points have been agreed upon, it is said. The proposal was framed Tuesday night at a meeting of members of the State board of arbitration and representatives of the union with Mr. Du Pont. Mr. Du Pont has given out no statement, but up to the time of the meeting held that strikers must come after men employed to take their places.

The representatives of the men and of the company were still in conference at 3:30 o'clock Wednesday, a settlement not having been reached up to that time.

NEW ENGLAND STREET RAILWAY CLUB MEETING AT WORCESTER

A monthly meeting of the New England Street Railway Club will be held in the electrical engineering building of the Worcester Polytechnic Institute at Worcester, Mass., Tuesday evening, May 26. On invitation of the institute the members of the club will be given an opportunity to inspect the new laboratory building and equipment, particularly that portion devoted to railway work. Some experimental demonstrations of high-voltage apparatus will be given. Previous to the inspection of the laboratory, A. S. Richey, professor of electric railway engineering, will address the club. Through the courtesy of the Boston Elevated Railway, the Boston & Worcester Street Railway and the Worcester Consolidated Street Railway, the party will be taken from Boston to Worcester on special cars provided by the Boston & Worcester Company. The cars will leave Park Square, Boston, at 5 p. m., and returning will leave Worcester at 9 p. m. Lunch will be served en route.

THE BRITISH INSTITUTION OF CIVIL ENGINEERS

At the annual meeting of the Institution of Civil Engineers, held on Tuesday evening, April 28, the result of the ballot for the election of officers was declared as follows: Charles Inglis, president; W. R. Galbraith, G. H. Hill, A. Siemens and W. C. Unwin, vice-presidents. Other members of council are: J. A. F. Aspinall, of Liverpool; B. H. Blyth, of Edinburgh; C. A. Brereton, W. B. Bryon, R. Elliott-Cooper, Col. R. E. B. Crompton, C. B.; Dr. G. F. Deacon, Dr. F. Elgar, M. Fitzmaurice, C. M. G.; A. T. Grant-Dalton, of South Africa; R. A. Hadfield, of Sheffield; Dr. C. A. Harrison, of Newcastle-on-Tyne; J. Hobson, of Canada; W. Hunter, G. R. Jebb, of Birmingham; Sir Wm. Thomas Lewis, Bart., of Aberdare; Sir George T. Livesey, A. G. Lyster, of Liverpool; Thos. Matthews, A. D. Moncrieff, of Australasia; A. Ross, J. N. Ryan, of Dublin; J. Strain, of Glasgow; Sir Frederick R. Upcott, K. C. V. O., of India; W. B. Worthington, of Derby, and A. F. Yarrow. This council will take office Tuesday, Nov. 3, 1908.

The council has made the following awards for papers read and discussed before the Institution during the past session: A Telford gold medal to W. Barclay Parsons, of New York; a Watt gold medal to Sir Whately Eliot; George Stephenson gold medals to Sir John Ottley, K. C. I. E.; Dr. A. W. Brightmore, J. S. Wilson and W. Gore; Telford premiums to F. W. Davis, of Darlington; C. R. S. Kirkpatrick, of Newcastle-on-Tyne; Hugh T. Ker, of Glasgow; G. H. Scott, S. H. Ellis and R. R. Gales, F. C. H., of India.

ANOTHER "L" EXTENSION IN BOSTON

By the signing of the bill giving the Boston Elevated Railway Company authority to extend its overhead structure to Medford, the company gains an "L" franchise for a second long spur, reaching from its present terminal at Sullivan Square, in Charlestown, to an outlying center of Boston suburban traffic. This time the outlying center is a point at or near Medford Square, where surface lines run in from Lowell, Woburn and Winchester, on the Boston & Northern Street Railway; from West Medford and several districts in Medford and Malden, on the Boston Elevated system; and where a connection can easily be made with the new direct line now planned by the Boston Elevated and Boston & Northern to reach Spot Pond, in the beautiful Middlesex Fells Reservation, and Stoneham, Reading, Lowell and Lawrence. The route of the proposed new spur of the "L," as contemplated, will be by way of Mystic Avenue, a long straight highway across the marshes on the edge of Somerville and Medford, within sight of the Charles River, and at present only slightly built upon.

This last-mentioned fact emphasizes the policy of the Boston Elevated Company to secure quick express lines from outlying centers, that will bring passengers from those points to the city centers by practically separate routes, leaving the people in the intervening territory, whose transit facilities were developed earlier, to be served very largely by the surface-elevated combinations already in effect. In this case the intervening population is that of Somerville, which, while traversed only on its outskirts by the new "L" route, has had

ample facilities by surface-car connection for using the original "L" lines ever since the first overhead structure was completed.

Another "L" extension from Sullivan Square, authorized a year ago, but not yet built, strikes more directly north than that to Medford, and runs along the Mystic marshes on the outskirts of Everett to the center of Malden, where land for a terminal has been secured not far from the main-line station of the Boston & Maine Railroad. Surface lines that center near here include those from Lowell, Lawrence, Wilmington, Reading, Wakefield, Melrose, Saugus and Lynn, of the Boston & Northern, and the Malden, Maplewood and Medford surface lines of the Boston Elevated Company.

