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

Subway Proposition Stated in New York

The Interborough Rapid Transit Company's proposal for improved transit conditions in New York was plainly stated in a large advertisement in all of the metropolitan papers, April 13. This is the first time, we believe, that the company has taken this means, on so large a scale, to state its proposition to the public. The company asks for the right to build a subway on the east side from Forty-second Street to the Bronx and on the west side from Forty-second Street to the Battery, and to install an express track on both the Second and Third Avenue elevated

lines. These changes will afford the quickest relief of present conditions possible with the existing Interborough system, and the requests should be granted as soon as the necessary legislation can be passed. We do not see that these betterments will interfere with the proposed extension of the Hudson & Manhattan Railroad which has been approved by the commission.

Danger of Trespassing on Railway Tracks

The Railroad Commission of Indiana continues to exercise its good offices in directing forcible attention to the large number of accidents due to trespass on railway tracks. A circular which has just been issued by this commission, stating that 214 trespassers were killed or injured on railway tracks in Indiana during 1908, and that "most, if not all, of these casualties were avoidable," seeks the cooperation of mayors and city councils in its movement to "reduce this appalling and unnecessary loss of life." Although the railway constructed on private right of way was never intended for use as a public highway, the number of accidents resulting from its illegitimate employment in this manner must continue in some relative proportion to the large totals of foot passengers who, despite warnings and counsel, will use the dangerous path provided by the railway track. The remedy proposed by the Indiana commission, if adopted, will reach only part of the trespassers, but if any are compelled or influenced to avoid the risk of walking where trains are operated it will help to lessen the problem. If the mayors and city councils who are thus petitioned will pass the ordinance submitted, providing a fine of not exceeding \$100, together with costs of prosecution, for trespass of this nature, except where tracks may be laid across streets, alleys or station grounds, it will help to preserve lives and limbs. The publicity which has been given to the campaign conducted by the commission is in itself an important deterrent to public negligence in this matter, and the support of city authorities, if given freely, will aid still further in impressing the necessary lesson.

Economy of Old and Modern Steam Plants

An English contemporary has recently drawn attention to the better economy in steam practice which obtains generally in Europe than in Great Britain, and more particularly cites certain power stations in Holland which obtain what are described as wonderfully good results from machinery that would be regarded as obsolete in Great Britain or in America. One of the explanations of the good results is the general cleanliness of the plants. Cleanliness is no reason for economy, it is true, but it may very well be accepted as an outward and visible sign of an inward excellence of maintenance of working parts. Poor attention to an engine internally is hardly likely to be con-

comitant with external cleanliness, and many engineers who have visited Continental power houses must have been struck by the higher order of care and cleanliness. There is an appearance about them which tells the observer that bad joints, dirty oil drips or a throw of oil are not allowed to continue until there is a good opportunity to effect a remedy. The remedy is applied at once. The same principles, when applied throughout the station, cannot fail to show their effect in the coal consumption.

Too often there is a serious want of proportion or lack of good judgment between the system of manufacturing steam and that of using it. In a station where the steam engine is of the best, fully equal to the use of high-pressure steam at a temperature of considerable superheat, a cold feed of dirty water may be flowing to the boiler, which at once becomes feed heater, water purifier and steam generator in one. Naturally, this boiler turns out very wet steam, the most unfit fluid to work in a steam cylinder. The boiler should be confined solely to changing water into steam. We do not mean that an old station can be made to work with the economy of a good modern station, but we do say that the care that is demanded of a modern plant, with its high pressures and high-speed machinery, is so much greater than that needed by the plants of older forms that the latter will often come first by strict adherence to correct methods of working and by a stricter attention to small details that make for waste.

The importance of heating by stages in the process of steam formation is very great. Let an engineer pay but scant attention to the feed-heating stage, allowing the heating pipes to become encrusted with scale and throwing the duty of feed heating upon the boiler, and great detriment to the efficiency of the latter as an evaporator will follow.

Storage Battery Cars in New York

Those who are familiar with the history of storage battery cars must have read with some astonishment of the coming trial to be made with an accumulator car by the Third Avenue Railroad Company, of New York, as it is now seven years since cars of this type have been used in the metropolis. But the times change and batteries change with them. It is yet too early to state to what extent the Edison nickel-iron batteries will minimize or eliminate the objections which the old batteries presented, particularly on account of their high maintenance cost. It is not to be expected that a storage-battery car can be operated for the same cost as a trolley car where the service is at all frequent. In New York, however, there is no hope for the electrification of the horse-car lines to any but the costly conduit system, so that self-propelled cars offer the only modern substitute for animal traction. Practically all of the long north and south lines are electrically operated, and in general the self-contained motor cars would find their widest application on crosstown lines. On the experimental line, for instance, the total run will be only about 3 miles. As in the older accumulator cars, the batteries are to be placed under the seats at first. Later, they will be carried under the car, so that the passengers will not be annoyed even if the batteries do give off some fumes. The maximum number of storage-battery cars is not likely to exceed 5 per cent of all rolling stock, and as

they will be charged at night, during the light-load period, the cost of fuel and electrical efficiency will be of secondary importance. The real problem is that of maintenance. If the Edison battery fulfills the expectations regarding its ruggedness, there is good reason to believe that it will drive the ancient horse car from its last ditch. The storage-battery car, however, will not have the field to itself in the coming test, but must prove its superiority to a gasoline-electric vehicle tried under the same operating conditions. Of course, the problem before the Third Avenue Railroad Company is really special, yet it is to be hoped that its experiments with the very latest designs of self-propelled cars will bring forth valuable data applicable to other localities, particularly those of scant traffic.

Three-Phase Generators for Single-Phase Transmission

The power-generating and transmission system of the Chicago, Lake Shore & South Bend, which is described elsewhere in this issue, is a particularly interesting installation. It involves the use of three-phase generators operating normally as single-phase machines; the trolley is fed at the power house direct from one phase at the generator voltage of 6600; two substations, 24 miles each side of the power station, are supplied with 33,000-volt current from the same phase, and the station lighting and power load are connected three-phase to the generator buses. At first glance, the transmission scheme adopted would seem to lend itself perfectly to a balanced three-phase system of generation and distribution feeding direct to the trolley on one phase and to each of the outlying substations on the other two phases. When operating single-phase the capacity of the generating units is reduced from a three-phase rating of about 2000 kw to a single-phase rating of 1500 kw. As yet no very large commercial light and power load has been connected to the station, and two of the generator phases are dormant. On the other hand, the plan adopted reduces the number of transformers required in the power house and insures continuity of transmission to both substations, even though one of the three step-up transformers inserted between the generator buses and the transmission buses should fail. Two transformers alone have ample capacity to carry the transmission line load.

Except for the fact that the transmission line carries high-tension current and step-up transformers are used, the installation is very similar to that in the Cos Cob power station of the New York, New Haven & Hartford Railroad. This road adopted three-phase generators because it anticipated connecting up a large power and lighting load in the numerous cities and towns between Mt. Vernon and Bridgeport. Its generator voltage is higher and the transmission distances are shorter, so that the additional complication of step-up transformers and substations was not necessary for economy. The experience gained in the New Haven installation with the operation of star-wound three-phase generators delivering single-phase current has evidently satisfied the manufacturers that this type of apparatus can be successfully operated in other places under similar conditions. The use of an auxiliary short-circuited coil inserted in the rotor to control the fluctuations in the magnetism of the generator fields and overcome local heat-

ing has been entirely successful. Means for controlling the violent surges of current following short-circuits on the line by inserting impedance coils on the trolley side of each generator have been also applied in the case of the New Haven installation, and presumably these same precautions have been taken in the South Bend power station.

One feature of the operation of cars on the Chicago, Lake Shore & South Bend is, we believe, a departure from previous practice on single-phase lines, most of which are equipped with combined a.c.-d.c. apparatus on the cars. This is the provision for sectionalizing the trolley where it passes through towns and cities and impressing upon it current at a potential of only 700 volts instead of 6600 volts, which is used in the long stretches through the country. This requires the use of auto-transformers at the section breaks, taking current on one side from the trolley and stepping it down in the ratio of 10 to 1, and on the cars connecting the wheel trolley to the primary coil of the car transformer so as to impress on the secondary coil exactly the same motor voltage as it delivers when taking 6600-volt current from the trolley wire through the sliding pantograph trolley.

Railway Depression in England

Statistics have been published so often showing the disproportionately small amount of electric railway trackage and equipment in Great Britain, compared with that in this country, that the facts are familiar to readers of this paper. Perhaps no one thing during a visit to England makes such an impression upon an American who is familiar with electric railway methods in his own country as the paucity of electric transportation lines in England. London, it is true, is well supplied with underground railways, but the surface electric transportation facilities are extremely meager in proportion to the population. This condition is even more strikingly evident when one inspects the cities outside of the metropolis. The equipment for the most part is modern, but the number of miles of track in each city would hardly seem ample for an American community of one-third or one-fourth of the size, and although many cities are located close together, interurban lines are practically non-existent.

This condition has given rise to assumptions, less frequently made during the last few years than previous to that time, that many of the lines in the cities would soon be joined by interurban connections, and that the possibilities and future of electric railway development in England were enormous. But although the field seems thus to lie fallow for the railway constructor, the situation has practically remained unchanged for the last 15 years, or since the commercial possibilities of the electric suburban and interurban railway were demonstrated in America.

According to the English papers, this situation and other conditions which indicate a retardation of the electrical industry in England are causing considerable concern to many of the manufacturers who had prepared to undertake the work which has never come, and steps are being taken to determine the cause or causes, and if possible reduce their effect. Meetings have been held for the purpose of agitating in some way for a change, but the difficulties in the way seem enormous. The subject is broader than the

electrical industry only. Moreover, the questions involved are largely of a political character, and some of them are bound up with policies to which one or the other of the two great political parties of Great Britain stand committed. Without attempting at this distance to determine the correctness of the analysis of the situation which has been reached by the new "Electrical League," being formed by a number of representative manufacturers, railway owners and others connected with the electrical interests in Great Britain, it is instructive to consider what are claimed by some members of this league to be the causes for a condition which is undeniable.

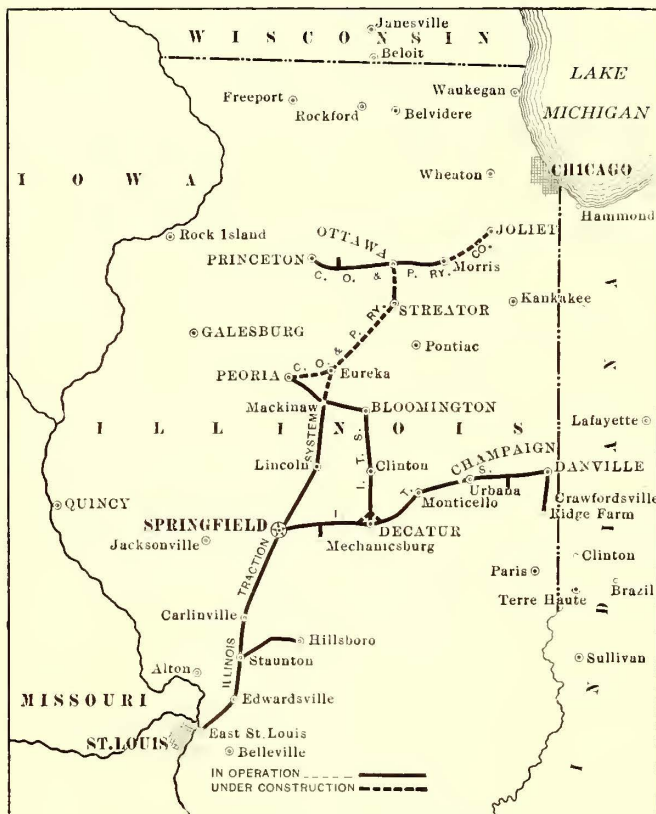
The first reason for the lack of electrical development in Great Britain is alleged to be the ownership and operation of a large number of the tramway systems in England and Scotland by the municipalities. Independent of whether municipal administration of these tramway systems has been wasteful or economical, and whether it has resulted in lower fares and greater returns to the city treasury or not, municipalization is a policy which involves separate and local ownership of the tramways in neighboring communities and an ownership which, at least theoretically, should stop at the boundaries of each municipality. At all events a consolidation of the ownership of the tramways in adjoining towns is impossible, and one great incentive to interconnect systems and operate through cars is lacking. The second condition for industrial depression in the electrical business in Great Britain, according to the league, is the fact that in the case of a number of large contracts recently awarded, outside manufacturers, particularly the Germans, have been able to underbid the local manufacturers and thus secure the order. Another alleged cause for the stagnant condition not only of the electrical industry, but of all industrial affairs in England, is the action of the labor unions and the labor element in promoting through Parliament various bills detrimental to the manufacturing interests. Particular stress is laid upon recent legislation reducing the hours of labor, in which the unions were particularly active, the employers' liability bill and the old age pension bill, and it is charged that the cost of the greater part of this legislation, particularly of the first two, is saddled upon the employer, and hence upon the productive energies of the country, which are already overloaded.

Relief can come only through remedial legislation backed by popular sentiment, and to this cause some of the leading Conservative papers are lending their influence. Whether the diagnosis and treatment recommended are correct or not, it would seem as if there was some relation between the problem of the unemployed in Great Britain and the absence of electric railway development, if we assume that the latter typifies a general industrial condition. Coincident with the agitation outlined above, and undoubtedly related to the causes of which it is the effect, is the statement that British funds for investment are seeking foreign fields to a far greater extent than ever before, and that of the total amount of British capital abroad about one-third has been invested during the last six or seven years. The situation is undeniably a serious one, and even if it has been somewhat overdrawn by those anxious for a change, it should not be without its lesson to this country.

MAINTENANCE AND IMPROVEMENTS ON THE ILLINOIS TRACTION SYSTEM

The *ELECTRIC RAILWAY JOURNAL* of April 3 contained an illustrated description of the new Decatur shops of the Illinois Traction System, which also outlined the improvements and standardization now being made in the company's rolling-stock equipment. Other features of the company's maintenance methods, organization, traffic and extensions of lines are treated in the following pages:

The Illinois Traction System operates 425 miles of main-line interurban track, exclusive of its trackage rights in cities and local street railway systems. Its longest direct line is from Danville, Ill., near the Indiana-Illinois border line, to East St. Louis, 227 miles. The interurban system is shown on the accompanying map and it will be noted that near the center point of the system there are two lines extending to the north. The eastern one of these two lines connects Decatur on the Danville-St. Louis route with Bloomington, 45.4 miles north. The other line extends from Springfield north 57.2 miles to Mackinaw Junction, where it connects with the Bloomington-Peoria



Map of Illinois Traction System

division, which is 37.4 miles long. The latter two lines are now operated with single-phase alternating current.

Plans are well advanced toward the construction of a line from Peoria to Joliet, to be known as the Chicago, Ottawa & Peoria Railway. The southern end of this new division will connect with the present lines at Peoria and at Mackinaw. The northern end will connect at Ottawa with the Illinois Valley Railway operated under the same management, and will afford a direct route from St. Louis to Ottawa and thence to Joliet and Chicago. Terminal arrangements have been made for an entrance to Joliet over the tracks of the Joliet & Southern Traction Company. On this new northern connection work is under way between Streator and Ottawa and Seneca and Joliet. The section from Ottawa to Seneca, a part of the Illinois Valley

Railway, has been in operation for several years. With the completion of the Chicago, Ottawa & Peoria Railway electric service will be possible between Chicago and St. Louis over tracks that are well built and well maintained.

The three principal branches of the Illinois Traction System—Peoria to Springfield, 74.7 miles; Danville to Springfield, 130.7 miles, and East St. Louis to Springfield, 96.6 miles, as well as the Bloomington-Decatur division, 45.4 miles—are each served with limited trains operating at high speeds on two-hour headway. The schedules of the limited trains are so arranged that the cars meet at Springfield for through transfer of passengers. A passenger may ride by limited train from Danville to East St. Louis, 227 miles, on any of six trains a day, which make the run in 9 hours and 40 minutes. The present running time for the 96.6-mile division between Springfield and East St. Louis is 3 hours and 40 minutes, but it is planned to shorten this run to three hours within the next few weeks. A limited train leaving Danville each day at 6 p. m. reaches Springfield at 10:55, where connection is made with a sleeping car, which arrives in St. Louis at 4:10 a. m. The limited trains between Danville and East St. Louis make 40 regular stops. In this service special equipment is used and plans are now made for improving and increasing the rolling stock available.

Some of the special equipments mentioned were described in the *ELECTRIC RAILWAY JOURNAL* of April 3, page 635.

The tracks of the Illinois Traction System for most of the distance parallel long-established steam railroad lines serving a territory supported by agricultural and mining industries. There are seven coal mines along the route which have no other outlet than by electric tracks; and on the parallel steam roads are 100 coal mines which also are served by the traction system. The coal traffic on the electric road is heaviest during the five winter months, when an average of about 1000 carloads of 30 tons each of commercial coal is handled each month. It is the policy of the traffic department to arrange shipments so far as possible so that each group of mines will supply coal for its own district, thus keeping the car-mileage as low as possible. The three mining districts within which coal traffic originates are Danville to Champaign, Springfield to Peoria and from Staunton to near Springfield. The average revenue for handling coal per ton-mile by the electric road is about 1.2 cents, while the similar charge on the steam lines for longer hauls is about 0.5 cent per ton-mile. The company has in operation 365 coal cars, many of which are used to deliver coal to dealers in the towns along the right of way. These dealers unload direct from the company's coal cars to wagons for house and factory distribution. Special sidings are built for each coal dealer. The coal and other freight and express traffic is handled largely at night so that it will not interfere with the passenger service.

In the freight and express service 15 motor cars, 40 trailers and 25 80,000-lb. capacity grain cars are regularly used. The longest through-car express run is between Peoria and St. Louis, 171.3 miles. Trains are operated daily each way over this route, leaving one terminal at 10 p. m. and arriving at the other at 7 a. m. During the past year the freight and express traffic of the Illinois Traction System has increased so largely that plans are being made for improvement in this service by the construction of belt lines around the larger cities, the extension and addition of siding tracks and boosting the trolley voltage.