IMPORTANT DECISION IN NEW YORK SUSTAINS RIGHT OF COMPANIES TO LIMIT TRANSFERS

The Court of Appeals of New York in the case of Kelly vs. the New York City Railway Company, has handed down a very important decision on the right of a street railway company to protect itself from abuse by limiting transfer privileges. As has been explained before in the STREET RAILWAY JOURNAL, the transfer system of the company is arranged so as to limit a trip by a passenger to continuous travel in one direction, as evidenced by the color of the transfer ticket. With this sole limitation, a passenger can ride on any intersecting cross-town lines and any of the longitudinal lines reached thereby, but he cannot reverse the direction of travel. The action against the company was for \$50 and was first brought in the Municipal Court, which returned a verdict for the defendant. On appeal to the Appellate term judgment was reversed and a verdict found for the plaintiff. On appeal to the Appellate Division the determination of the Appellate term was reversed and the judgment of the Municipal Court was affirmed. On appeal to the Court of Appeals judgment, as before stated, was rendered for the defendant.

The plaintiff rested his case on the provisions of Section 104 of the Railroad Law, relating to surface railroad corporations which have contracted for the lease or consolidation of other roads, claiming that by force of the provisions therein contained no limitation could be imposed upon the right to transfer and that a transfer ticket must be available in any direction, according to the desire or whim of the holder. The section in question says:

Every such corporation entering into such contract shall carry or permit any other party thereto to carry between any two points on the railroad or portions thereof embraced in such contract any passenger desiring to make one continuous trip between such points for one single fare, not higher than the fare lawfully chargeable by either of such corporations for an adult passenger. Every such corporation shall upon demand, and without extra charge, give to each passenger paying one single fare a transfer, entitling such passenger to one continuous trip to any point or portion of any railroad embraced in such contract, to the end that the public convenience may be promoted by the operation of the railroads embraced in such contract substantially as a single railroad with a single rate of fare.

The Court of Appeals, in returning its finding, says:

I am unable to assent to a construction of the statute, which finds no just support in a fair reading of its language and which would impose so onerous a burden upon the defendant. A passenger, under such a construction, would be able to accomplish a round trip on the defendant's lines for one fare. . . . I do not think that the statute intended to confer any such extraordinary right, and, in my opinion, the regulation of the defendant was a reasonable one and not in contravention of the statute. It was as liberal in the privileges which it accorded to the traveling public as it was possible for the company to be, short of allowing a round trip upon payment of a single fare. . . . What was intended by the Legislature, when authorizing a leasing, or consolidation, of competing lines of railroad, appears to have been the attaching of a condition by which the public would gain some advantage from it and its convenience be promoted thereby. That condition was that the contracting companies should "carry . . . between any two points on the railroad, or portions thereof, embraced in such contract, any passenger desiring to make one continuous trip between such points for one single fare." The statute, more or less, defines the scope of the Legislative enactment in the language used: "That the public convenience might be promoted by the operation of the railroads as a single railroad, with a single rate of fare." But a single railroad would never be required to give to a passenger a return transfer for one fare, and it is hardly conceivable that it should be. When the Legislature, in unmistakable terms and within constitutional limits, has exercised its power to regulate corporate operations, it should be given full effect by the courts; but no inferences unfavorable to a reasonable operation of its franchises should be allowed from words susceptible of use in more than one sense.

AFFAIRS IN NEW YORK

In the United States Circuit Court last week Judge Lacombe heard arguments on the petition of Frederick W. Whitridge as receiver of the Union Railway Company in the litigation instituted by the Lorain Steel Company to abolish the transfer system now in operation between the Union, Yonkers & Westchester Electric Railroad companies, and to make various changes in the running of cars over the different lines of each company. The petition states that the Union Railway Company is under no contract or obligation to exchange transfers with the two roads named and that to continue to do so is inimical to its interests. "The abolition of the transfers may cause considerable public inconvenience," says the petition, "but the public has the power to avoid it." To carry out the plan to discontinue the present transfer system it is found necessary to discontinue certain joint operations now carried on between the roads. Herbert J. Bickford, who appeared for Receiver Whitridge, re-enforced the latter's petition by saying that one third of the passengers now carried by the Union Railway Company were carried on transfers.

The Interborough-Metropolitan Company has coming due on May 27, notes payable to the amount of \$4,545,000, which it is said will again be renewed. The notes are a part of an issue of \$8,000,000 6 per cent six months notes put out on May 27, 1907, by the Interborough-Metropolitan for the purpose of providing the New York City Railway Company with funds with which to electrify certain horse car lines and to meet the cost of other improvements then contemplated.

The comparative statement of accidents on the street railways of Greater New York for April, as compiled by the Public Service Commission, shows:

	Jan.	Feb.	March.	April.
Car collisions	170	203	148	138
Persons and vehicles struck by cars.....	934	945	905	929
Boarding	479	412	574	562
Alighting	416	286	454	544
Contact with electricity.....	34	36	27	36
Other accidents	1,888	2,069	2,245	2,498
Totals	3,921	3,951	4,353	4,707
Injuries included in above:				
Passengers	1,444	1,219	1,525	1,671
Persons not passengers.....	570	462	632	662
Employees	486	476	474	503
Totals	2,500	2,157	2,631	2,836
Serious injuries included in above:				
Killed	44	26	44	30
Fractures of skulls.....	15	15	8	24
Amputations of limbs.....	6	5	1	5
Broken limbs	32	24	33	30
Other serious	91	69	101	102
Totals	188	139	187	191

Samuel Rea, third vice-president of the Pennsylvania Railroad, has written to Comptroller Metz, supporting the contention made by John McDonald that there is no need for the proposed Broadway-Lexington Avenue subway, and that the traffic requirements of the city will be met for some time to come by continuing a branch of the present subway from Forty-second Street south under Seventh Avenue. Mr. Rea said:

This line on the west side of the city is imperatively needed, because the Pennsylvania Railroad and Long Island Railroad will place in the Seventh Avenue and Thirty-third Street district daily over 200,000 passengers. In addition, the United States postoffice and other large buildings will be located in the vicinity, so that for the accommodation of the citizens in various parts of New York City, and especially those in the Boroughs of Brooklyn and Queens, which will reach our station over the Long Island Railroad, the Seventh Avenue subway will be an absolute necessity.

The new underground terminal at the Delancey Street end of the Williamsburg Bridge in New York was opened to the surface cars operating from Brooklyn on Monday, May 18. The terminal eventually will be used by both surface and elevated cars. It was made the subject of an article which appeared in the STREET RAILWAY JOURNAL of April 11, 1908.

The Manhattan Railway Company, which owns the elevated lines in Manhattan and the Bronx, has applied to the Public Service Commission for permission to issue \$10,818,000 bonds to pay off the first mortgage bonds of the Metropolitan Elevated Railway Company, which fall due on July 1, and to issue \$894,000 bonds to repay the company for the cost of extending the lines in the Bronx from Tremont Avenue to Bronx Park, a total of \$11,712,000. Both issues are asked for in accordance with the consolidated mortgage dated Feb. 26, 1890, to the Central Trust Company, to secure issues authorized by the stockholders. This mortgage took up \$10,818,000 of the outstanding mortgage bonds of the Metropolitan Elevated Railway

Company, and it is to pay these that the present new issue is proposed. A representative of J. P. Morgan & Company is quoted to the effect that it is too early to make any statement about the proposed financing. The application to the commission was signed by George J. Gould as president of the railroad, and Julien T. Davies and Charles A. Gardiner as counsel. The commission ordered hearings upon the matter to be held May 26.

The completion of the electrification of the Long Island Railroad from Queens to Hempstead was signaled Tuesday, May 19, by the passage of the first electric train from the Flatbush Avenue station to Hempstead. The run was made in 36 minutes.

The Court of Appeals, in a decision handed down May 19, decides against the city of New York in its efforts to prevent the New York & Long Island Railroad Company from completing the so-called Steinway tunnel from Forty-second Street to Long Island. In 1906 the city tried to stop the work on the ground that the railroad company no longer had any corporate power; that the company had not completed its route within the prescribed time, and that its franchise had lapsed. An injunction restraining the city from interfering with the work is now upheld by the Court of Appeals.

FINAL BOSTON & EASTERN HEARINGS

What are presumed to be the final hearings of the Boston & Eastern Electric Railroad project were begun before the Massachusetts Railroad Commission on May 19. Chief Engineer Bickford presented an exhaustive discussion of the differences between his proposed road and the Boston & Maine and the Boston, Revere Beach & Lynn railroads, if the latter were electrified. He said that the Legislature had already distinguished between an electrified steam road and the high-speed interurban operating over private right-of-way, in Chapter 516, Acts of 1906. The differences in the movement of traffic are of primary importance. The electric road is limited to the carrying of certain classes of freight and one class of passengers—suburban passengers. The Boston & Maine is a through line conducting five classes of traffic, namely, local or suburban passengers, through passengers, express and baggage, freight in passenger trains, local or suburban bulk freight, and through bulk freight. If the Boston & Maine were electrified, the service would be no greater in flexibility, and there would be no increase in speed over present conditions. It would simply mean a change in methods of hauling. It would be fundamentally impossible to perform the service proposed on the Boston & Eastern on the existing tracks of the Boston & Maine and continue the present freight and through business.

The acceleration adopted for the Boston & Eastern trains is 1.82 m.p.h.p.s., and all trains will accelerate alike. The only variation between local and express trains will be in the stop intervals. At night, when the tracks are reasonably clear, locomotive-drawn trains could be used to conduct a non-interfering freight service. The average acceleration of trains drawn by steam locomotives will vary from 0.25 m.p.h.p.s. with heavy express trains to 0.5 m.p.h.p.s. for shorter local trains. The legitimate and profitable business of the steam railroad is the development of its freight and long-distance passenger traffic, leaving the short-haul business to the electric roads. No steam road can afford to allow the suburban traffic to check its terminal line where the cost of such privileges has reached into many millions.