ORGANIZATION

The northern Illinois lines of the McKinley syndicate connecting La Salle, Ottawa and Seneca, the Galesburg Railway & Light Company, the Quincy Horse Railway & Carrying Company, the Wichita Railroad & Light Company and the street railway lines and gas, electric and heating utilities in practically all of the towns served by the interurban lines of the Illinois Traction System are all under the management of H. E. Chubbuck, with headquarters at Peoria. The departments of claims and real estate also have their headquarters at Peoria, but the other department heads have their offices located as follows: George M. Mattis, vice-president and assistant treasurer, and B. E. Bramble, auditor, Champaign; B. R. Stephens, general traffic manager; C. F. Handshey, general superintendent of transportation, and A. C. Murray, supervisor of expenditures, Springfield; H. C. Hoagland, electrical and mechanical engineer; J. M. Bosenbury, superintendent motive power and equipment; L. B. Martin, engineer maintenance of way, and H. D. Perkins, engineer of bridges and buildings, Decatur. Local superintendents are held responsible for the operation of the interurban divisions and the local railways and public utilities, all reporting through the proper channels to the general manager.

IMPROVEMENTS CONTEMPLATED

The development of the Illinois Traction System, so far as the interurban lines are concerned, has been largely the result of rapid extension by construction rather than absorption of properties already built. The company has its own construction forces and executes all of its own engineering work. Because of the rapidity of extension and the considerable improvement in standards since inception, it is now found advisable to devote considerable attention to maintenance and local development. Plans recently have been consummated for a wide variety of improvements, all of which will tend toward the bettering of the service and the reduction of operating costs. Among these improvements, some of which will be described, are the following: Freight belt lines around the cities of Decatur, Springfield and Edwardsville; right-of-way improvements, such as placing standard signs, cattle guards, wing fences, station buildings, etc.; installation of complete signal system; elimination of grade crossings on passenger tracks; construction of steam railroad freight connections; power improvements to afford a higher average trolley voltage; faster schedules with through trains; new rolling-stock equipment; improved shop facilities; the unification of distribution systems comprising changing the present a.c. lines to d.c. lines; construction of a \$3,000,000 bridge across the Mississippi River at St. Louis to connect with passenger and freight terminals owned in Missouri, and the general improvement of the facilities for loading and unloading freight. The present article is largely devoted to a description of such of these improvements as are now under way.

MAINTENANCE OF WAY

The engineer of maintenance of way has department headquarters at Decatur. This engineer has a principal assistant with a corps averaging about eight men, which includes two draftsmen and two transitmen. For maintenance purposes the track is divided into four divisions of approximately 110 miles each with one roadmaster in charge of each division. There are 54 sections, each with a foreman reporting to one of the roadmasters. The section gangs comprise five or six men each in the summer and only the section foremen in the winter. Each foreman inspects his entire section each day.

The engineer of maintenance of way is advised of the work on the subdivisions of the road by means of a system of daily reports. Each foreman sends in a formal report to his roadmaster each day and the roadmaster condenses these to make a weekly report to the engineer of maintenance of way. Once each month the engineer of maintenance of way abstracts the reports of his subordinates and advises the general manager by letter of the progress of the work of his department.

The form of report used by the section foremen is of particular interest because of its completeness. These reports comprise eight pages 8 in. x 8 in. in size bound in heavy manila covers and ruled to present a daily record of time worked on one section for a month, the distribution of labor in regular maintenance work and a description of and distribution of labor for special work. Two pages of the foreman's report are arranged to show in detail the distribution of labor into hours' work per class of work. On the first page of one of these section foremen's reports the following instructions are presented:

INSTRUCTIONS.

GENERAL:

1. Foreman must enter the information daily.
2. Time must be shown on the dates the labor was actually performed. Foreman must return no time except for labor actually performed under his supervision.
3. The instructions on Page 2 must be carefully read and followed.
4. On the 15th and close of the month the Foreman must personally sign book, forward to the roadmaster, who will also sign personally and forward to the Engineer Maintenance of Way.

RELATING TO DAILY RECORDS ON PAGES 4 AND 5:

5. Separate items should be made of all labor on private tracks, joint tracks, new tracks laid, old tracks taken up, or on new and special work of any kind. The name and location of such track should be given, and the new or special work should be fully described and located.
6. If a gang works on more than one section, separate items should be made of the work on each, and the number of the section noted opposite each item. This rule also applies where regular section gangs help other sections.
7. Separate items should be made of all labor performed on bridges, buildings or other structures, sufficient information being given to identify such structures.
8. When reporting the unloading or handling of cinders, screenings and similar materials, state for what purpose they are to be used.
9. In reporting labor at wrecks, give location and car numbers; transferring cars, give location, car numbers and cause; repairing cars, give locations, numbers and cause.
10. If any labor is performed which is not fully covered by the printed description of work, a full description must be given on the blank lines at the bottom of Page 4 and on Page 6.

I hereby certify to the correctness of the returns made in this book.

..... Foreman.

Examined and approved:

..... Roadmaster.

As the reports of the section foremen are received in the office of the engineer of maintenance of way they are inspected and the accounts numbered for distribution and entered opposite the time as reported by the foremen. In this way the distribution of the maintenance-of-way labor account is made twice each month.

The laborers in the maintenance-of-way and bridges and buildings departments are paid each week. Whenever a man is released from work he is given a "service voucher," which, when properly filled out and used in connection with an identification stub, will be honored for payment by the nearest station agent. Copies of the blank forms used in connection with payment by service voucher are presented herewith. Referring to the blank form numbered 6765, that portion at the left is the foreman's stub made out when a man is released. The middle section of this form is the so-called letter of identification, also made out by the foreman and signed by him and by the laborer who is to be paid. This identification slip is given to the laborer to present to the station agent when asking for pay. At the same time that the laborer is given his letter of identification the foreman makes out the right-hand blank and

forwards it to the office of the engineer of maintenance of way. This office then fills out the three blanks numbered 14251. The blank at the right is the service voucher which is sent to the station agent, to whom the identification slip already has been addressed, and handed to the laborer. When this voucher has been paid by the agent, the corresponding letter of identification is forwarded by the agent to the engineer of maintenance of way. The two smaller stubs are for the records of the maintenance-of-way office (left) and the auditor's office (center). By means of this system of service vouchers double advice of all payments is given to those responsible for the disbursement.

During the past season the maintenance-of-way department reballasted 50 miles of main-line track with gravel and 20 miles with chats. Very satisfactory results are obtained by the use of chats for ballast. This material is

In addition to its regular work the maintenance-of-way department is locating and constructing the belt tracks earlier mentioned as having been made necessary by the great increase in freight traffic. Each of these belt lines will be a substantially built track laid on a private right of way located on the outskirts of the cities where there will be no objection to the movement of heavy trains of coal cars and other standard steam-road equipment. The exact location of the belt tracks is largely governed by the possibility of connecting with sources of profitable freight traffic, such as grain elevators, lumber and coal yards and industrial plants.

Three of these belt lines are soon to be built. In Decatur the belt line will leave the main track near the railway company's shops east of the city, pass in a westerly direction to connect with the Bloomington division and

<p>Illinois Traction System REQUEST FOR SERVICE VOUCHER—STUB 6765</p> <p>Date 190.....</p> <p>To Agent, Station</p> <p>Name</p> <p>Occupation</p> <p>Month</p> <p>Deduct For " Board } \$</p> <p>Balance due, \$</p> <p style="text-align: right;"><small>FOREMAN</small></p>	<p>Illinois Traction System LETTER OF IDENTIFICATION N₂ 6765</p> <p>To Agent, Station</p> <p>The Bearer is entitled to amount shown on Service Voucher bearing above request number.</p> <p style="text-align: right;"><small>FOREMAN</small></p> <p style="text-align: center;"><small>(Signature of Party to be Identified)</small></p> <p><small>Foremen or timekeepers must see that this slip is signed in their presence by the man to be identified. If he cannot write his name, he must make his mark, and the foreman or timekeeper must sign as witness. No expense will be taken for failure to comply with these instructions.</small></p>	<p>ILLINOIS TRACTION SYSTEM REQUEST FOR SERVICE VOUCHER N₂ 6765 190.....</p> <p>To</p> <p>Mr. (Working No.)</p> <p>has worked as on in month of 190.....</p> <p>Deduct For @ \$ per \$</p> <p>Balance due, for which Service Voucher should be issued, \$</p> <p>Payable at Station.</p> <p style="text-align: right;"><small>KNOW M. OF W.</small></p>
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<p>Illinois Traction System 14251</p> <p>To Agent Station</p> <p>Name</p> <p>Occupation</p> <p>Location</p> <p>Hrs. @ per Hr. Hrs. @ per Hr. Days @ per Day,</p> <p>Total - \$</p> <p>Deductions for - \$</p> <p>Total Deductions - \$</p> <p>Balance Due - \$</p> <p>Issued by</p>	<p>Illinois Traction System N₂ 14251</p> <p>To Agent Station</p> <p>Name</p> <p>Occupation</p> <p>Location</p> <p>Hrs. @ per Hr. Hrs. @ per Hr. Days @ per Day,</p> <p>Total - \$</p> <p>Deductions for - \$</p> <p>Total Deductions, - \$</p> <p>Balance Due, - \$</p> <p>Issued by</p>	<p>ILLINOIS TRACTION SYSTEM \$</p> <p>SERVICE VOUCHER</p> <p>N₂ 14251 190.....</p> <p>This to Certify that..... has been employed as..... during the two weeks ending..... 190..... as follows:</p> <p>Hrs. @ per Hr. Hrs. @ per Hr. Days @ per Day,</p> <p>Total - \$</p> <p>Less Deduction for - - \$</p> <p>Total Deduction, - - \$</p> <p>Balance Due, - - \$</p> <p>Correct Approved,</p> <p>Received..... in full of above.</p> <p>VOID After Thirty (30) Days</p> <p style="text-align: right;"><small>KNOW M. OF W.</small></p>
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Illinois Traction System Improvements—Blank Forms Used in Paying by Service Voucher

received from the zinc mines at Joplin, Mo., and is delivered at the interurban terminals at 80 cents per cubic yard. It is a material that can be worked easily and it runs well so that the labor cost for placing it under the ties is but slightly greater than that for clean gravel. The ballast is handled with electric locomotives pulling Rodger ballast cars in trains at night. Distribution is made both day and night, but the surfacing gangs work only by day. On the northern division the gravel used for ballast is purchased from a gravel-handling company which contracts to place the gravel on the track. Payment is made according to yardage. During the winter months the necessary surfacing work is done with cinders from the power plants. Cinders also are used in widening the banks and in building platforms.

thence extend south along and across the competing steam roads, again to connect with the Decatur-Springfield division of the electric railway west of the city. This belt is now under construction and will include 4.25 miles of new track.

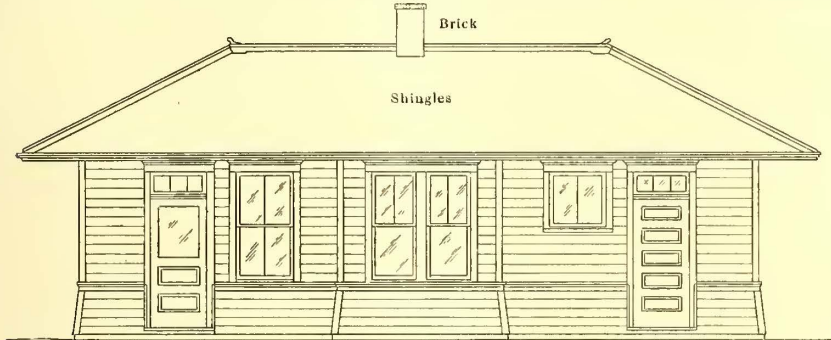
The Springfield belt will be 5.6 miles long. In Springfield the Illinois Traction System operates over rented tracks and a belt line will be of value in reducing the cost for handling through traffic. The line around the south-eastern edge of the city will afford freight connections with several steam roads and also will shorten the route for through traffic to and from St. Louis as well as relieve the city tracks of considerable heavy traffic. Right of way for the Springfield belt has been purchased and it is expected that the track can be laid this summer. The Ed-

wardsville belt will be 1.5 miles long and will offer improved facilities for handling heavy trains through that city.

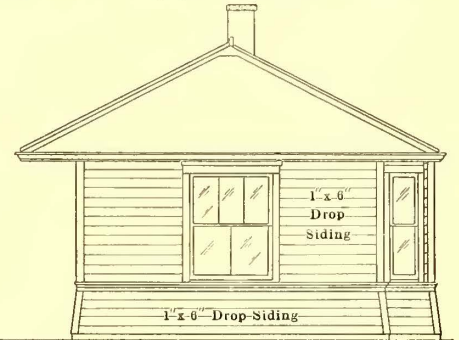
MAINTENANCE-OF-WAY RECORDS

The maintenance-of-way department is doing considerable work of permanent value to this and other departments. So-called "mileage" books in blueprint form are being made and distributed to all department heads. The pages of one of these books form a continuous map of the track shown as a straight line. Indicated on the map with the exact distance from one terminus are the locations of all stations, stops, bridges, railways, sidings, etc. Another book which this department is preparing is a "siding" book. The company has about 200 sidings which will each hold 10 freight cars in the clear. The new book will com-

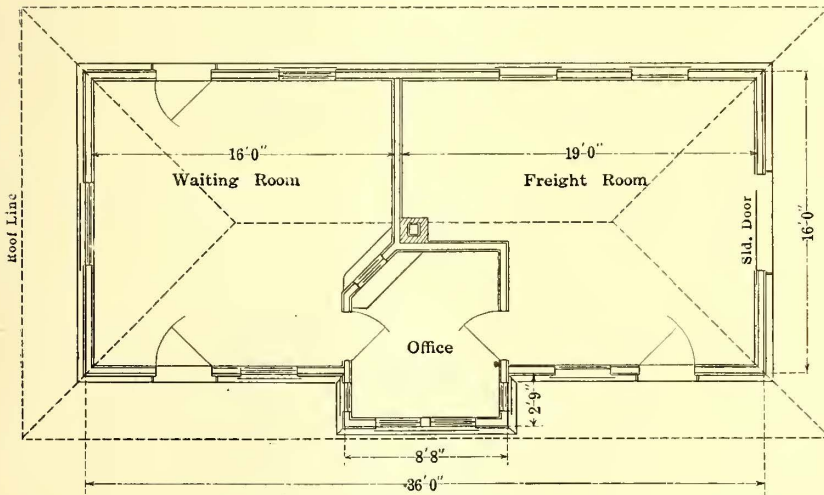
The headquarters of the maintenance-of-way department at Decatur is provided with a well-lighted drawing-room and a fireproof vault for the storage of maps and other records. A simple system has been developed for filing and indexing all right-of-way drawings. A sectional case has been built comprising 10 horizontal rows of pigeon holes with five holes in each row. The rows are numbered from 1 to 10, beginning at the top, and the pigeon holes from 1 to 5 beginning at the left. Thus two numbers combined serve to locate definitely any single hole. For example, "3-5" would indicate the fifth hole from the left in the third row from the top of the case. The drawings in each hole are numbered and on the ends of the pasteboard tubes around which the drawings are rolled the location number of each is given; thus, 3-5-2 would indicate draw-



Track Side Elevation



End Elevation



Floor Plan

Illinois Traction System Improvements—Standard Depot for Small Town

prise blueprint pages 4½ in. x 10 in. in size, each presenting a simple map of the track layout at one station. These maps will also show the connecting steam lines and the lengths of all electric siding tracks.

A complete resurvey of all the interurban lines is being made by the maintenance-of-way department, the results of which survey are being plotted on tracing cloth to a scale of 400 ft. to 1 in. The sheets of these right-of-way maps are 24 in. x 36 in. in size and the structures on each side of the right-of-way for ¾ mile are shown. The maps present all details of right-of-way location, such as cornerstones, bench marks, etc., as well as track details, including measurements, curves, stations, sidings, etc. Prints of these maps are made and filed with the Recorder of Deeds in the proper counties. Copies also are made for the company, the land commissioner and the treasurer.

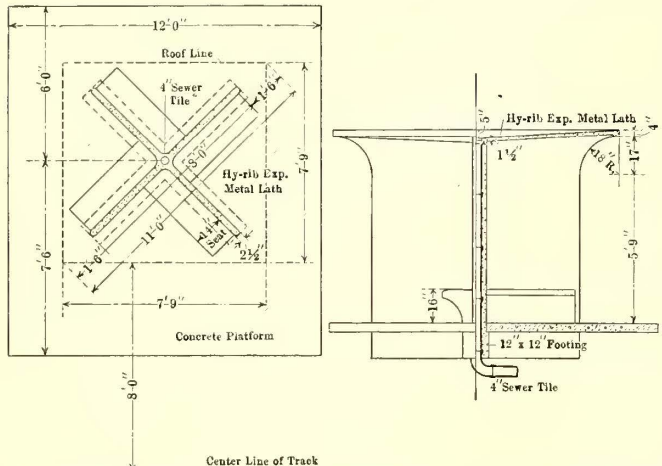
ing No. 2 in the hole located as earlier described. All drawings are indexed according to the name of the nearest railway station and one of the 1-in. x 42-in. tubes is provided for each tracing and its prints. Thus kept, the drawings are easily found and are not mutilated in filing.

DEPARTMENT OF BRIDGES AND BUILDINGS

The department of bridges and buildings is in charge of a superintendent with office at Decatur. Reporting to the superintendent are six foremen of bridges and buildings, one foreman bridge painter and one foreman building painter. In general the system of reports is similar to that followed by the maintenance-of-way department. Each day the foremen send a report to the superintendent of the department and the superintendent reports weekly progress by letter to the general manager. The daily reports used by the foremen are in the form of large postal cards

properly addressed on one side and having ruled spaces for the report on the reverse side. Space is indicated for reporting the number of men working and the total hours worked during the day. These postal-card reports are forwarded on the company cars as railroad business at the close of each day's work.