Mr. Bickford estimated the cost of electrifying the Eastern Division of the Boston & Maine from Boston to Beverly and Danvers at \$10,000,000, including extra roadbed, track, abolition of 26 grade crossings, widening of bridges, etc. If a connecting tunnel was built from the North Station to Post Office Square, the additional cost would be \$2,000,000. To be a commercial success the electrification must increase the volume of business nearly five times, which would be \$13.50 per capita per year, in addition to the estimate of \$6.50 for the Boston & Eastern.

The Boston, Revere Beach & Lynn is in a class by itself, and is handicapped by a ferry line and a 3-ft. gage. This gage does not permit the use of motors of sufficient power to handle the necessary service with the required speed and safety. The road does not serve the same territory as the proposed line, and its electrification would include the construction of a tunnel under Boston harbor, and the practical rebuilding of the road as a whole.

ONE MILL TAX IN ST. LOUIS UPHELD

The Supreme Court at Washington, on May 18, affirmed the validity of the tax of 1 mill per passenger imposed by the city of St. Louis on the street railways of that city. This decision reverses the judgment of the lower court, which held the new ordinance violated the obligations of a prior contract under which the roads were to pay license taxes or fixed sums.

PHILADELPHIA-ATLANTIC CITY TROLLEY PROPOSED

John L. Clawson, of Philadelphia, who at present is receiver of the Atlantic City & Suburban Traction Company, has made an informal proposal to the people of Atlantic City to the effect that if the city will grant him franchises for trolley lines on Pacific and Arctic Avenues he will finance a corporation to build an electric railway between Philadelphia and Atlantic City. It is suggested that the proposed road between Philadelphia and Atlantic City could land its passengers in Atlantic City on Florida Avenue, and as the public could board trains anywhere on Market Street, or in the heart of Philadelphia, doing away with ferries and bridges, it would be necessary to have proper advantages in Atlantic City. Therefore, in order to obtain these advantages, it would require satisfactory franchises to build an electric railway on Pacific Avenue and on Arctic Avenue, so as to reach both ends of the entire island.

THE SEMI-ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The semi-annual meeting of the American Society of Mechanical Engineers will be held in Detroit, Mich., June 23-26. An entire session will be devoted to papers on the conveying of materials, when hoisting and conveying machinery, including belt conveyors, the use of conveying machinery in cement plants, etc., will be discussed.

Among other subjects which will be taken up are: "Thermal Proportion of Superheated Steam," by Prof. R. C. H. Heck, of Lehigh University; "Horse Power, Friction Losses and Efficiencies of Gas and Oil Engines," by Prof. Lionel S. Marks, of Harvard University; "A Journal Friction Measuring Machine," by Henry Hess, of Philadelphia, and "A Simple Method of Cleaning Gas Conduits," by W. D. Mount.

BETTER GRADE CROSSINGS IN WORCESTER

Undesirable conditions, involving a grade crossing on a 7 per cent grade between the tracks of the Worcester Consolidated and the Leominster & Fitchburg Street Railways, in Fitchburg, Mass., are at last to be mitigated by an order issued by the Massachusetts Railroad Commission. The board thereby in reality corrects a condition that has held over from the old days when street railway tracks were put down under merely local authority without the board's expert approval.

Prior to 1902, when local locations were made subject to the board's approval, the Fitchburg Aldermen allowed the Fitchburg & Leominster and the Fitchburg Suburban (now part of the Worcester Consolidated) Street Railways to lay one track each on the north and south sides of Laurel Street, between Forest and Putnam Streets. In entering Putnam Street from Laurel Street the Worcester Consolidated trackage crosses that of the other company on a 7 per cent grade, and the operation of the increasingly heavy type of cars over these tracks has made the condition relatively worse than when the trackage was first put into use.

To assist in obviating it, the city has spent considerable money in widening Laurel Street, and arranged to have the street railway companies relocate their tracks in the middle of the street with a driveway on either side. The commission now approves the relocations, but recommends that the two companies, by agreement, install a system of signals and operate the same under such rules and regulations as will require all cars to stop before entering the block on Laurel Street between Forest and Putnam Streets, and prohibit the operation of more than one car at the same time over the tracks of these companies.

This case is typical of how city trackage, even in the smaller Massachusetts centers, is gradually being made over from the condition prevalent in the days of short, light-weight cars to the modern condition suitable for the present heavier and more systematic use.

STREET RAILWAY PATENTS

UNITED STATES PATENTS ISSUED MAY 5, 1908.

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

886,409. Quick-action Triple Valve for Air-brakes; William T. Richards, Colorado City, Colo. App. filed July 19, 1907. The object of this invention is to enable the auxiliary reservoir to be charged in the shortest possible time, to thereby afford greater control and more rapid operation of the air-brakes.

886,445. Car-lighting System; William A. Turbayne, Lancaster, N. Y. App. filed June 20, 1906. The main dynamo is provided and driven in a suitable manner from the car, while a storage battery is connected across the terminals. Employs a "crusher" between the battery and the lamp circuit and regulated by a variable speed apparatus.

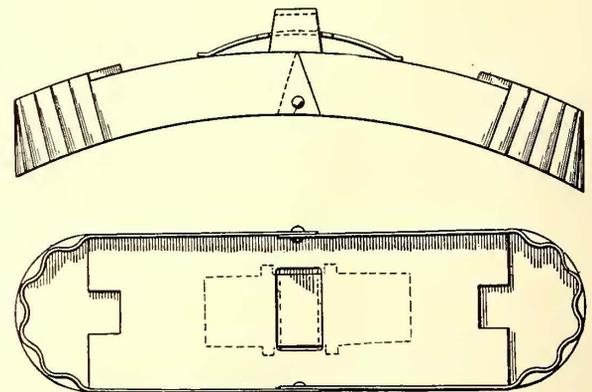
886,460. Automatic Braking System; Bert Aikman, Chicago, Ill. App. filed Oct. 15, 1906. Has a triple valve having two passages for the escape of the exhaust air to thereby permit more rapid operation of the emergency brakes.

886,475. Cut-out Block; Fred Brunberg, Windber, Pa. App. filed April 25, 1907. A trolley switch for use in mines, comprising a depending arm, which is moved to and fro by the engagement of the trolley wheel.

886,517. Trolley Harp; Hugh W. Kimes, Dayton, O. App. filed Jan. 13, 1908. The harp has an axle-clamped rigidly in the harp to insure good electrical contact. Makes use of a pin passing through the axle and which is received in a clamping device to prevent displacement.

886,553. Brake Shoe Shell; William H. Thrash, Columbus, O. App. filed May 18, 1907. A brake-shoe shell comprising a sheet metal body bent into back, side and end walls, the side walls being cut, overlapped and riveted.

886,603. Adjustable Brake Head; Philip T. Handiges, Cleveland, O. App. filed Feb. 20, 1908. The brake head bearing is so constructed that it may be caused to bind continuously upon the sleeve or other member which provides the end of the brake beam, after the necessary adjustment has been effected and will thus prevent any vibration between the parts and eliminate the noise and destructive wear.



PAT. NO. 886,553

886,620. Electric Signaling Apparatus for Railroads; Paul J. Matter, Coswig, Germany. App. filed Dec. 19, 1907. Improvements in electric signaling apparatus for railroads designed to provide an alarm indication within an engine cab in case two trains run on a same block section. Makes use of a trolley conductor, the circuit of which extends through signal lamps along the roadway and which receives its power from a generator on the wheel axle of the train.

886,627. Amusement Device; Henry O. Neebe, New York, N. Y. App. filed March 27, 1907. A pleasure railway in which the cars run over a continuous or endless series of tracks comprising reverse loops, whereby each is of like length. The cars are driven at uniform speed, but retarding devices are located at intervals in the tracks.

886,644. Car Replacer; George H. Sargent, Flushing, N. Y. App. filed July 15, 1907. Has an inclined extension on either side of the rail for guiding the wheel down onto the rail after

the wheel has been properly positioned thereover, the replacer extension inside the rail having a surface sloping down and toward the rail for sliding the wheel to a seat on its tread on said portion above the rail.

886,645. Trolley Guard; Jean E. Saucier, Montreal, Quebec, Canada. App. filed June 30, 1906. An elongated roller is mounted in the rear of the usual trolley wheel in a frame pivoted to the harp. Provides good contact with the wire and prevents flashing.

886,676. Automatic Electric Signal System for Railways; John P. Buchanan, Cleveland, O. App. filed Aug. 3, 1906. Means are provided for controlling or eliminating the "sneak" currents. Relays are energized to establish discharge circuits.

886,694. Brake Shoe; Isaac A. Gibbs, Roanoke, Va. App. filed Sept. 17, 1907. Comprises an open sand conduit in the brake shoe face adapted for connection with a sand supply at the upper end and to deliver sand to the track immediately adjacent to the wheel.

886,744. Car Vestibule; Lorenzo Ullo, New York, N. Y. App. filed Jan. 23, 1908. Comprises two folding doors, one opening into the car vestibule and the other into the side of the car adjacent the vestibule. The act of opening these doors automatically opens a sliding door leading from the vestibule to the car.

886,762. Amusement Apparatus; Charles A. Carlson, Brooklyn, N. Y. App. filed March 6, 1908. A pleasure railway comprising an endless track, surrounded by a wall and a moving picture device located within the track comprising a picture record, which travels in a direction opposite to the direction of travel of the cars and thus gives the illusion of greater speed.

886,798. Fire-hose Bridge; Robert C. Groh, St. Paul, Minn. App. filed Nov. 11, 1907. Details of construction.