The department now has in hand considerable construction work of an interesting character. Many new stations are being built at the smaller towns, right-of-way fixtures



Electric Ry. Journal

Illinois Traction System—Reinforced Concrete Shelter Shed

are being standardized and erected and plans are being made for new rotary converter substations on the divisions now operated by alternating current.

STANDARD BUILDINGS

An illustration is presented showing the floor plan and elevation of a type of standard 36-ft. x 16-ft. depot just approved for small towns. These structures will be of frame resting on the best available foundations. The buildings will be simple and comfortable and the roof is given a wide overhang to afford shelter from storms. The sides are constructed of 1-in. x 6-in. creosoted drop siding on the outside and lath and plaster above a 3-ft. 6-in. wainscot inside. The ceilings are 10 ft. 3 in. high and are plastered. One-half of a depot will be set off for the office and waiting-room and the other half for the accommodation of the freight and express department. It is estimated that such depots will cost about \$800 each. The ticket window design it is proposed to make standard for all offices where applicable. The design includes a drawer and money till to be built in as a part of the window structure.

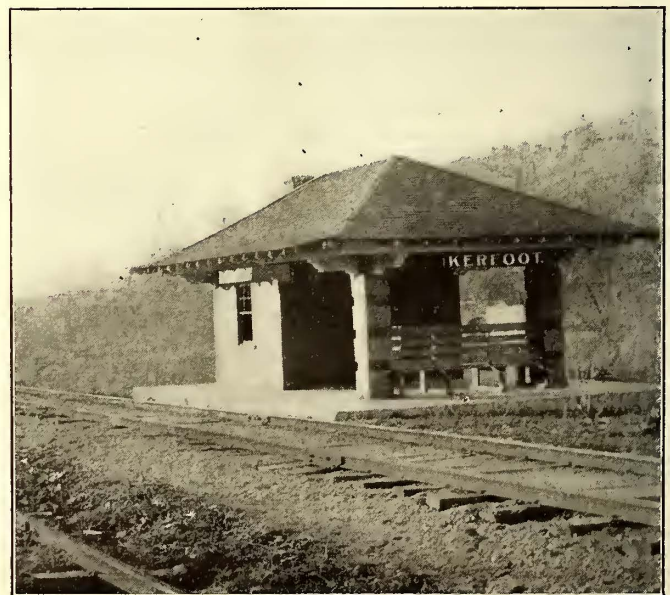
The bridges and buildings department is just completing the construction of a brick substation building at Clinton, Ill., to cost \$5,000. This structure is 88 ft. long by 40 ft. wide and is subdivided by brick walls into the following rooms: Substation, 36 ft. 10 in. x 32 ft. 8 in.; general waiting-room, 25 ft. x 26 ft.; ladies' waiting-room, 11 ft. 4 in. x 19 ft. The substation-room accommodates two 300-kw rotary converters. The long side of the building is adjacent to the track and the roof of the building projects over the landing platform. This extended roof is covered with ribbed glass so that the space below may be well lighted.

Standard substation design No. 2 is reproduced in elevation from the track side. Eight such substations are planned as a part of the change of the Peoria division from a.c. to d.c. operation. These buildings will accommodate passengers at one side of the center office and freight at the other, in front, and the substation wing will be in the

rear. The structural materials will be mainly concrete for floors and foundations and wire-cut face bricks for the extension walls. The roof will be covered with tile.

A standard cement and plaster shelter shed, designed as shown in the accompanying illustration, is to be adopted for highway crossings between towns. This type of station resembles in general form, but not materials, that adopted by the Illinois Valley Railway Company as the result of a contest held about two years ago. It will be noted that the structure has two intersecting walls supporting a flat roof draining to the center. The roof line is beyond the extremities of the wings or partitions and therefore on account of the arrangement of the walls protection will always be afforded, even from a driving rain. The structures will be built of fireproof material. Concrete supported on Hy-rib lath will be used to form the partitions and the roof. The shelter will be surrounded by a concrete platform. In constructing one of these stations the steel lath will be assembled on the ground. The exterior of the lath will be plastered with cement and after this is set the center or core of each wall will be poured. The roof is designed to drain to a 4-in. sewer tile leading through the middle portion of the intersecting walls and under the platform a sufficient distance away from the track. One of the principal benefits of this center-draining roof other than its simple construction is that falling water will not drip from the eaves on waiting passengers.

The bridges and buildings department has developed standard designs for telephone booths, register booths and hose houses. Illustrations are presented showing the details of the telephone booth and hose house. These illustrations need no explanation. The design for the register booth is similar in form and material to that for the telephone booth, the only variation being in the size. The floor dimensions of the register booth are 3 ft. x 5 ft.



Illinois Traction System—Shelter Station Near Peoria

Mention has been made of the standard roadway signs which are being erected throughout the interurban system. Illustrations are presented showing the design and dimensions of some of these signs, all of which are made of cypress wood painted white with black letters. Signs are provided for the following indications: Fare limits; sidings; stations; bridges; no trespassing; section limits; boundary lines; subway; slow; railroad crossing; railroad,

highway and intersection stops; yard limits and mile markers.

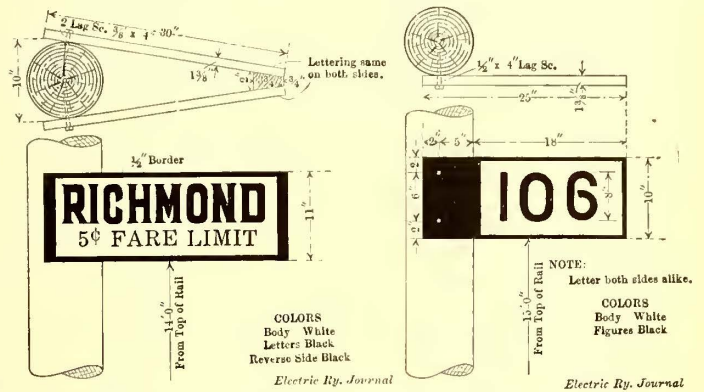
ELECTRICAL AND MECHANICAL ENGINEERING DEPARTMENT

The power generation and distribution department is in charge of the electrical and mechanical engineer, who has reporting direct to him the chief engineers of the power stations, superintendent of overhead construction and the superintendent of substations. The superintendent of overhead construction has four line foremen with headquarters at Champaign, Decatur, Mackinaw and Staunton, who are in charge of the following territories respectively: Danville to Decatur; Decatur to Bloomington and Decatur to Springfield; Bloomington to Peoria and Springfield to Mackinaw; and all lines south of Springfield. Each foreman has two linemen and a motorman and conductor, who act as ground men. This organization is only for the maintenance work of the overhead, feeder and construction circuits. The subdivision of the telephone system is made according to similar territories and for each division in charge of a line foreman there is an additional lineman in charge of telephones, telephone lines and signal lines. The standard line car of the company is a 43-ft. flat car with a 20-ft. body, mounted on Brill trucks equipped with GE-57 motors. The relative sizes of the body and the platform leave available ample space for carrying materials and for mounting a tower.

All line foremen and telephone foremen report to the superintendent of overhead construction on the daily report blank illustrated on page 723. It will be noted that this blank presents a complete record of the performance of the crew and the car at their disposal. From such reports it is possible to check the trainmen's time and the trips of the

and Bloomington no signals have been installed except on a long grade near the entrance to the city of Peoria.

This signal installation has six blocks each about 1 mile long with equipment supplied by the McClintock Manufacturing Company. There are two signal posts with semaphores and lamps at the end of each block, as illustrated. A train entering a block causes large semaphore blades to fall to danger at both ends of the block and remain so while the train is within that block. There is one complete set of signals for operation in each direction. The

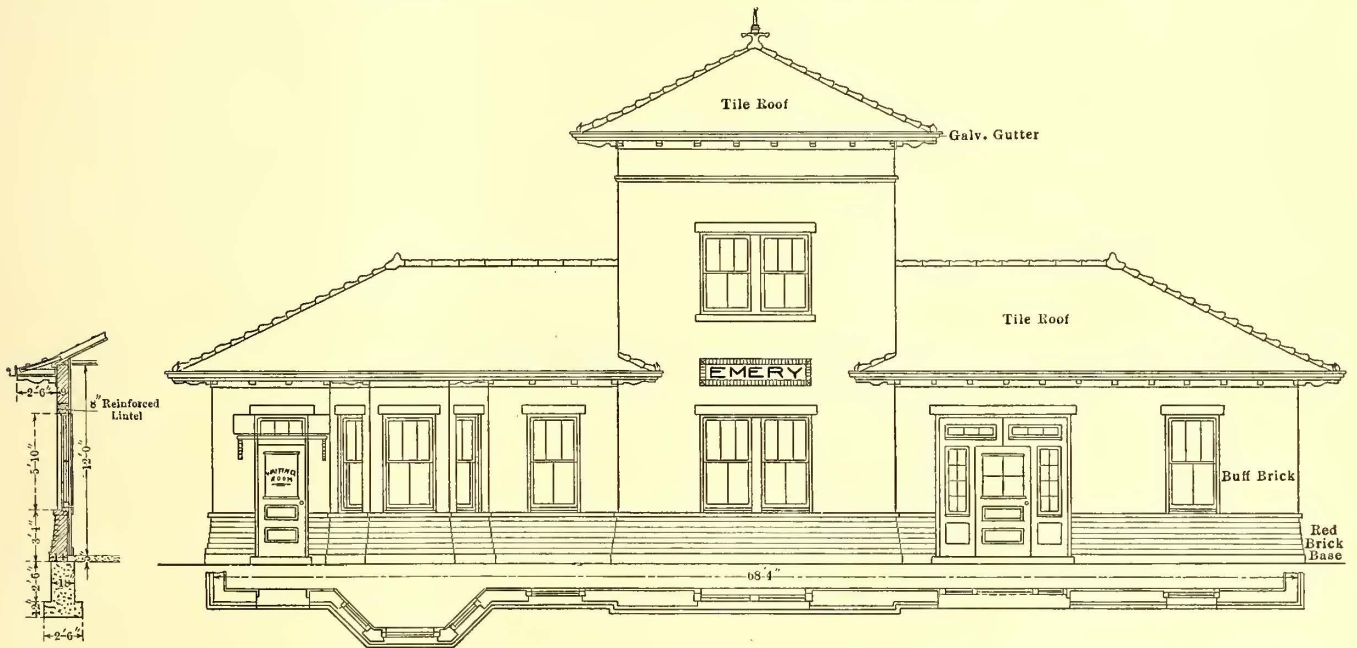


Illinois Traction System—Right-of-Way Signs

signal circuits are carried on one track rail supplemented by three iron wires supported on cross-arms below the telephone line.

POWER TRANSMISSION

Practically all of the power used in operating the 425 miles of interurban line is generated in three stations located and having capacities as follows: Riverton, 4000



Illinois Traction System Improvements—Front Elevation of Standard Substation and Depot

car, as well as to note the character of the work performed and the materials used. The superintendent of overhead construction abstracts the reports of his foremen once each week to form the basis of a report to the general manager.

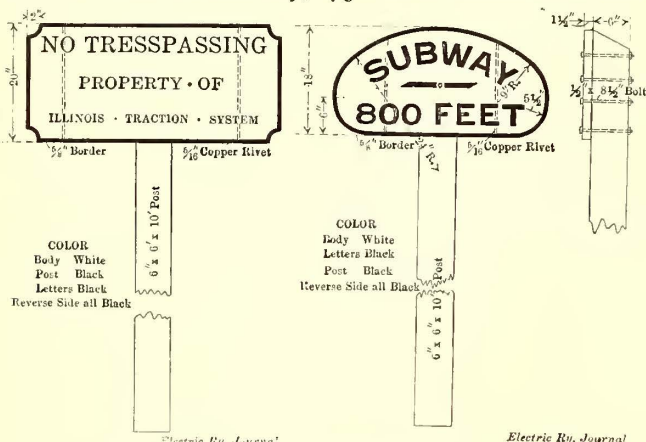
SIGNALS

During the past two years 60 Blake signals have been installed at sidings on the main line between Danville and East St. Louis. These signal blades are controlled from the dispatchers' offices at Danville and Springfield. On the a.c. division north of Springfield and connecting Peoria

kw; Peoria, 4000 kw; Danville, 2000 kw. The transmission voltage between power houses and substations is 33,000, except on the Danville end, where from Danville to Champaign, 34.1 miles, the power is transmitted at 15,000 volts. The company also has a 500-kw generating station at Edwardsville on the southern end, which is connected with the transmission line so that it may be used to assist in handling heavy local loads. Each of the three main power stations is connected by a transmission line with a dispatching substation at Decatur. At this substation the

operator synchronizes the three plants and dispatches the load according to the demands of the service. During 18 hours a day the Danville plant feeds the line for 40 miles west of Danville. From midnight until 6 o'clock the Danville plant is shut down and the local railway and lighting load, as well as the interurban load at and near Danville, is carried by the Riverton or the Peoria plant, as the case may be. The Riverton plant is located near Springfield, 130 miles distant from Danville, and the Peoria plant is near the center of that city, 173.8 miles distant from Dan-

a.c. motors there is considerable lack of flexibility in handling the equipment. While the a.c. cars are equipped to run on the d.c. system it would hardly be practicable to equip the far larger number of d.c. cars so that they could use single-phase current. Unless this is done in time of emergency it is impossible to shift the equipments to the best advantage of the service. Heretofore it has been found necessary to confine the a.c.-d.c. equipments entirely to the schedules of the a.c. lines. On account of the inflexibility of this arrangement, plans have been made and are now nearly completed for the re-equipment of the a.c. sections. New substations furnishing 650-volt direct current to the present catenary supported trolley wire will be built and new motor equipments for the cars will be purchased.

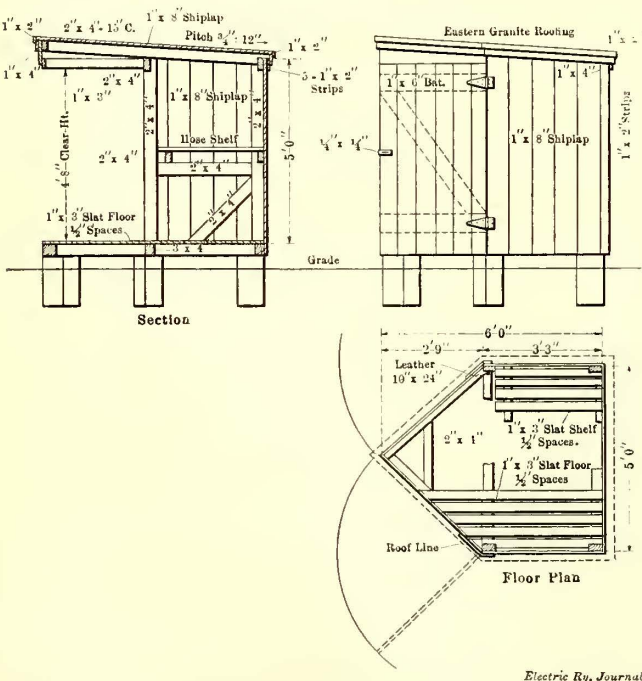


Illinois Traction System—Right-of-Way Signs

ville. The capacities of the three generating stations are such that by means of the transmission lines mutually connecting at Decatur there is considerable flexibility in the way in which the load may be distributed to the various plants. It is stated that no difficulty has been experienced

The catenary supported overhead construction which has been in service for more than a year on the a.c. lines is in excellent shape and will need no alteration. Since it has been installed there has been only one breakdown on the line and that was in the copper trolley wire and not in the steel messenger cable. This line has been subjected to extraordinarily severe sleet storms, one of which recently broke down copper and iron telegraph wires within a territory 40 miles wide. The sleet conditions at the time of this storm were such that the wires accumulated such heavy loads as to cause a break in every span for distances of from 2 miles to 3 miles. The parallel telephone and telegraph lines where a large number of wires were carried on one pole also were brought to the ground by the breaking of the poles due to the weighing down of the wires to the breaking point. The catenary, as earlier stated, withstood these severe weather conditions with but one break. This type of construction has three-point suspension and is supported by wooden poles.

In making the change from alternating current to direct

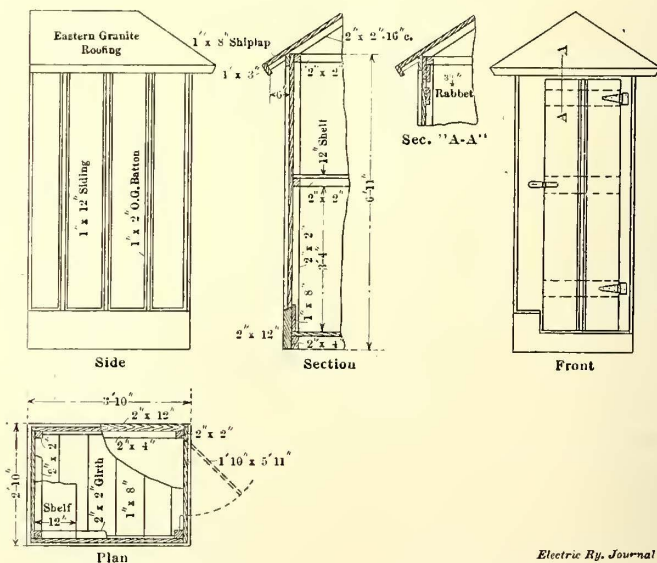


Illinois Traction System—Standard Hose House

in synchronizing these generating stations located so far apart.

CHANGE FROM A.C. TO D.C. OPERATION

Some of the newer lines of the Illinois Traction System were built for and are now operated with 3300-volt single-phase current. The a.c. equipment includes the line connecting Peoria and Bloomington and a line from Mackinaw, the midpoint of the latter line, through Lincoln to Springfield. Inasmuch as only 15 per cent of the interurban mileage of the Illinois Traction System is now operated by



Illinois Traction System—Standard Telephone Booth

current the plan as now laid down contemplates doing the work in sections. The first change will be made from Springfield to Lincoln, then from Lincoln to Mackinaw and last from Peoria to Bloomington. When changing over one of these sections two portable substations will be installed to furnish 600-volt current until it has been possible to complete the permanent substation equipments. Then the portables will be moved to the next section to supply current. The power readjustment will call for the installation of eight substations, two of which will be

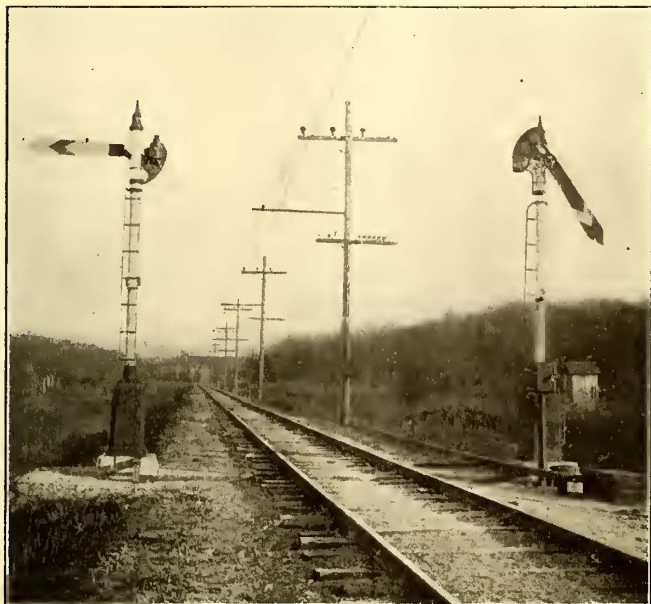
equipped with 500-kw rotaries and six with rotaries of 300 kw capacity.

The engineering department is now adding a third transmission wire on the same cross-arms with the two wires

the new transmission and feed wires. This car has a boom of such length that the wires may be placed directly on the cross-arms as the car moves forward without interfering with the other wires.

One of the most interesting features in connection with the change from alternating current to direct current is the plan which will be followed in obtaining a higher average voltage throughout the re-equipped lines and possibly throughout the entire system. It is planned to install enough copper and boosters to maintain midway between feeding points a normal voltage of 600 and a minimum voltage of not below 500. The substations will feed the trolley and d.c. feeders at 700 volts or the maximum of the rotary converters. Wherever there is a district between substations in which a reasonable amount of copper will not serve to hold the voltage to the required value a booster set and special booster feeder will be installed. The boosters will be of the series type and will be operated only when there is a demand on the trolley section which the rotaries cannot meet; as, for instance, when several extra heavy freight trains are pulling on one substation. The company is introducing interpole motor equipments in all of its car reconstruction work so that there may be the least possible commutation trouble on the high d.c. trolley voltage.

One of the refinements being introduced by the electrical engineering department is the strengthening of the transmission line at points where it crosses foreign wires. A drawing is presented showing the arrangement of wires and supporting cables at such an intersection. The trans-



Illinois Traction System—Block Signals on Peoria Hill which now distribute the 33,000-volt current along the single-phase lines. Between the new substations and for the entire length of the re-equipped road between Peoria,

Form 6 8-15-03. 5M

ILLINOIS TRACTION SYSTEM

LINE FOREMAN'S HOURLY REPORT

Division _____ Date _____

Gang Reported at _____ M. Train Crew Reported at _____ M. Line Car No. _____

Hour	Left	Time	Arrived	Time	Nature of Work	Material Used
6	M.					
5	M.					

Work Done by Detached Men	Time Report		
	Name	Occupation	Hours

Material Received _____

Signed _____

Foreman _____

Illinois Traction System Improvements—Linemen's Daily Report Blank

Bloomington and Springfield a copper feeder of 317,000 circ. mils cross-section will be installed in addition to the present No. 000 trolley wire and its catenary messenger. A specially constructed derrick car is used for stringing

mission wire is supported not only by two insulators at each pole, but also it is supported at 5-ft. and 10-ft. intervals by vertical hangers supported from a single steel messenger wire.

POWER STATION OF THE CHICAGO, LAKE SHORE & SOUTH BEND RAILWAY

The constructional features of the Chicago, Lake Shore & South Bend Railway were described in the *ELECTRIC RAILWAY JOURNAL* of April 10, 1909, page 674. The power station of the company, which is described in the following pages, generates all the current used in operating this new road between Pullman, Ill., and Michigan City and South Bend, Ind. Single-phase current is distributed direct to the trolley at 6600 volts and to static transformer stations at 33,000 volts. The wiring diagram on page 728 illustrates the main connections between the generating and distributing system.

STATION BUILDING

The power station is located at Michigan City, Ind., at the head of the harbor connecting with Lake Michigan, and an ample supply of lake water is assured for all purposes. A direct connection with the Lake Erie & Western Railroad serves for coal supply. The site of the power station was originally a marsh, which was filled in by the United States War Department in dredging the harbor. While the

so that the steam pipes have a clear run to the proper boilers. The exciters are set in the middle of the turbine room in front of the operating switchboard and opposite the chimney. This arrangement was chosen so that the plant could be divided into a number of sections or panels, each of which would substantially be independent of the others, and the steam piping and electrical connections were laid out with that end in view. The boiler-room floor and the lower floor under the engine room are at ground level and the turbine floor is about 18 ft. higher. The turbo-generators are supported on concrete foundations with pile footings separate from the building foundations. The exciters are set on steel beams in the turbine-room floor. A large part of the space under the engine room is taken up by the high-tension room in which are placed the three 1000-kw step-up transformers and all the busbars, wiring, oil switches and lightning arresters.

The turbine room is spanned by a traveling crane which can reach all apparatus in that room directly. Over the 1000-kw transformers in the lower story are hatches behind the operating switchboard, through which the transformers may be lifted, and over all the larger pieces of apparatus in the lower story are small holes in the floor closed with steel covers when not in use, but through which wire lifting cables may be passed so that the large crane may be used in setting up or dismantling the apparatus.

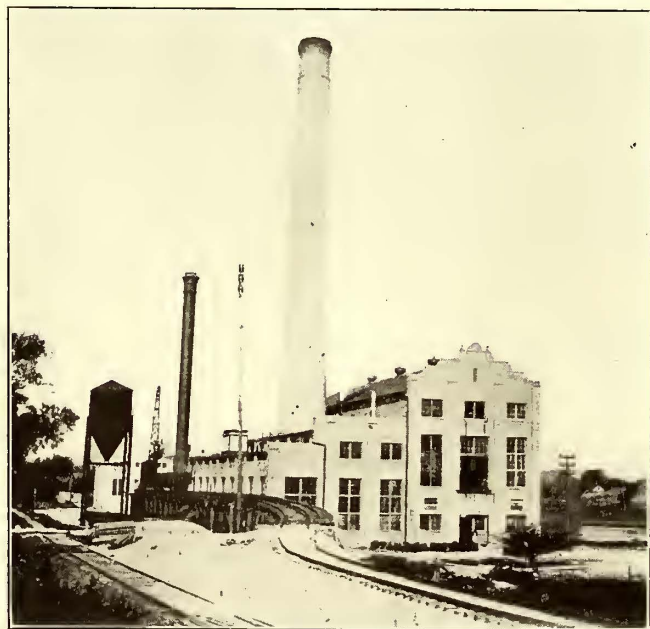
The power-house building is 164 ft. long by 102 ft. wide. The outside walls are of concrete blocks made on the ground from lake gravel and cement. These blocks are of special shape designed so that they dovetail into each other leaving grooves which, as the courses were completed, were filled with grout. Reference to the illustration of the method of laying the blocks will show that the units were closely anchored to each other forming a uniformly solid wall. The facing of each concrete block was made of a special waterproof compound with narrow beveled edges. The joints were pointed with dark mortar. All lintels are of steel. The division walls are of sand-lime brick of local manufacture and the roof is made of 3-in. Georgia pine laid on steel trusses covered with Ludowici red tiling. The underside of the pine roofing was given three coats of asbestos paint.

Reinforced concrete was used for all floor construction and for the pilasters which support the crane columns. Notwithstanding the discouraging nature of the subsoil upon which the building was placed, no defect whatever has thus far developed after eight months of use.

BOILER AND COAL-HANDLING PLANT

There are six Babcock & Wilcox Stirling boilers of 500-hp capacity each. These have 4-in. tubes and are designed for 200 lb. working pressure. Superheaters of the B. & W. U-tube type are built in each boiler. These have sufficient surface to add 90 deg. superheat to the steam at normal boiler capacity. The furnaces project in front of the boiler walls, thus allowing large combustion chambers. Coal is fed by steam-engine-driven Murphy stokers.

The fuel generally used is Indiana slack which averages about 9000 b.t.u. per pound, but varies considerably as received from different mines. Two parallel trestles are provided for coal storage and handling, one about 15 ft. higher than the other. The loaded coal cars are placed on the lower trestle and unloaded by a steam locomotive crane with a clam-shell bucket which discharges the coal into a weighing hopper and crusher mounted on a gantry crane running the entire length of the boiler room directly over the coal bunkers. The crusher is operated by a 30-hp,



Chicago, Lake Shore & South Bend—Power Station at Michigan City, Ind.

surface soil was very light, careful soundings showed a good hard bottom for the power station foundation at from 35 ft. to 45 ft. below the surface. About 1100 oak piles were driven to support the building and machinery foundations. These piles were sawed off 3 ft. under low-water line and a concrete foundation mattress was built on them. About 100 piles were placed under the chimney alone. In the construction of the foundations and superstructure 5000 cu. yd. of concrete were used. The mixture was made up of Medusa Portland cement, crushed limestone and beach sand.

The general arrangement of the power station is shown in the plans and sections presented. The boiler and engine rooms are divided by a brick wall, and though under one roof are really separate buildings. The chimney is at the middle of the boiler room with two batteries of two boilers each at the west side, and one battery and space for another at the east side, extending lengthwise of the building.

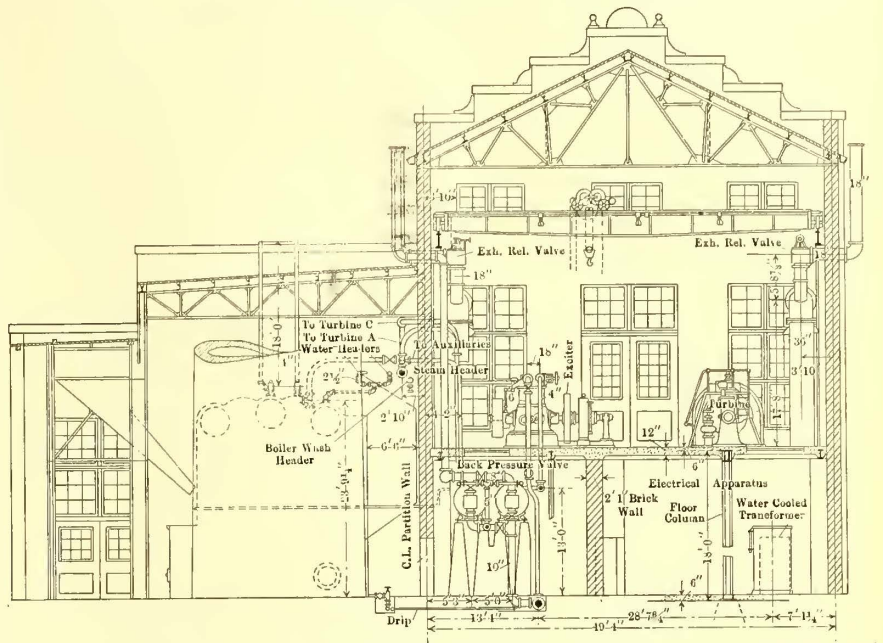
In order to make the engine and boiler rooms of the same length the turbo-generators were set in two rows, staggered

three-phase induction motor and the gantry by a 7½-hp, three-phase crane motor. When coal is received in hopper-bottom cars it is dumped directly under the trestle for storage or unloaded as described. Coal storage for at least 10,000 tons is provided. The high trestle is provided with an apron to cause all coal when dumped from the cars to slide outward and away from the power house so as to be within reach of the bucket of the hoisting engine. With these arrangements 160 tons of slack have been unloaded in 10 hours by three men. With two men a 40-ton capacity car of coal can be unloaded, crushed and placed in the bunkers in three hours. Steel bunkers over the boilers have a capacity of about 25 tons per boiler. The power house being at the water front, fuel can be delivered by boat if found advisable.

ASH-HANDLING APPARATUS

The vacuum method of removing the ashes from under the stokers and elevating them to the loading hopper which is used in this station is very similar to that employed for handling shavings in planing mills. Under the pits in front of the Murphy furnaces is run an 8-in. collecting pipe extending the whole length of the boiler room, and just in front of each ash door is inserted a T-fitting with a 6-in. opening. In the concrete floor a hopper about 1 ft. square and a few inches deep is formed

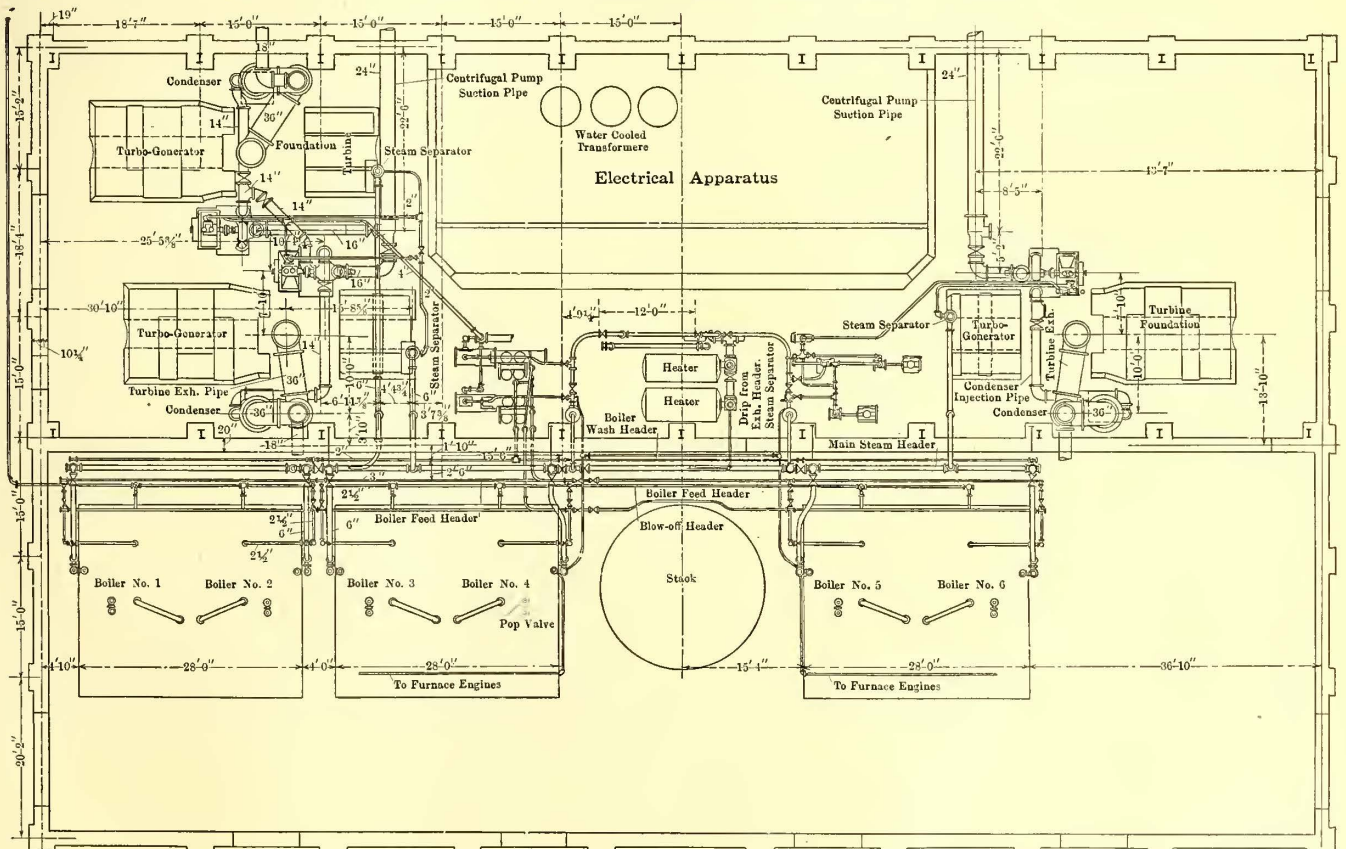
hopper, which is large enough to hold about a carload of ashes loosely piled. The top of the hopper is tightly sealed and over this is set a rotary fan driven by a 40-hp induction motor, which exhausts air from the hopper to a vac-



Chicago, Lake Shore & South Bend—Section Through Engine and Boiler Rooms

Electric Ry. Journal

uum of about 1 lb. below atmosphere. Water from the tank overhead is sprayed into the top of the hopper to quench the hot ash as it comes in.