886,841. Metallic Tie and Rail Fastener; Lewis McFarland, Pittsburg, Pa. App. filed June 11, 1907. The tie has transverse grooves in which longitudinally disposed tongues on the rails are adapted to fit; brackets engaging the sides of the tie, splice bars secured to the brackets and embracing the sides of the rails, and means to secure the splice bars to the tie.

886,847. Automatic Railway Signal; James P. Norwood, Chicago, Ill. App. filed Oct. 5, 1906. Adapted for use at a railroad crossing and designed to display signals and make a time indication as to the position of the trains in approaching or receding from the crossing.

886,880. Trolley; John Shepherd, Chicago, Ill. App. filed Dec. 20, 1907. An anti-friction bearing for a trolley wheel designed to permit movement of the axle, whereby the latter may partake of movements to maintain the wheel in properly contacting relation with the wire at all times.

886,910. Automatic Sander; Henry M. Williams and Eleazer Isaacs, Pittsburg, Pa. App. filed Jan. 11, 1908. Means are provided whereby the skidding of the locomotive wheels will automatically open the sand discharge valve.

886,942. Trolley-line Clamp; Auguste Caron, Indian Orchard, Mass. App. filed July 25, 1906. The trolley conductor is bent at a fixed radius or curvature and engaged between the members of a clamp, which has the lower surface adapted to guide the trolley wheel at the portion where its continuity is interrupted by said bend.

886,947. Railway Block Signal; David H. Coker, Piedmont, and Whitfield A. Scarbrough, Choccolocco, Ala. App. filed April 3, 1907. A semaphore device and circuit-closing apparatus therefor, making use of tappets, which are displaced by the wheel flanges of a passing train and which close circuits to energize electro-magnets for the semaphores.

886,958. Amusement Railway; James H. Dewey, New York, N. Y. App. filed Jan. 22, 1908. A pleasure railway, in which the car travels on two tracks, one of which supports the car and the other of which causes the car to rock and pitch like a ship at sea.

886,972. Rail Joint; John C. Hafford, Lincoln, Ark. App. filed Oct. 24, 1907. The rail base flanges are recessed on their underside and at their ends and a locking key is provided which lies in the space occurring in the under side of the base flanges of the rails, and said key is provided at intervals upon its upper side with studs, which lie in openings provided in

the webs of the rails and enter recesses located under the heads of the rails.

886,993. Electric Signal for Railways; Anton Kuzel, Cleveland, O. App. filed Dec. 30, 1907. The track is equipped with special mechanical tappets at the locations to be protected, and these engage devices on the locomotive, so as to establish alarm circuits in the engine cab in case two locomotives are simultaneously located on the protected track section.

886,997. Frictional Brake; William Love, London, England. App. filed July 8, 1907. Brake shoes adapted to exert a frictional drag upon the track under the action of inclined guideways, in accordance with the momentum of the vehicle, spring means for advancing the shoes from an inoperative position into engagement with the track and means operable from any convenient point on the vehicle and automatically for permitting the spring means to act.

887,030. Brake Lever; Jacob J. Byers, Cameron, Mo. App. filed March 7, 1908. Comprises, in combination, a brake lever and a slotted fulcrum pivotally connecting it with the brake, said lever having a lateral projection adapted to prevent dropping of the lever through said slot.

PERSONAL MENTION

MR. H. C. ALLEN has been appointed passenger and freight agent of the Erie Traction Company, Erie, Pa.

MR. W. GOSS, of Philadelphia, has been appointed superintendent of the lines of the West Chester Street Railway Company, of West Chester, Pa.

MR. I. R. ROSENBERGER, the first president and one of the promoters of the Easton & Doylestown Street Railway, Easton, Pa., is dead.

MR. A. R. McLEAN, after operating individually for the past seven years in street railway and interurban street service work, has accepted the position of superintendent of the Freeport Railway, Light & Power Company, of Freeport, Ill.

MR. CLARENCE COBURNE has been appointed superintendent of the Berkley division of the Norfolk & Portsmouth Traction Company, and will enter upon the duties of his new position on June 1. Mr. Coburne was until recently with the Atlantic Terminal Company, where he filled the position of train dispatcher.

MR. DAVID YOUNG, SR., left York, Pa., May 15 for New York, where he boarded the Caronia on a trip to Europe, which will cover about two months. He will visit England, Ireland, Scotland and other countries. Mr. Young, besides representing Brown Brothers & Company, who are financially interested in the York Railways Company, superintended the construction of the York & Hanover Electric Railway, recently described in these columns.

MR. JOHN MELLOR, who has been master mechanic of the Putnam line of the Connecticut Company a number of years, has been appointed master mechanic of the Norwich, New London and Putnam lines of the company, and Mr. John Humphrey, superintendent of the overhead work of the Putnam line, has been appointed line superintendent of the Norwich, New London and Putnam lines. Under the new arrangement in their respective departments Mr. Mellor and Mr. Humphrey will have supervision of the work on all the lines of the Connecticut Company in eastern Connecticut, including the line to Willimantic. Their headquarters will be at Willimantic.