Chicago, Lake Shore & South Bend—Plan of Michigan City Power Station

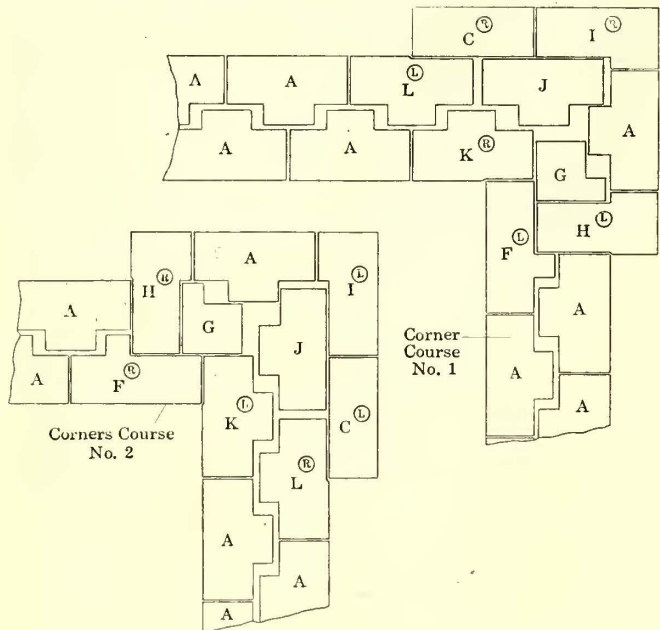
Electric Ry. Journal

above this opening. At the east end of the boiler room the 8-in. collecting pipe is carried up several feet above the floor and left open. At the west end the 8-in. pipe runs under the boiler-room floor and up to the top of the ash

When ash is being elevated all the openings of the 8-in. pipe in the ash pits are closed except the opening in the pit being emptied. There a man rakes the ashes from under the grate into the small hopper in the floor and the blast

of air coming through the open end of the pipe carries them along and deposits them in the hopper. With the full boiler-room capacity installed and in operation it is estimated that two men will be able to remove easily the ash as produced.

The maintenance of this equipment has not yet been determined, but it appears that there is considerable wear



Chicago, Lake Shore & South Bend—Details of Interlocking Concrete Blocks in Power Station Building Walls

wherever the direction of the ash pipe changes and any roughness in the pipe which produces a small change in direction or velocity causes local wear. Wet ashes seem to cause more wear than dry ashes. Elbows are provided with wearing pieces against which the stream of ash impinges. These can be renewed cheaply and all joints in straight pipe are made with the pipe ends faced true and screwed into a coupling till they butt. The pipe below the floor level is laid in a drained concrete-lined trench so that it can be renewed readily if necessary and so that water may not accumulate about the pipe. With these precautions the wear has been inconsiderable as yet. The ash-handling plant was installed by the Economic Engineering Company, of Chicago.

STACK

The stack of Custodis radial tile is supported on a concrete and pile foundation and is 210 ft. high above the grates. It has a 12-ft. internal diameter. With Indiana coal it has a capacity for about 6000 hp of boilers or double the present boiler installation. Lightning protection consisting of two No. 0000 copper conductors is provided. These conductors extend above the top of the stack about 5 ft. and are stapled to the top course in a substantial manner. They are grounded by means of soldered connections to the water-piping system and also to a large perforated copper plate sunk in the ground below the lake level. A special outside iron ladder is attached to the stack, the rungs of the ladder being of such a shape that a man when climbing will be inside the ladder with his back to the chimney.

WATER SUPPLY

The water for boilers and condensers is taken from a large concrete well just outside the building, which receives water from the harbor by gravity flow, and into which the pump suction pipes dip. The condenser hot wells

are all connected together and discharge through a common overflow. A large creek empties into the harbor directly opposite the plant and both lake and creek water are available. The creek water carries little mineral but some vegetable matter and the latter appears to counteract the effect of the small amount of lime and magnesia found in the water from the lake.

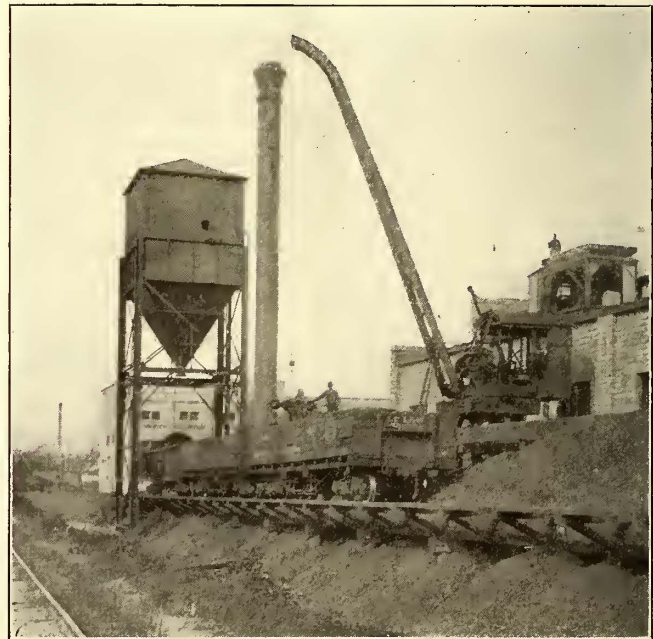
CONDENSERS

The condensers are of the barometric type furnished by the Fred M. Prescott Company, of Milwaukee, Wis. They have a double tail pipe which prevents an excessive supply of water from flooding the injection chamber. One tail or overflow pipe is placed inside the other, the inside pipe taking normal discharge. When the water rises to the danger point in the inside pipe the second or outer one disposes of the surplus. The injection water is furnished by single-stage centrifugal pumps with a 14-in. discharge, driven by simple vertical automatic engines at about 350 r.p.m. These pumps are primed by 2-in. ejectors connected into the top of the pump casing and into the discharge pipe just below the valve. Both connections were found necessary to start the pumps promptly. No foot valves are used on the suction pipes of these pumps, which are enlarged at the ends to about double area.

Each turbine has a separate condenser and injection pump and the injection pumps of the two turbines at the west end of the station are cross connected so that either pump may be used with either condenser and provision is made so that when the fourth turbine is installed the condensers of the two units at the east end will be similarly cross connected.

BOILER FEEDING AND WASHING

Boiler feed water is usually taken from one of the small hot wells into which each condenser tail pipe discharges, but may also be drawn from the large concrete well in front



Chicago, Lake Shore & South Bend—Coal and Ash Handling Apparatus at Power Station

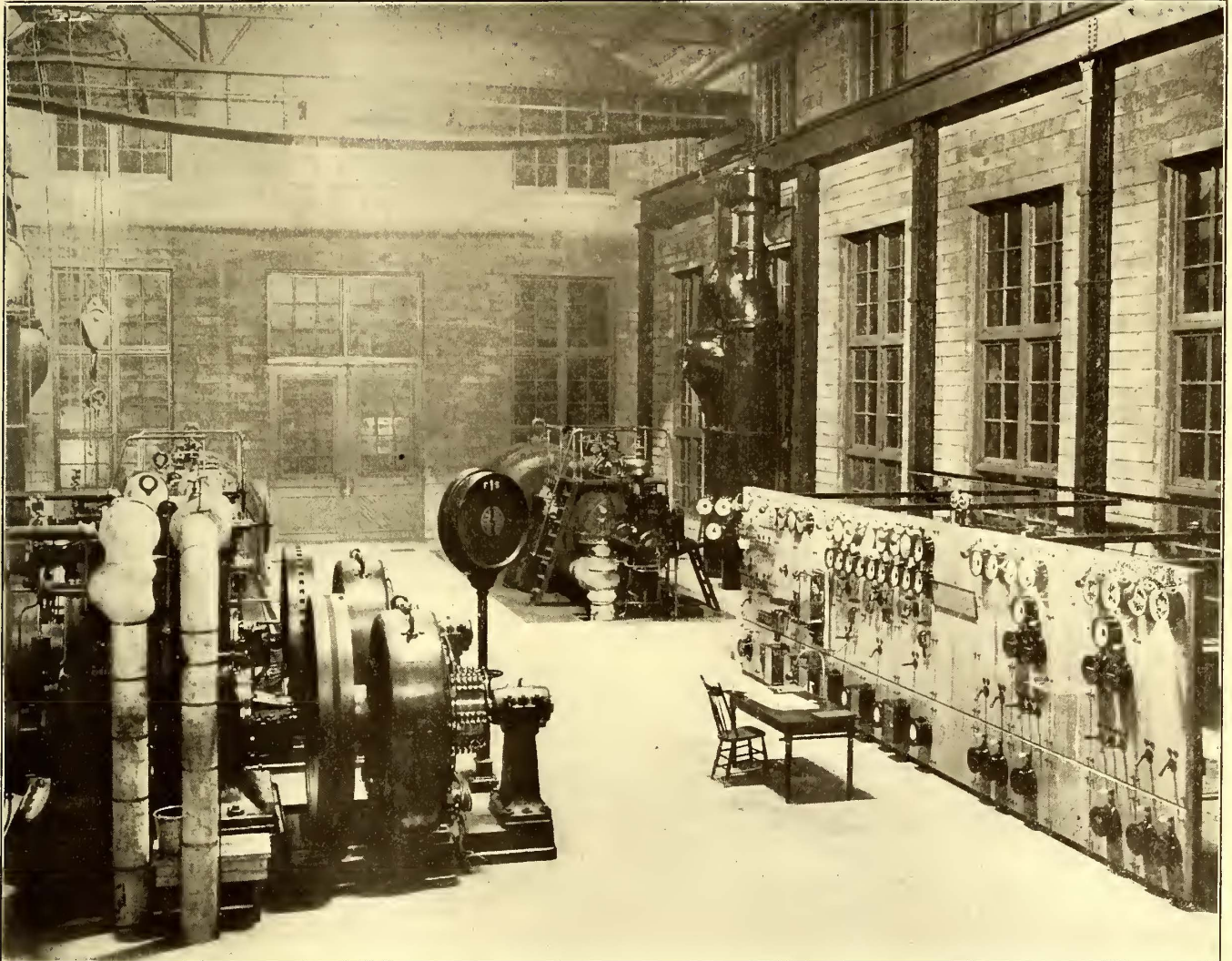
of the building which communicates with the harbor and from which condensing water is drawn. There are three 8-in. and 12-in. x 12-in. single-cylinder piston pumps which deliver water from either of the wells described to the feed-water heaters. There are two Hoppes steel shell open heaters having 425 sq. ft. of tray surface each, which re-

ceive all the steam of the pumps and exciter engines. These heaters are connected to the exhaust riser of the auxiliaries through induction chambers, which are combined single-pipe connections and oil separators. There are also baffle oil separators inside the heaters. Both heater connections contain valves and there is an automatic back-pressure valve in the riser beyond the heaters and both heater shells are ventilated to the riser above the automatic valve. By this arrangement either or both heaters can be shut off for cleaning or repairs. The heaters are set above the floor on concrete pedestals so as to allow a fall of about 8 ft. to the suction openings of the boiler feed pumps and a gallery is built at the open ends of the heaters for convenience in removing the trays for cleaning.

so that either feed pump may be used for cleaning, while the other is feeding boilers.

One of the three boiler feed pumps is intended for building service and pumping water into the steel tank over the hopper which forms part of the pneumatic ash-handling outfit. From this tank water is distributed to the turbine bearings, transformer coils, etc., and is used for drenching ashes. These pumps are cross connected so that all three may pump into the heater or while one is supplying the heater and another the tank the third is held in reserve for either purpose.

As one boiler feed pump and one hot-well pump, at moderate piston speed, can supply the normal capacity of the station and one heater and one feed main are sufficient



Chicago, Lake Shore & South Bend—Interior of Power Station (Photograph Taken at Night by Light of Mercury Arc Lamps)

The boiler feed is supplied by two 18-in. and 10½-in. × 16-in. single-cylinder direct-acting steam pumps with outside end packed plungers and pot valves. From the pumps to the boiler connections the feed pipes are run in duplicate so that the mains form two loops, each supplying one-half the boiler room. The boiler connections are single pipes from cross connections between the mains and the feed pumps are cross connected. Either pump and either side of either loop may be cut out without disturbing operation. Both boiler feed pumps may also take water directly from the hot wells and both are connected into the boiler waste line which also runs the length of the boiler room

for operation without any serious inconvenience, this arrangement is flexible enough to meet any ordinary contingencies.

STEAM PIPING

The steam piping is laid out as a sectional system, each battery of two boilers supplying one turbine. The boiler-room main header receives all the boiler connections and the supply pipes to the several turbines are taken directly from it, while a smaller loop header to supply the steam-driven auxiliaries is connected into this main header at both ends.

The plant was laid out so that each turbine should be

supplied normally by the corresponding boiler battery and the turbine steam pipe is connected to the main header between the two boiler connections, so that no part of the header will normally be required to carry more than the steam supplied by one boiler. This header is really only an equalizer and could have been made very small. The header is 8 in. in diameter and the boiler and turbine connections are each 6 in. in diameter.

Valves are placed in the header between the boiler batteries and at each end of the auxiliary section, which is between batteries 2 and 3. The auxiliary section is also divided in the middle and valves are placed in the auxiliary header so that the loop may be supplied from either end. This divides the entire live-steam pipe system into three turbine sections which are quite independent, and two auxiliary sections from either one of which all the boiler feeders and hot-well pumps may be operated. All turns in the boiler and turbine leads are made with bent pipes.

Directly under the steam opening of each turbine is placed an angle type Hoppes steam separator of 15 cu. ft. volume with a straight 8-in. lead up to the turbine. In each end of the auxiliary loop header is a similar separator of 10 cu. ft. volume. The engines which drive the centrifugal condenser injection pumps are supplied with steam from the separators of their respective turbines and are cross-connected similar to the water piping.

The boiler pipes are connected with the header through angle-globe valves with horizontal stems which are extended through the wall into the turbine room, so that a damaged boiler or lead can be cut out with safety. In addition, there is an automatic non-return valve between the angle valve and the boiler. A gate valve is placed in each turbine lead just above the header with its stem also extended into the turbine room.

The intent was to sectionalize the large steam piping so that any broken portion could be isolated quickly and safely, and at the same time to keep the design as simple and inexpensive as practicable.

DRAINAGE SYSTEM

Under the main steam header and connected into it at each turbine tee is a drainage header which empties in two traps in parallel. The two smaller separators and the auxiliary steam piping also drain into them. These traps discharge into both heaters. Each turbine separator drains into a separate trap, all three of which discharge through common piping into both heaters. All the traps are Squires 2-in. and are by-passed and connected up exactly alike with flange couplings. One or more extra traps similarly equipped are held in reserve, ready for substitution for any trap that does not work properly.

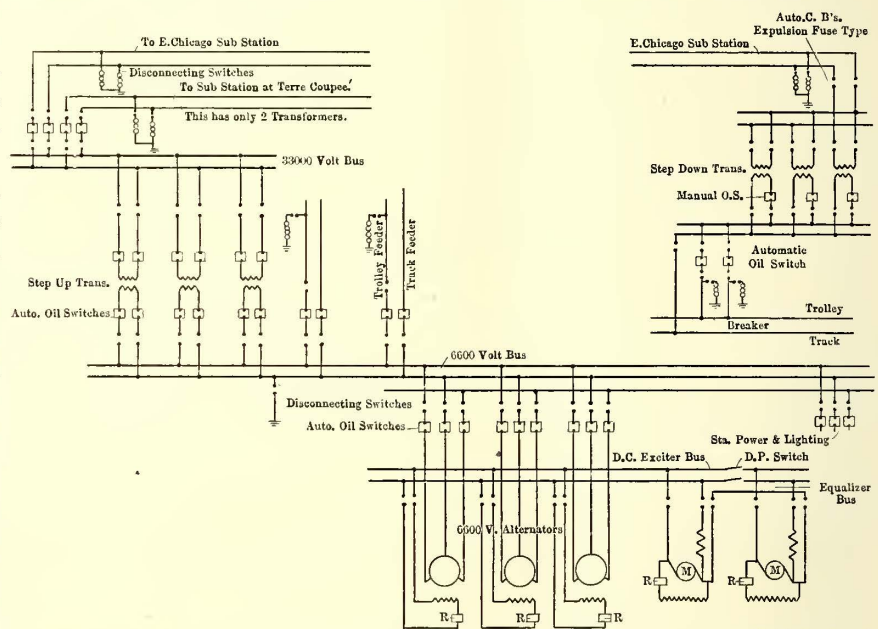
All piping exposed to boiler pressure is full-weight wrought iron and all flanges in it are of forged steel. Flanges of 4-in. pipe and larger are loose, with the pipe ends turned over to make the steam joint between the pipes themselves, while the smaller pipes have the flanges screwed and planed on. The valves and fittings are of extra heavy cast-iron except the small valves, which are brass. Substantially all piping is flanged, as nothing larger than 1 $\frac{1}{4}$ -in. was permitted to have screw fittings, and this includes only a few small pump connections.

All the larger steam piping is covered with 1 in. of laminated asbestos and air-cell covering with 1 in. of 85 per cent sectional magnesia covering over that. Two-inch steam pipes and smaller and drips have only the laminated asbestos lagging. The entire feed system, including heaters, pumps and piping, is protected by sectional covering.

GENERATORS

The generating plant consists of three 1500-kw Westinghouse-Parsons steam turbines connected to three-phase, 25-cycle, a.c. generators. Each generator has a capacity of 1500 kw single-phase or about 2000 kw at the three-phase rating. The speed is 1500 r.p.m.

Three-phase units were chosen for the main generators to provide against the need of future long-distance transmissions and possible commercial power load. As the trolley line is supplied directly from one phase of the generator windings the possible effect of surges in the other generator phases was feared and the generators were required to be insulated to endure safely a high-potential trial of double voltage to ground for 30 minutes. All other electrical apparatus was required to endure the insulation trials recommended in the A. I. E. E. standardization rules.



Chicago, Lake Shore & South Bend—Wiring Diagram of Connections for Power Station and Distribution System

There are two 100-kw, 125-volt, d.c. exciters direct driven by Westinghouse compound engines. Variations of voltage are governed by a Tirrill regulator. A special synchroscope of large diameter with an illuminated dial is mounted on a pedestal so that it may be seen from all parts of the turbine room in addition to the usual synchroscope mounted on the switchboard.

SWITCHBOARD AND ELECTRICAL APPARATUS

The switchboard is of the standard Westinghouse type with electrically operated oil switches. The control circuits carry exciter voltage and no high-tension current is connected to the board. All 6600-volt and 33,000-volt apparatus is placed in a fireproof room directly under the switchboard. This apparatus includes busbars, oil switches, instrument transformers, oil-insulated choke coils, low-equivalent lightning arresters, three 1000-kw, single-phase, 6600-33,000-volt, oil-insulated, water-cooled, step-up transformers and transformers for lighting the station and operating the induction motors of the coal-handling machinery. Owing to the fact that the armature leads are connected

directly to the trolley without intervening transformers, extra lightning protection is now being installed in the shape of aluminum cell arresters.