MR. ELMER M. WHITE has just been appointed auditor of the Coney Island & Brooklyn Railroad Company, of Brooklyn. The office has been created for Mr. White and will relieve Mr. D. B. Cannon, the secretary and treasurer of the company, of some of the duties which he has been obliged to carry in the past. A sketch of Mr. White's street railway work was published in a personal notice in the STREET RAILWAY JOURNAL for Nov. 16, 1907, following his resignation as treasurer and auditor of the Birmingham Railway, Light & Power Company, of Birmingham, Ala. Since that time Mr. White has made his headquarters in New York as a consulting auditor, and has been engaged in making special reports on a number of properties, taking up both the physical and operating as well as the financial examinations. He entered upon his duties at the Coney Island & Brooklyn Railway on May 21.

NEWS OF THE WEEK

CONSTRUCTION NOTES

Items in this department are classified geographically by States, with an alphabetical arrangement of cities under each State heading.

For the convenience of readers seeking information on particular subjects, the character of the individual item is indicated as follows:

- * Proposed roads not previously reported.
- o Additional information regarding new roads.
- † Extensions and new equipment for operating roads.

Numerals preceding these signs indicate items referring to:

1. Track and roadway.
2. Cars, trucks and rolling stock equipment.
3. Power stations and substations.
4. Car houses and repair shops.
5. Parks and amusement attractions.

2†MONTGOMERY, ALA.—The Montgomery Traction Company has just received a shipment of six new cars from the J. G. Brill Company, of Philadelphia, Pa.

oMARTINEZ, CAL.—The Board of Supervisors of Contra Costa County has granted A. W. Malthy and Joseph Naphthaly permission to construct and operate an electric railway through the Alameda and Contra Costa County tunnel.

oREDLANDS, CAL.—The City Council recently granted extensions of time for the construction of three street railway systems in Redlands. R. H. Dunn, who has a franchise for a street railway on State Street, Citrus Avenue, Reservoir Street and the Yucaipa Road, as a part of the Redlands & Yucaipa Railway, was granted an extension of 30 days in which to expend the \$5,000 required in the first year. C. S. Chestnut, who is interested with Mr. Dunn, was granted an extension of time on Colton Avenue from western to eastern city limits and on Sixth Street to connect with the State Street line of the Redlands & Yucaipa line. Mr. Chestnut also was given an extension of 60 days on a franchise granted to C. C. Haskell, having taken an assignment of it in order to use a part of the route for the Redlands & Yucaipa line. On the remainder it is planned to build an electric railway to Crafton. It is reported that W. D. Larrabee, of the Redlands & Yucaipa Company, has placed an order for rails for 10 miles of road with the Colorado Fuel & Iron Company at Pueblo, Col. Ties have also been ordered and are expected on the ground in season for an early beginning of construction.

*SACRAMENTO, CAL.—It is reported that W. T. Garrett, of San Francisco, has applied to the County Board of Supervisors for a franchise for an electric railway around Oak Park. The proposed line is to be about six miles in length.

oCOLORADO SPRINGS, COLO.—It is stated that plans are rapidly assuming shape for the beginning of work at once on the Manitou & Crystal Park Railroad and summer resort project, which involves the expenditure of \$500,000 for the railroad, \$500,000 for the construction of a summer hotel, artificial lake, buildings and pavilions, and another \$500,000 in general improvements. J. K. Vanatta is president of the Manitou & Interurban Railway and secretary of the Manitou & Crystal Park Railroad Company, which is to undertake the work of building the new road and the improvements at Crystal Park.

†DENVER, COL.—The Colorado & Southern Railway on May 14 opened its line to Gloveville, where it will later connect with the Denver & Interurban Line to Boulder. The officials of the Colorado & Southern state that the Denver & Interurban Railroad is now practically completed and ready for operation between Denver and Boulder. The track is all laid, the trolley wires strung and connections made with the power plants. The new line consists of 47 miles of track, including 32 miles of main line from Denver to Boulder and the Eldorado Springs spur and the loop from Louisville Junction through Louisville and Marshall.

oWATERBURY, CONN.—Stockholders of the Waterbury-Milldale Tramway Company recently held their annual meeting in Waterbury and elected the following officers: President, Charles H. Clark, of Milldale; treasurer, E. S. Todd, of Southington; secretary, John H. Cassidy of Waterbury; directors, C. H. Clark, E. S. Todd, J. H. Cassidy, Otis S. Northrop and George F. Hughes. It was reported that the right of way for the proposed new line from East Main Street through Mill Plain to Milldale had been secured. It is said that work on the construction of the road will not be undertaken until there is an improvement in the money market.

*DOVER, DEL.—Articles of incorporation were filed here recently for the Myersdale Construction & Equipment Company, of Pittsburg, Pa., to

construct, maintain and operate electric railways. The incorporators are H. D. Brenn, W. A. Wood, of Pittsburg, Pa., and W. W. Stand, of Bellevue, Pa. The capital stock is \$100,000.