All oil switches in the generating station and in the high- and low-tension substations are protected on both sides by lever-type disconnecting switches, so that they can be isolated for inspection or repair without shutting down any apparatus not directly controlled by that particular switch.

The leads from each generator to the 6600-volt busbars are single conductor cables insulated with varnished cambric and braided. They are drawn into fiber conduit ducts which are continuous without pull boxes from the generators and pass through the wall of the high-tension room in the lower story of the engine house. The ducts are supported in steel frames just below the turbine-room floor and are enclosed in a mass of concrete molded about them in place.

The high-tension room is divided lengthwise by a brick wall into which are built or attached the barriers and structures for the 6600-volt busbars, oil switches and connecting cables. All these barriers are concrete slabs reinforced with light expanded metal, molded separately and seasoned before being installed.

The larger division of the high-tension room contains the 33,000-volt busbars which are supported on line insulators on a steel frame without barriers. Directly under these busbars are the 33,000-volt oil switches and between these and the outer wall stand the 1000-kw, water-cooled, step-up transformers and the lightning arresters and choke coils. This part of the installation is made up of standard apparatus.

In molding the reinforced floor of the turbine room 7 in. of concrete was placed above the top of the steel floor beams and about 5 in. below. The lower stratum contains the reinforcement, consisting of twisted iron rods and welded mesh and was laid complete so as to offer a working floor during the installation of the electrical equipment. On top of this were laid the steel conduits for the control wiring of the oil switches, the field cables of the generators and the exciter leads and lighting circuits, after which the upper part of the floor was put in. By careful arrangement of work the delay in completing the floor was inconsiderable; in fact, the concrete men were able to work steadily, the conduit work being kept ahead. All the control conduits are continuous without junction boxes in the turbine floor.

The general illumination of the power plant is furnished by Cooper Hewitt lamps, the direct current for which is provided by a Lincoln induction motor-generator set. All incandescent lighting circuits are fed with 110-220-volt, 25-cycle, alternating current. The wiring is enclosed in steel conduits throughout.



The experiment made by the Liverpool Corporation Tramways of running first-class cars on which a higher rate of fare is charged has not proved successful. Some months ago the service was given on the line to Aigburth, one of the best residential quarters of the city, and cars de luxe, on which double the ordinary fare is charged, were run at frequent intervals. It appears that the average operating expenses per car-mile in Liverpool are 20.25 cents and the average earnings per car-mile on the entire system are 22.08 cents. The earnings per car-mile of the first-class cars, however, are only 11.4 cents, or half the average on other lines.

HEARING ON MILWAUKEE FARE CASE BY WISCONSIN RAILROAD COMMISSION

Additional testimony in the case relating to the rates of fare charged by the Milwaukee Electric Railway & Light Company was presented before the Railroad Commission of Wisconsin at Milwaukee during the week beginning March 29. Part of the testimony offered, all of which was on behalf of the company, is published herewith:

TESTIMONY OF FRED G. SIMMONS

Fred G. Simmons, superintendent of construction and maintenance of way for the Milwaukee Electric Railway & Light Company, was presented as a witness on April 2. Mr. Simmons was examined by Edwin S. Mack, of counsel for the company, who stated that Prof. W. D. Pence, engineer for the Railroad Commission, had testified that in making his appraisal as between paving and track construction he included as track construction merely the concrete foundation of ties to the bottom of the ties. Mr. Simmons stated that the city paving did not extend to the bottom of the ties, but extended, on an average, about to the middle of the tie.

DEPRECIATION AND WEAR OF TRACK

Mr. Mack said that the engineering staff of the Railroad Commission had computed life curves based on the head-wear. Was the head-wear the only test of a track? The witness thought that corrugation, which could not properly be considered as head-wear, was another and an important element in limiting the life of rails. He believed that to take care of depreciation due to age and wear of track, ties and bonding on the lines of the company in Milwaukee, exclusive of any provision for obsolescence and inadequacy or public requirements, 7½ per cent per annum should be allowed. While this percentage might vary in some cases, it would be necessary in approximately 13 years to expend in replacements and renewals on any given piece of track, as an average, an amount equal to the original construction value of that track. At the end of that time the usable value of the track structure would be from 75 to 85 per cent of its original value. For depreciation due to age and wear of special work and the installation of special work, the witness would allow 12½ per cent. About eight years on the average was the life which would apply to special work of the character under consideration. Paving and grading the witness placed at 10 per cent, computing that in the course of 10 years he would have expended in replacements and renewals an amount equal to the original cost. Ballast was figured at 5 per cent. Tracks, ties, bonding, etc., were computed by the witness at 47½ per cent of the total. Applying an average "weight" of 47½ per cent to track depreciation, the witness multiplied the 7½ per cent annual appropriation for track, etc., by 47½ per cent, reaching 3.56 per cent. The following table was presented:

Kind of work	Annual allowance for depreciation Per cent	Multiplied by Per cent	Total Per cent
Tracks, ties, bonding, etc..	7½	47½	3.56
Special work.....	12	7½	.90
Paving	10	25	2.50
Ballast	5	20	1.00
Total		100	7.96

EXPENSES IN TRACK CONSTRUCTION

The cost of construction or reconstruction was increased when the work was done on a city street and one track had to be kept in service. Mr. Simmons had figured that the

additional expense caused by this requirement, based on the experience of the company for years past, as compared with construction where operation ceased, was approximately \$882 for labor per mile of single track. The additional material used for the installation and maintenance of temporary cross-overs and additional protective devices amounted to about \$50 per mile of track, and additional supervision with incidentals about \$68, making a total of approximately \$1,000 per mile of track additional on account of such a method of construction. That figure took into consideration solely the expense incident to operation of cars on the additional track.

W. J. Curtis, of counsel for the company, asked how much more it would cost to put in a piece of special work in some of the crowded parts of the city and provide for operation of the cars over the track than if the opportunity to lay the special work was unhampered by traffic. Mr. Simmons said the proportion would be approximately the same when taken in relation to the mileage cost of the special work, as the proportion would be in mileage of the straight track. As special work was usually done at night, the cost of labor and some small items of material, such as lighting, were undoubtedly somewhat larger; just how much larger the witness had not computed, because the difference in the labor cost was mainly due to the reduced efficiency of the men at night as compared with their efficiency in the daytime, and it would be difficult to figure the increased cost accurately.

Responding to a question from Mr. Curtis, Mr. Simmons said that without interruption or interference, the normal labor cost per mile of track would be somewhat over \$2,200 per mile.

Mr. Mack stated that there was some evidence as to work done on the street or in connection with bridges or in similar ways that did not appear in the inventory, but was done by the company in the construction of tracks under the requirements of franchises. Mr. Simmons gave several instances showing expenditures of this nature. In one case the curbstone on each side of the street had to be set back, and this was done at considerable expense. In another case the company was required either to pay for or execute the entire excavation for a subway under the track of the Chicago & Northwestern Railway for the full width of the street, except just that portion across the Chicago & Northwestern right-of-way, and that occasioned a considerable delay. When the company, in another instance, was given the right to remove tracks from one street in connection with a grant of additional privileges, the entire street had to be filled and paved with crushed stone for the district, necessitating the use of about 10,000 cu. yd. of crushed stone. In another instance, when the company was granted a franchise to construct a track, the requirement was included that the street and sidewalk be graded to the full width of the street.

CONSTRUCTION REQUIRED BY CITY PAVING ORDERS

Mr. Mack said it had been stated that as a practical question the company must make its track reconstruction coincident with the city paving of streets. It had been suggested by the city attorney that the company made a saving on paving under these circumstances. Did tracks have to be taken up before the end of their useful life to an extent that caused a loss to the company exceeding any possible saving from the fact that the city did the paving?

There were a few cases where, in the opinion of the witness, the expense would be less to secure the remaining life of the rail and then pay for the taking up and replace-

ment of the pavement. That occurred, however, only under certain favorable conditions. It was undoubtedly very much to the convenience of the public to have the street torn up only one time. The Board of Public Works had always insisted, so far as its authority extended, that the company make its work coincident with the city paving operations to the extent of sending notices when paving was contemplated and requesting the company to do its work at the time of the repaving.

A statement was presented by Mr. Simmons showing that from information obtained at the City Hall, resolutions had been recommended for passage for the year 1909 providing for the paving of 19.03 miles of single track. From 1901 to 1908 there had been reconstructed on account of city paving requirements the following miles of single track: 1901, 6.75 miles; 1902, 7.45 miles; 1903, 5.57 miles; 1904, 6.01 miles; 1905, 11.29 miles; 1906, 7.89 miles; 1907, 10.56 miles; 1908, 9.83 miles; total, 65.35 miles; average, 8.17 miles.

In the foregoing list there were some minor items, where the track had been reconstructed in dirt streets not coincident with city paving at the same time, but the great majority, probably over 90 per cent, was reconstruction which was carried on during the city's construction of pavements.

Mr. Simmons specified instances where the rail was good for a life of between three and five years, but at the request of the city, in order to comply with the requests for paving, the rail was relaid.

Mr. Mack asked if there had been cases where the company had had to relay its pavement and track foundation at its own expense because the city had changed the paving of the street. The witness said that the expense which the company had to assume in these cases was incident to placing cross-overs and taking care of the track during the period of reconstruction, and of operating the cars on one track while another track was undergoing construction. He had two instances where the company was ordered to make these changes and complied with the requirements, although the portion of the pavement for which the company was responsible was good for a considerably longer period.

To construct new track in paved streets with 7-in., 97-lb. rail, bringing the concrete to the point where the upper portion of the paving would be imposed upon it, cost \$15,900 per mile, exclusive of any special work or overhead construction. This figure did not include allowance for interest during construction, accidents, contingencies or general office expense for labor, but did include an allowance for engineering and superintendence and general office expense in buying material. Such allowance as there might be for this latter item was comprised in the cost of the material. This figure was based on actual results based on actual cost of materials for allowance for contractors' profits. On a dirt road the expense would be less by the amount of concrete plus the expense for the ordinary gravel or cinder ballast. The cost would be approximately \$12,500 per mile on the dirt road.

Answering an inquiry from Mr. Mack as to the number of yards of concrete in the cost as computed, Mr. Simmons stated that his estimate was based on bringing the concrete up ready for the imposition of the top layer of pavement, and 1500 cu. yd. of concrete at \$3.60 per yard would be required. If carried only to the center of the tie, about 1000 yd. of concrete at the same price would be necessary. Answering an inquiry from Lester C. Manson, of counsel for the city, the witness stated that about 800 yd. of con-

crete would be required if it went to the bottom of the tie.

Mr. Simmons said that no portion of the general expense of the company was included in the figures. The company had exceptional appliances and facilities for doing concrete work. The witness did not believe the price of \$3.60 per cubic yard could be secured by contract in the city of Milwaukee.

Mr. Mack stated that the figure used by Professor Pence was \$5 per cubic yard, as he remembered it, and Mr. Simmons said that was an ordinary contractor's figure, as he remembered it, for concrete work of that character in Milwaukee. The exceptional advantages made possible by the company's arrangements resulted practically in the saving of \$1.40 per cubic yard in the concrete cost. The cost was reduced by the fact that the company transported its material by utility equipment instead of by wagon.

CONTINGENCIES IN TRACK CONSTRUCTION

Testifying regarding the statement of Prof. M. E. Cooley as to the contingencies which were met in track construction, the witness said that he had had a great many experiences of the character mentioned; many in the city, but more on the outside lines. In citing difficulties met in the city, the witness stated that at one time, where the track was all ready for installation, an old brick sewer that had been built many years before by the city underneath the street gave way and all the underfilling was washed out and through the sewer about the time the concrete work was begun. The company then had to tear out what it had put in, fill up again, tamp it all down, and the city had to repair the sewer; then the company went ahead. The expense due to this contingency would have been impossible to foresee. In another instance, where the road-bed had been prepared for the construction of track, a roller was used to crush down the surface, and it developed that there was a layer of silt just below the ground, which had to be taken out. It had apparently been an old creek bottom, and many yards of cinders had to be hauled for filling before the surface was ready for the installation of the track. Sewers had broken down a number of times in different places. In a great many cases it was found that pipes were laid closer to the surface than the plans or drawings in the city engineer's office would show. It had also been found necessary at times to ask the gas company to remove its pipes or to change the location of a manhole and the city had often had to change the location of manholes.

On the interurban lines there had been two or three sink-holes and two or three minor contingencies of the same character. In one of the instances mentioned over 60,000 yd. of filling had been placed in a hole 600 ft. long.

In the lower district of the city near the Milwaukee River there was a continual settlement of pavement, tracks and foundation as the ground was very soft. Every now and then this settlement took place to such a degree that the company had to open up the tracks in the pavement and raise them again because they had got into a rut.

DEVELOPMENT OF TRACK AND TRACK CONSTRUCTION

Mr. Simmons then discussed the development of track and track construction within recent years as follows:

City construction, track. When the first electrically operated street cars were installed in Milwaukee it was thought practical to operate on a considerable amount of track which had been laid with the flat strap rail on wooden stringers which had been used originally for horse-car service. When new track was installed for electrical operation at that time a 5-in. 58-lb. tram girder rail was used. After about three or four years and at the time that the present

management assumed control of the property, a little over 11 years ago, the inadequacy of these weights of rail had become apparent. Partly on account of lack of experience it was impossible to arrive at accurate conclusions as to just what materials would give the required service, but another reason was that electrical equipment for the propulsion of these cars developed so rapidly and increased so much in weight within this very short period that a change to a heavier type of rail was found necessary. A Shanghai T-rail 6 in. in height and weighing 60 lb. to the yard was proposed, and this was very shortly supplanted by Shanghai T-rail 7 in. in height and weighing 70 lb. to the yard.

Increasing weights and traffic soon showed these sections to be undesirable, and a Shanghai rail 6 in. in height and weighing 72 lb. to the yard was adopted as standard. For five or six years this section appeared to be adequate, but the weight of electrical equipment, the size of the cars and the number of people carried thereon increased so rapidly that about four years ago it was found necessary to adopt a still heavier section of rail and the company designed and had rolled for its use a Shanghai T-rail 7 in. in height and actually weighing approximately 97 lb. to the yard. This section is the present standard.

Originally the track, even in the paved street, was constructed on a gravel or cinder ballast, but it soon became evident that this style of construction was not equal to the loads imposed on it, and after the present management assumed control of the company it was decided to construct all of the tracks in permanent pavements upon a 6-in. bed of cement, and this style of construction is standard at the present time.

The joints used originally were fish-plates or angle-bars, the latter being a considerable improvement over the former. Both of these, however, have been superseded by the cast-welded joint, which also was made necessary on account of the increasing traffic imposed on these lines.

The cost of installing the pavement in connection with the tracks has been increased on account of the necessity for extremely careful and thorough work, required by increased loads and increased traffic.

Interurban construction, right of way. When the construction of interurban lines was first considered the use of public highways for their installation was deemed to be proper practice. The present management of the company, however, soon decided that the installation as interurban railways on private right of way was the proper method to be pursued, and some of the first lines of this character built by the company were placed on rights of way 30 ft. to 50 ft. in width. There was no law in the State of Wisconsin at that time permitting the condemnation of these rights of way and it was a difficult matter to secure them of any width. The need for wider rights of way very soon became apparent and a law was soon passed by the Legislature which permitted the condemnation of rights of way up to 75 ft. in width, where this might be shown as necessary. It was not long before it was found necessary in order to obtain high speed on modern interurban lines that the same rights be granted for this purpose as were granted to the steam roads; and the law was amended so that the interurban acquired very nearly the same rights as the steam roads. Rights of way are now purchased almost invariably up to the full width of 100 ft. and in many places where deep cuts or high fills are necessary in order to establish proper grades, rights of way much wider than 100 ft. are secured.

Interurban Track. When the first interurban lines were constructed by this company, some 10 years or more ago, a 56-lb. T-rail 4½ in. in height was considered adequate. After a few years' operation, however, the increasing weight of equipment made it necessary to adopt a heavier rail and the 75-lb. A. S. C. E. section was adopted. Some two years ago it was found necessary still further to increase the weight of the interurban rail and an 80-lb. A. S. C. E. T-rail was adopted and is standard at the present time.

The development of the art, which 10 years ago permitted the construction of wooden culverts, cattle passes, bridges, etc., along interurban electric railways, has been such that it is now considered absolutely necessary to employ concrete, stone or other forms of permanent construction, and,

of course, a much higher rate for original investment than for the types previously used.

REPLACEMENT OF RAIL

Under cross-examination by Mr. Manson, the witness, speaking of the headwear of the rail, stated that sometimes where the design of the head of the rail had called for a very thick head it might not be possible to wear it down to 25 per cent, but in other cases where the original head was not so thick it would be possible to wear it down, if the girder quality of the rail was sufficient, to even less than that. The wear of the rail was affected by the character of the soil. In the district where work was being carried on at present the character of the sub-soil was very wet and spongy and nearly the entire rail would be replaced. All replacements of that rail were charged to depreciation.

When a rail wore out in part it was cut and a new piece at least 12 ft. to 15 ft. long was inserted. If the rail had to be replaced because of a flaw, the expense of replacement was charged to maintenance, but the general replacement of rail in a piece of track that had gone down so that it was not in condition for operation was charged to depreciation. The most common experience was to replace rail in from one to three blocks practically in toto. A little piece here and there of a length or two might be all right, but the majority in most instances would have to be replaced. Ties were not always replaced with the rail. Ordinarily the ties in Milwaukee had had a little longer life than the rail. Very often on account of the bad condition of the rail the concrete foundation had become shattered and it was necessary to excavate a portion of it and renew it.

The replacement of rails during the connection of Mr. Simmons with the company had been charged to depreciation reserve; the expense of cast-welding the joints had been charged to depreciation reserve except on new lines constructed or in a few cases where an individual joint had worn out and might be charged to maintenance.

About 50 per cent of the track in the city was on a concrete foundation, the ballast was on crushed stone ballast and in some cases on cinders and gravel.

Mr. Manson asked about the expense of building a mile of track on a stone ballast foundation with 5-in. 58-lb. rail compared with the expense of building a mile of track with 7-in. 97-lb. Shanghai rail on concrete foundation.

The witness stated that there would be the difference in the price of concrete for one item and the essential difference would be in the 61 tons of steel representing the difference in the weight of rail necessary. There would be a little difference in the case of handling the lighter materials as compared with the other, making a minor increase in the expense of labor. A fish-plate joint on an average rail would not cost more than 60 to 75 cents. The angle-bar joint would cost in some cases as high as \$1.50 or \$1.75. In one case the cost had reached \$1.87. The cast-welded joint cost the company anywhere from \$3 to \$3.50.

In making his estimate of \$15,900 for the cost of a mile of new track on a concrete foundation with 97-lb. 7-in. rails, Mr. Simmons figured the cost of rails at \$40 per ton. This estimate was based on the price at which rail was figured during 1908.

It cost more to maintain way over which cars were operated at high speed than where the speeds were lower, not only on account of the greater grinding and wearing effect on the rail while braking, but because the car was more liable to spread the gage than where it was operated more slowly. The cost of maintenance also increased with the weight of the cars.

INCREASED SPEED AND WEIGHT

Commissioner Halford Erickson asked whether increased speed or weight of cars was more damaging to track. The witness replied that both increased the foot-pounds in the blows given by the car and it was almost impossible to separate the two effects. Mr. Manson asked what the difference would be with a 20-ton car if (1) the weight of which was increased 50 per cent, or (2) if the weight was kept the same but the speed was increased 25 per cent. The witness thought that in the cases cited the 30-ton car would be the more destructive, but that if the speed had been increased 50 per cent instead of 25 per cent, the more speedy car would do more damage.

Taking up the direct examination again, Mr. Mack asked if it was not a fact that the cost of welding joints, as stated by Mr. Simmons, was less than the ordinary market cost. The witness thought the cost in the market at the present time would be even more than \$1 above the cost which the company paid; he did not believe he could get any one to contract to weld the joints for less than \$4.50 at the present time. The rail on the city street was very much larger than on the interurban lines on account of the frequent stops in the city. If a motorman using full current in the city had to slow up, even if he did not actually stop the car, it was in effect a stop so far as the track was concerned.

Mr. Curtis asked how the standard of track construction in Milwaukee compared with the best standard track construction in other cities. The witness stated that the track construction in Milwaukee was as good as that in any city of the country where the use of T-rails in city streets was permitted. The interurban track construction was practically up to the best interurban electric railway track construction.

ADDITIONAL TESTIMONY OF EDWIN W. OLDS

The examination of Edwin W. Olds, superintendent of rolling stock, by Mr. Mack, of counsel for the company, was continued on March 29. Mr. Olds, presenting a list of corrections of the inventories of rolling stock and equipment made by Mr. Gore, accountant for the city, stated that the Gore inventory was nearly correct and that he thought the errors had been caused by mistakes in copying and misunderstanding the inventory. The following statement on this subject was presented by Mr. Olds:

CHANGES IN INVENTORY

Our first inventory was Jan. 1, 1898. At the time I took hold of the department, Dec. 15, 1896, there were 192 closed cars. Between that time and Jan. 1, 1898, there were scrapped or sold 43 of the old type of cars, there being shown on the Gore inventory, built prior to 1896, 125 single-truck cars and two double-truck closed cars. A number of these 43 cars were sold for children's play-houses and cottages, and used at different places, some of them at Waukesha Beach. A few were sold to small railroads and continued in use as street cars. About 20 or 25 were scrapped.

The average value of single-truck cars in 1898, as shown on the inventory, was about \$650 each. This inventory being taken Jan. 1, all of the closed cars were equipped with motors, which makes their value more than the single-truck open cars. It must be remembered that at this time the motors and trucks were changed from open cars to closed cars in the fall and back to open cars in the spring, so that the value of closed cars would be, as previously stated, more in winter than in summer.

In 1906 you will note that but 42 single-truck closed cars were still owned by the company. My judgment is that about 40 of the cars disposed of were scrapped, the balance, as previously stated, sold at prices ranging from \$50 to about \$300 for bodies alone, with trucks from \$175 to about

\$400, with electrical equipment complete from \$350 to \$1,000. The cars sold for about \$1,000 were of the better class and more modern motors, average prices being about \$500 complete with trucks and motors.

Single-truck open cars, as shown by Gore inventory, 1898, 130, this number being reduced to 80 in 1906. But few of the open cars were scrapped, most of them being sold to small roads at prices varying from \$100 to \$300 for bodies alone, with trucks \$175 to about \$400, with electrical equipment complete from \$350 to about \$600. A few which had been rebuilt with more modern motors were sold at a better figure, or about \$1,000 each. I cannot give the original cost of the single-truck closed and open cars at the time they were purchased. Judging, however, from values at that time, their cost would average for bodies and trucks about \$1,200 each, with electrical equipment from \$2,000 to \$4,000 each. None of the old single-truck closed cars or open cars had been in regular service for five or six years, and were not used at all for about four years.

All of the single-truck closed cars in use at the time I took hold of the department, Dec. 15, 1896, had been rebuilt by the company putting on larger platforms and vestibules or windbreaks, as required by city ordinances, at a cost of from \$200 to \$300 per car. Changes had also been made in all of the motors, rewinding the fields and a large number of armatures, putting on new controllers, costing from \$300 to \$500 per car.

There are shown on the Gore inventory, in addition to those purchased from car builders, car purchased from the Milwaukee, Racine & Kenosha Company, Belle City Company, of Racine; Waukesha Beach Company, Waukesha; Wauwatosa Company and Whitefish Bay Company. Some of these cars were overhauled and rebuilt, equipped with motors and put into city service for a few years, but have been out of service for the last four or five years. At the present time some are being used by the way department for transporting track laborers and as bunk cars, but are of little value. The values as shown on Gore inventory of these cars were made up from our best judgment, after they had been rebuilt and overhauled, so that they could be used by the company, at a cost of from \$100 to \$1,000 each. Seven of the double-truck cars purchased from the Milwaukee, Racine & Kenosha Company were sold to small roads, some being sold with motors, some without.

The first value for each car as shown on Gore inventory of all cars purchased from 1897 to 1906 is the purchase price from the car builders, electrical equipment builders, and, added thereto, this company's cost for installing the electrical equipment, fenders and other miscellaneous parts, including superintendence while the cars and equipment were under construction at the manufacturer's. Subsequent valuations are reduced for depreciation, but with allowance for improvements and any reconstruction.

Cars purchased from 1896 to 1898, inclusive, were constructed without closed vestibules—that is, were without doors at the platform steps and in front of the motorman, the sash being constructed so that it could be removed in summer. These cars were all changed, there being constructed stationary vestibules with doors over each step, as is our standard practice. The cost for this work was about \$400 per car.

The cars purchased in the years 1897 and 1898 were equipped with two motors, which was not found satisfactory. Two additional motors were installed with new controllers, wiring and other electrical appliances, also making necessary changes in trucks, changing them to four-motor standard equipment. The cost of these changes was about \$2,000 each.

The cost of those purchased from 1899 to 1906, inclusive, as shown on Gore inventory and previously explained is practically correct, being made up same as with the previous equipments purchased, from the price paid the several manufacturers and the cost to this company of installing motors, fenders and other appliances, including superintendence.

Following the presentation of this statement by Mr. Olds, the cross-examination was begun by Mr. Manson.

TESTS TO SHOW CURRENT CONSUMPTION

Mr. Olds mentioned tests that had been made by the

company to show the energy required to propel different weights and sizes of cars. It varied practically in proportion to the weight of the car. The tests were made under the joint supervision of Mr. Olds and Otto M. Rau, chief electrician. The wear on a car equipment and life of a car are affected by the condition of the road, number of stops and other factors which cause strain on the car structure and equipment. Mr. Olds said that, as a rule, a car body would last about 12 years; it could be kept in service for a longer period, but excessive maintenance would then be required. In his estimates of the proper rate of depreciation on car bodies he had assumed that cars should be maintained and kept in service only so long as it was economical to do so.

ADDITIONAL TESTIMONY OF OTTO M. RAU

On March 29 Otto M. Rau, chief electrician, on cross-examination, amplified his previous testimony that the annual allowance on poles and fittings due to age and wear should be 5 per cent, based on an estimated life of 20 years. Mr. Rau said that in making this calculation the entire equipment of poles was considered. He testified that probably 70 per cent of the poles in Milwaukee are of iron, the rest are of wood. Most of the wood poles are of cedar; 60 per cent of the iron poles are lattice, the rest tubular. A wood pole will last from 12 to 15 years and will cost from \$8 to \$15, depending on the length. An iron pole lasts about 25 years and costs about \$25. The cost for setting either is \$5 to \$6, including the foundation, as both iron and wood are set in concrete. The first of the iron poles were installed about 1890, Mr. Rau believed, and had been found to be too light. Originally lattice poles were used. The company is now setting heavier tubular poles, and any present replacement would be with such poles.

Since Mr. Rau's connection with the property, which was from the conversion from horse to electric power, the company had used for trolley wire No. 4 wire, No. 0 wire and No. 000 wire. The latter would be replaced by No. 0000 as soon as heavier equipment was placed on the system.

PRICE OF SCRAP COPPER

The price of scrap copper depended upon the scarcity of ingot copper. There was a time when ingot copper was as high as 20 cents a pound, and then practically the same price could be secured for scrap. Now that copper was down in price it was not possible to dispose of scrap at all; nobody cared to buy it. The points of greatest wear of a trolley wire are at its points of support. When its area at such places has been reduced 25 per cent, it is necessary to take the wire down, even if between supports it is almost unworn. The life of trolley wire varies almost directly with the number of cars using it. There are curves in Milwaukee where the wire has lasted less than a year; in others the wire has lasted five years.

Mr. Manson asked whether, in making the estimate of an allowance of 20 per cent annually for depreciation due to age and wear of copper wire, Mr. Rau had taken the scrap value into consideration. Mr. Rau stated that this value was not considered because the cost of taking the old wire down usually consumed the amount realized from the scrap.

It would cost approximately \$25 for labor to take down the wire on an intersecting curve, that is, a curve with a cross over. To take down a wire on an intersection of this nature would require two line crews of six men. The cost of taking down 1000 ft. of straight line wire might be figured at about \$6.

UNDERGROUND SYSTEM

The underground feeder system in Milwaukee is laid with clay ducts, which are subject to very little wear, but settling of the soil sometimes affects the alignment of the ducts, admits water, and thereby causes some deterioration. The cost of laying tile duct in concrete is from 20 to 40 cents a foot, depending upon the paving of the street and the condition of the soil. Most of the conduit is from 3 to 4 ft. below the surface of the street, but where other street mains had been encountered it had been necessary sometimes to go as far down as 20 ft. The cost of laying the conduit, exclusive of the cost of excavating, would depend on the cost of the conduit; the company had paid as high as 8 cents a foot and as low as 4 cents a foot for the tile duct. With two ducts the cost of the concrete had run as high as 12 cents per foot of duct. When a six-duct or ten-duct conduit was laid, the cost for the concrete would run as low as 4 or 5 cents per foot of duct. Six inches on the bottom, 3 in. on each side and 3 in. on the top was required. The ducts were about 4½ in. square outside.

The drainage work was figured at 10 cents a linear foot for a trench 3 ft. deep and about 1 ft. wide. That included all the excavating and filling, but not the paving. Mr. Rau estimated the life of a lead cable at from 18 to 20 years ordinarily. Age disintegrated the lead coverings of the cables so that they deteriorated and ceased to be waterproof. The company limited the number of wires in the cables to 60 wires. The cables had been bought for 80 cents and for as high as \$1.30 per foot, depending upon the price of copper. No duct contained more than one cable.

The scrap in cables was of very little value on account of the expense of cutting it out. First, the lead had to be taken off and then the insulation, and by the time the copper was reached very little was left. It was assumed that any scrap removed was offset by the cost of removing.

Mr. Manson asked whether the life of a cable was 20 years, and 5 per cent was estimated per annum for depreciation due to age and wear, no allowance being made for scrap. Mr. Rau said that this was so, and that no allowance had been made for removing the material. The company had sold scrap cable and had received for it about one-half the scrap value of scrap copper. It ought to cost about 4 to 5 cents a foot to remove a cable from the duct, depending on the condition.

CURRENT TRANSMISSION AND CONSUMPTION

The witness said that the amount of energy required increased rapidly with the speed of the cars. For double the speed three or four times as much energy would be used in the operation of the cars. Differences in live load were almost negligible in their effect on the total energy consumption, except that when more people were taken on a car more frequent stops were required, and energy was again required to accelerate the car. Under maximum load at the power house the company assumed a loss of 10 per cent in transmission.

The cost of charges in the overhead system was brought up by Mr. Manson. Mr. Rau stated that the replacement of any considerable extent of trolley wire was charged to depreciation reserve. When the wire broke and only a span was replaced the cost was charged to operating expense.

Mr. Curtis, examining Mr. Rau, stated that the attention of the witness had been called to certain matters by counsel for the city, as tending perhaps to affect the question of depreciation. He asked whether Mr. Rau desired to modify in any respect his statement regarding depreciation of

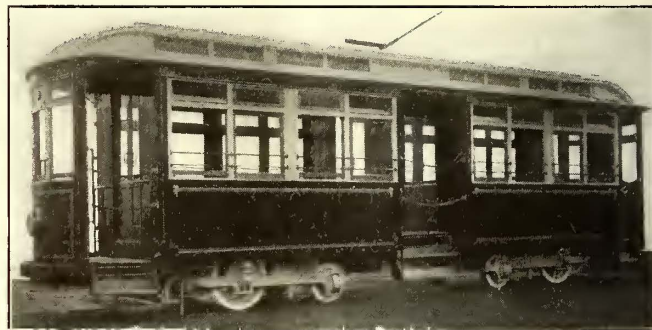
property in his department. The witness did not desire to make any modification; the percentages as given originally were considered very carefully and based on his own experience.

Mr. Mack, taking up the examination of Mr. Rau, referred to the abandonment of the a.c.-d.c. system, and asked whether one of the reasons for the abandonment was the large current consumption required. Mr. Rau said that the current consumption was not excessive. It was not practicable to keep any record of the amount of current used on the different lines.

ELECTRIC CARS FOR SOUTHERN MANCHURIA

The peaceful trolley car already has found a place in Southern Manchuria, which but a few years ago was the scene of the Russo-Japanese war. Thirty handsome cars of the type shown in the accompanying illustration are to be used there on the lines of the South Manchurian Railway, and they are now on the way from the United Electric Car Company, Ltd., of Preston, Lancaster, England.

The cars are 27 ft. 6 in. over the corner posts, 34 ft. 8 in. over the platforms and 35 ft. 8 in. over all. The width over the body is 7 ft. 8 in. and over the roof 8 ft. The clear height inside the car is 8 ft. 7 in. and from the rail to the roof 12 ft. The car seats 32 passengers. A striking feature is the division into first and second-class compartments by an inside platform 4 ft. wide. Special



Central-Entrance Car for Southern Manchuria

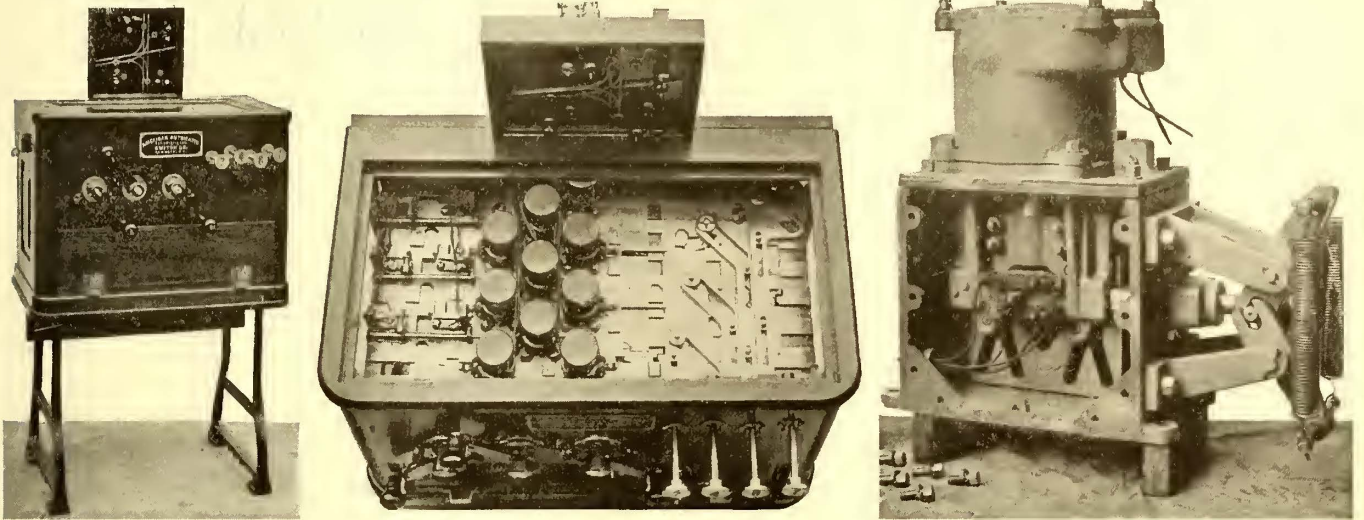
side sills were required, as the steps to this platform were not to project outside the car body. In addition to the central entrance, the car is provided with end doors, which, like the others, are of the double sliding type. The inside finish throughout is of oak and North Carolina pine, with the roof boards exposed. The first-class compartment is furnished with reversible cross-seats upholstered in green mohair velvet, and the second-class compartment with longitudinal slat seats. Instead of placing ventilators in the clerestory, individual louvers are used over each window. The side sash are arranged to drop into pockets. The trucks were supplied by Mountain & Gibson, of Bury, England, and the electrical equipments by the Allgemeine Electricitäts Gesellschaft, Berlin, Germany.