†WILMINGTON, DEL.—The People's Railway Company has been granted a franchise to lay tracks on Church Street, from Seventh to Fourth, to run cars near the wharf of the Wilson Line of steamboats.

oEDGEFIELD, GA.—A meeting of the incorporators of the Edgefield & Augusta Electric Railway was held at Edgefield on May 10. The town of Saluda was represented and enthusiasm over the project was high. A committee of three was appointed to receive subscriptions and do all necessary to advance the enterprise.

oALTON, ILL.—Incorporation papers of the Wood River, East Alton & Bunker Hill Traction Company have been filed for record. The first board of directors is composed of J. T. W. Rudesill, R. M. Smith, S. B. Knepper, D. R. Maxcy and B. A. Campbell, of East St. Louis. The stated intention is the construction of an electric railway from the site of the new Standard Oil Works, in Madison County, to Gillespie, in Macoupin County, where it will connect with the Illinois Traction Company's line.

3†CHICAGO, ILL.—It is reported that the Aurora, Elgin & Chicago Railway Company recently appropriated \$80,000 for a new substation to be located in Elgin. Bids are now being received. Edwin C. Faber is general manager.

oQUINCY, ILL.—At the annual meeting of stockholders of the St. Louis, Terre Haute & Quincy Interurban Railway, held in Quincy recently, the following officers were elected; President, Edward Yates, Pittsfield, Ill.; vice-president, W. C. Fick, Quincy; secretary, F. W. Knollenberg, Quincy; treasurer, S. P. Landcraft, Quincy. Executive Committee—H. C. Simmons, Virden, Ill.; J. A. Wible, Kansas City, and F. W. Knollenberg, Quincy. Reports were read showing that New York capitalists were ready to finance the road, and construction work will soon begin at Quincy and Taylorville, Ill., which part of the line has already been surveyed.

5†ANDERSON, IND.—The Indiana Union Traction Company is said to have begun extensive improvements at Mounds Park, near Anderson, and the company has created the office of amusement manager. It is announced that many attractions will be added to the park.

1†SOUTH BEND, IND.—A contract has been awarded to the St. John Engineering Company, of Chicago, Ill., for hallasting and laying track for the Chicago, South Bend & Northern Indiana Railway Company's extension from South Bend to La Porte. Charles Murdock is vice-president of the company.

oVINCENNES, IND.—It is reported that the Vincennes, West Baden & Louisville Railway Company has begun work on the construction of an interurban line between Vincennes and Jasper connecting the intermediate towns of Monroe City, Petersburg, Otwell, Alfordsville, Ireland and Algiers. The company has located sites for the improvement of at least three amusement parks. Thomas H. Adams is president.

oELDORA, IOWA.—Andrew Stevenson, of the Iowa Railroad, writes that the final surveys for the line have been started, under the direction of G. W. Scott. The Iowa Railroad was incorporated April 13, 1908, with a capital stock of \$100,000. It is planned to construct a standard-gauge electric railway, 127 miles in length, which will connect the following cities: Waterloo, Cedar Falls, Fredsville, Dike, Lincoln, Grundy Center, Eldora, Hubbard, Garden City, Story City, Ames, Boone, Moin-gona, Perry, Kelley, Huxley, Ankeny and Des Moines. Mr. Stevenson states that the management intends to use the overhead trolley system. The power plant and repair shops will be located at Eldora. The railroad also proposes to furnish power for lighting towns along the route. The officers of the company are as follows: Henry S. Osborne, 1402 Ashland Bank, Chicago, Ill., president; Andrew Stevenson, 1211 Association Building, Chicago, Ill., first vice-president and general manager; James F. Hardin, Eldora, second vice-president and treasurer; L. W. Harris, Eldora, secretary; George Welsby Scott, Security Building, Chicago, Ill., chief engineer. The incorporation of this company was announced in the STREET RAILWAY JOURNAL for April 18, 1908.

oPADUCAH, KY.—Mayor James P. Smith has signed an ordinance granting a franchise to the Paducah & Cairo Interurban Railway Company. The interurban line will extend from Paducah to East Cairo, Ky., where a ferry-boat will be operated to Cairo.

1†FREDERICK, MD.—At a meeting on May 7 of the executive committee of the Washington, Frederick & Gettysburg Railway Company it was decided to proceed immediately with the extension of the company's line from Lewistown to Catocin Furnace, to connect with the Monocacy Valley Railroad to Thurmont, which the company acquired last week by purchase. The distance from Lewistown to Catocin Furnace is about three and one-half miles, and it is expected to have the connecting link completed in 90 days from the letting of the contract.

2†NEW BEDFORD, MASS.—The New Bedford & Onset Street Railway Company has just received a new electric express car.

1†MONROE, MICH.—The Toledo, Ottawa Beach & Northern Electric Railway, it is said, is planning to extend its road from Toledo Beach, to