The first electric car was run on the tramway lines of Rangoon, Burma, on Dec. 15, 1906, and the electrification of the system was completed in March, 1907. Many new sections have since been opened. The total number of passengers carried in the year ended Dec. 31, 1907, was 6,026,915, as against 3,433,540 in the preceding year. The car-mileage was 973,187, and receipts \$189,000, as compared with 328,180 car-mileage and \$90,000 receipts during 1906.

**IMPORTANT AUTOMATIC SWITCHING INSTALLATIONS
IN WASHINGTON, D. C.**

Because of the erection of the new union railroad station in Washington, D. C., the two electric railways of that city constructed during 1908 about 2 miles of tangent and curved track on the station plaza and approaches. This work was carried out by a board of construction composed of D. S. Carll and J. H. Hanna, respectively

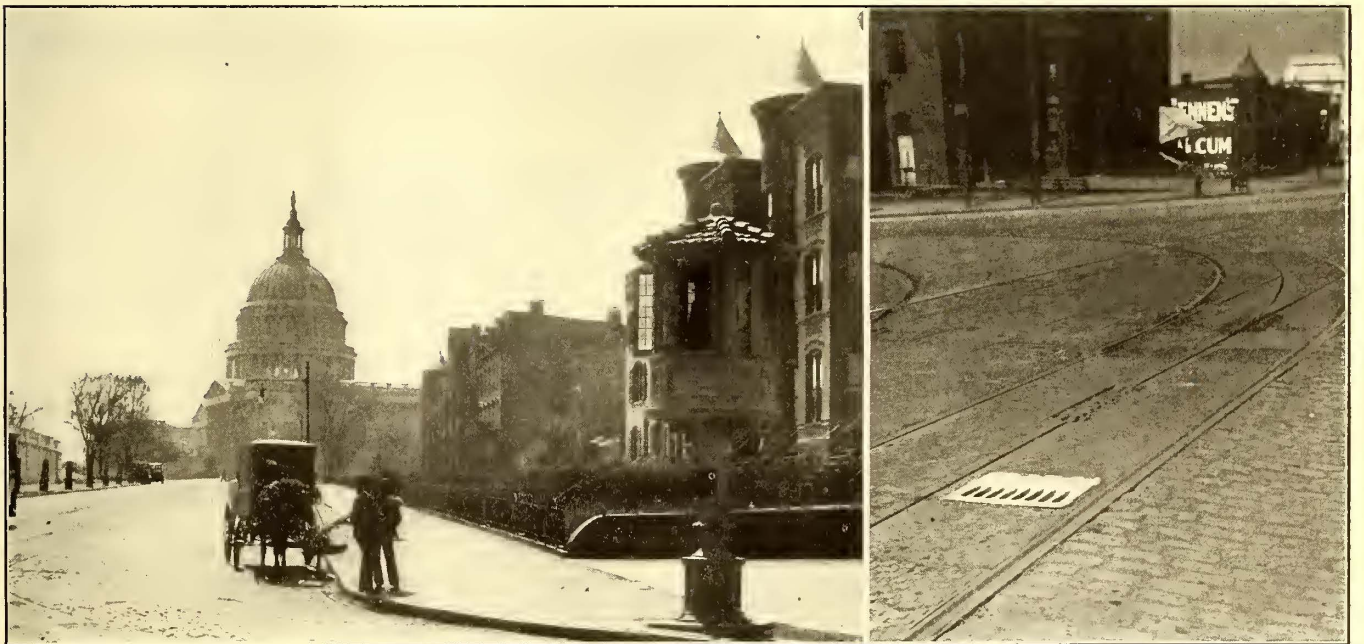
men and one flagman, but after a few months of operation by hand switching, it was decided to install a comprehensive electro-mechanical interlocked switch and signal system built by the American Automatic Switch Company, of New York, and devised by Roy V. Collins, chief engineer of that company. The new system was placed in service during the extraordinary traffic succeeding the Presidential inauguration in March, and has been in continuous operation ever since, without mishaps of any kind.



Washington Electric Switching System—Exterior and Interior Views of Tower Control Cabinet and Switch-Throwing Mechanism

general manager and chief engineer of the Capital Traction Company; H. W. Fuller and C. S. Kimball, respectively general manager and engineer maintenance of way,

Experience with this automatic method of car control brought out clearly several advantages over hand switching. In the first place, the only visible features of the in-



Washington Electric Switching System—View of a Switching Tower and Grating over the Protected Signal Lamps Under the Tracks

Washington Railway & Electric Company, and William B. Upton, engineer of the board, but not otherwise connected with either company.

It was realized that the problems of switching cars properly would be a serious one, inasmuch as the new lines led to the greatest traffic center of the city. At first, car movement was controlled by two shifts of three switch-

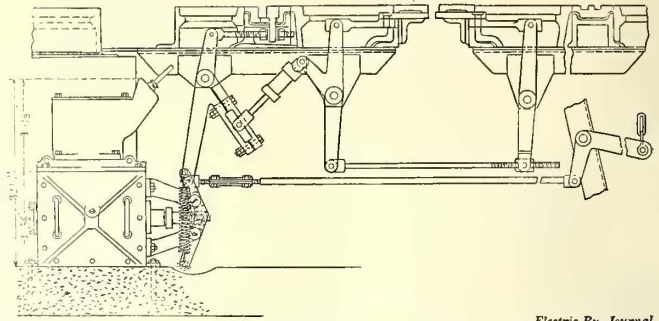
stallation are the five switching towers, which are decided ornaments to their surroundings. These towers take the place of the less ornamental shelters for switchmen and avoid the necessity of having flagmen standing in the roadways, where they cannot help being a hindrance to traffic. From engineering and financial considerations, however, the greatest advantages of this electric switch-

ing plan are quicker car movement, greater reliability through interlocking and saving in operating cost. Quicker car movement is permissible through an arrangement which permits the towerman to send two, three or four cars to the crossing at once, merely by touching some buttons, whereas a flagman would have to wave each car separately. Greater reliability is attained by an interlock, which prevents the towerman from making a mistake, while a flagman is liable to signal forward several cars to a point where they may collide, or else the motorman may err in reading the flag signals. As to the saving in operating cost, it has been found that one man can now carry out the movements formerly entrusted to four men.

LOCATION AND CHARACTER OF SWITCHING TOWERS

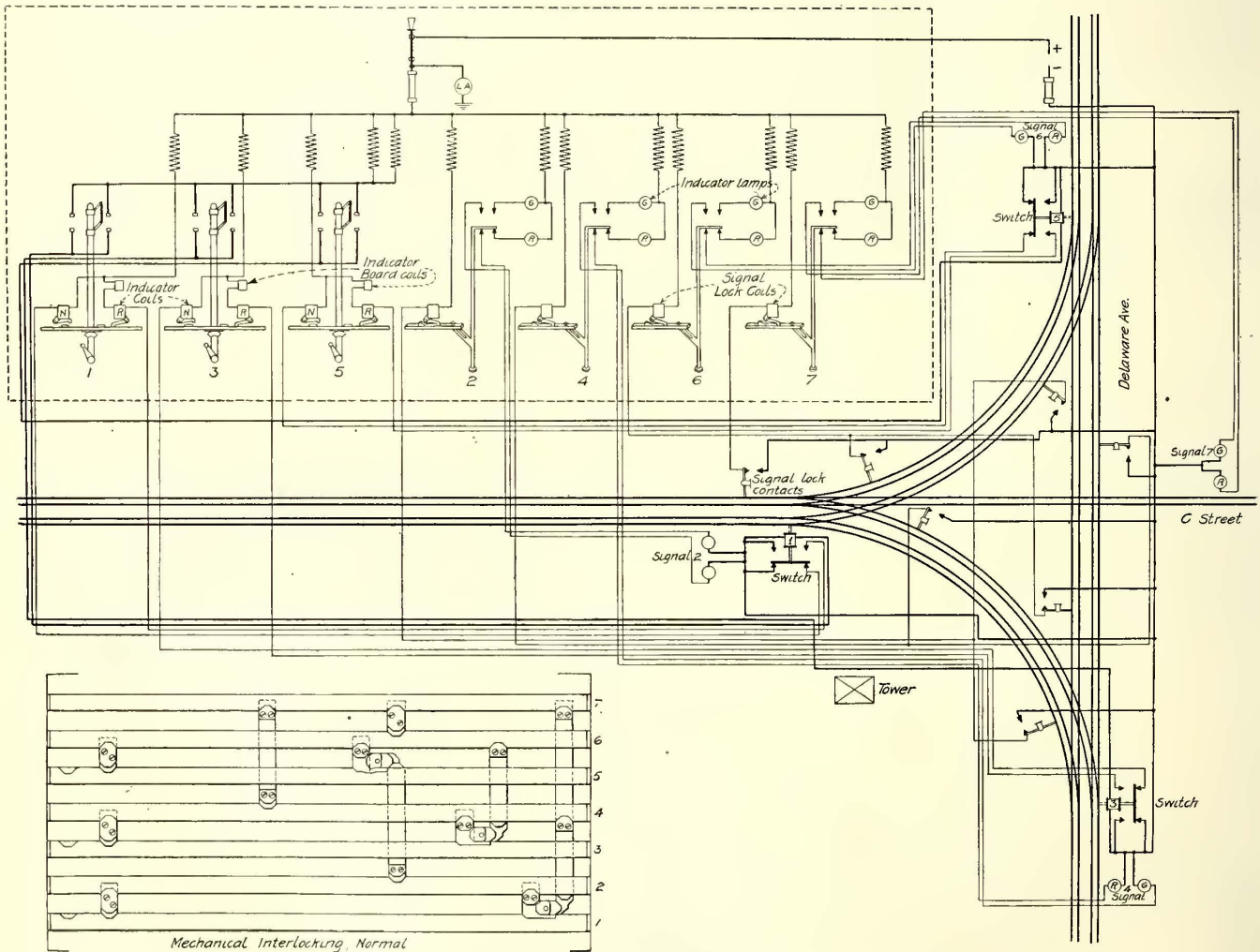
The electric switches are controlled from five towers located as follows: Delaware Avenue and C Street; Union Station Plaza, West; Union Station Plaza, East; North

mun inside measurement of 4 ft., and are handsomely finished in bronzed copper to harmonize with the architecture of the union railroad station. They are carried on in-



Electric Ry. Journal

Washington Electric Switching System—Connections to a Track Switch



LOCKING SHEET.

Normal position of switches is when the switch is set to send car to right.
Reverse position of switches is when the switch is set to send car to left.

When No. 1 is thrown No. 2 is locked at normal.
When No. 3 is thrown No. 4 is locked at normal.
When No. 5 is thrown No. 6 is locked at normal.
When No. 2 is at clear No. 1 is locked at normal.
When No. 4 is at clear No. 3 is locked at normal.
When No. 6 is at clear No. 5 is locked at normal.
When No. 1 is at normal No. 2 locks up No. 6 if No. 5 is reverse.
When No. 1 is at reverse No. 2 locks up No. 4, No. 7 (and No. 6 if No. 5 is reverse).

When No. 3 is at normal No. 4 locks up No. 7 (and No. 2 if No. 1 is reverse).
When No. 3 is at reverse No. 4 locks up No. 7, No. 6 (and No. 2 if No. 1 is reverse).
When No. 5 is at normal No. 6 locks up No. 7 (and No. 4 if No. 3 is reverse).
When No. 5 is at reverse No. 6 locks up No. 7, No. 2 (and No. 4 if No. 3 is reverse).
When No. 7 is given No. 4 and No. 6 are locked (and No. 2 if No. 1 is reverse).

Washington Electric Switching System—Typical Track Layout at Delaware Avenue and C Street, with Wiring and Locking Sheet Therefor

Capitol Avenue and Massachusetts Avenue; First Street and B Street, N. E. The positions of these towers and under-track apparatus are shown on the track layout on page 737. The towers are octagonal in shape, with a maxi-

conspicuous ornamental iron columns set on a granite base with anchor bolts embedded in concrete. The columns are hollow and contain the wiring conduits between the controlling and switching mechanisms. The towers are

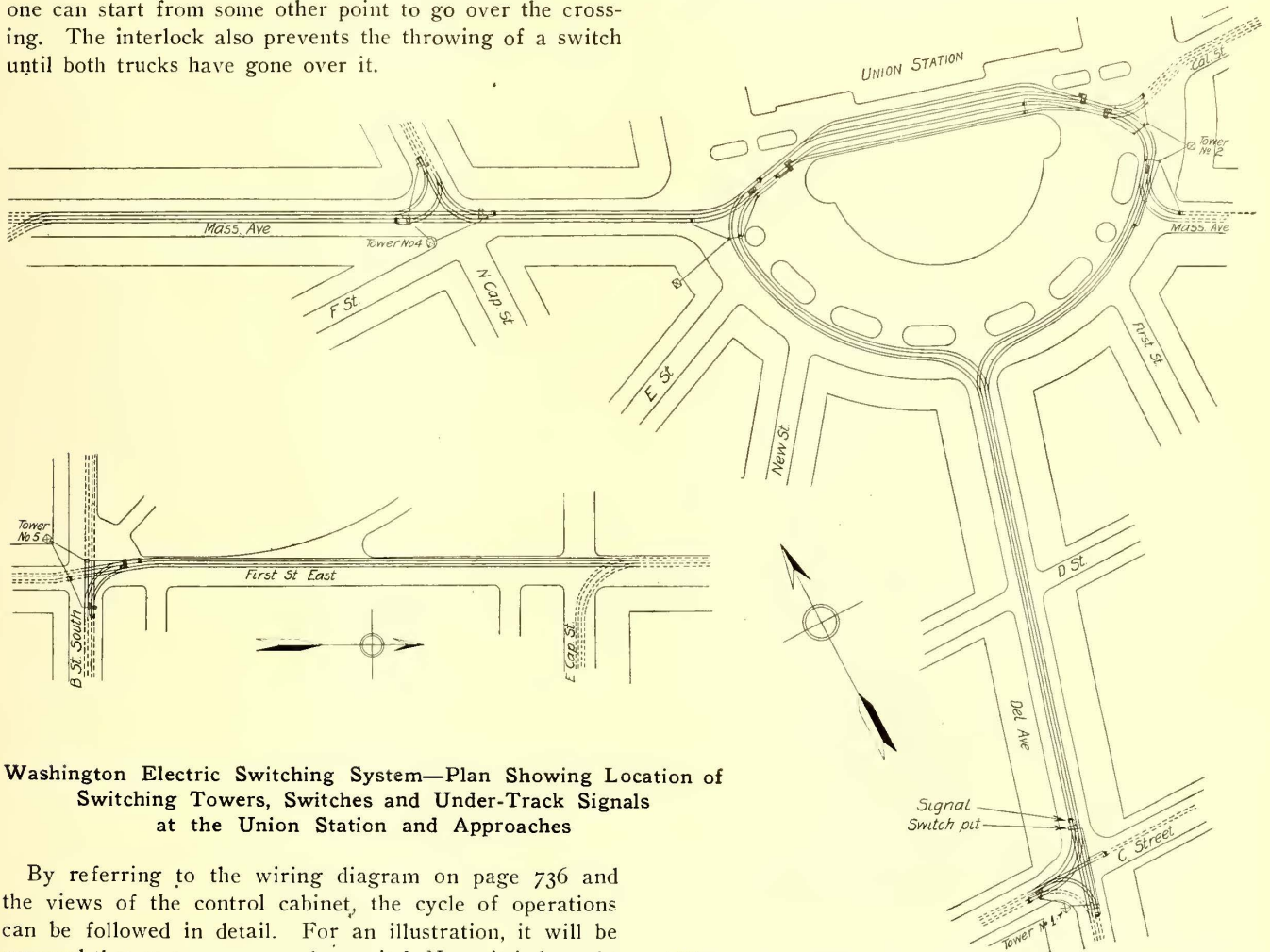
reached by concealed steps in the columns and a trap door. These structures are about 8 ft. above the curb, so that the towerman can watch the tracks freely without obstructing the views of pedestrians. As the several installations differ only in a few details, the following description of the apparatus at Delaware Avenue and C Street will suffice to explain this method of switching and signalling.

OPERATION OF APPARATUS

The switches and signals are controlled from the tower cabinet, which is supplied with a miniature track and signal layout for the towerman's general guidance. The handles of the cabinet are electro-mechanically interlocked to prevent the sending of cars into a crossing where they could collide, the arrangement being such that one car must be entirely past a given point before the second one can start from some other point to go over the crossing. The interlock also prevents the throwing of a switch until both trucks have gone over it.

giving a signal for the car to proceed into a switch which has not completed its throw.

The circuit to the solenoid which throws the track switch is controlled by a magnetic blow-out, quick-break switch mounted in the cabinet. This switch has two contacts on each side, and when either pair is bridged by a pivoted conductor between, the circuit to the solenoid is completed. When the cam attached to the shaft rotated by the switch control handle has made about one-quarter of its stroke, it engages the top of the pivoted conductor and forces it to bridge one pair of the contacts. The cam engagement ceases at three-quarters of the stroke, when the pivot contact is pulled back by springs to its normal vertical position. The movement of the handle in the opposite direction simply causes the pivot conductor to make and break with the other pair of contacts.



Washington Electric Switching System—Plan Showing Location of Switching Towers, Switches and Under-Track Signals at the Union Station and Approaches

By referring to the wiring diagram on page 736 and the views of the control cabinet, the cycle of operations can be followed in detail. For an illustration, it will be assumed that as a car approaches switch No. 1 it is brought under control and stops at the motorman's sub-track signal No. 2, marked G and R. This signal consists of one red and one green electric light placed in a waterproof, glass-covered case under a slotted handhole, through which the motorman can see the lamps. The normal indication is red or "stop."

If the switch lies against the car, the towerman starts to rotate that cabinet lever which controls the switch-throwing mechanism. The contact thus made completes a circuit to the solenoid actuating the switch. When the stroke is a little over half completed, the lever is arrested by the latch of one of the two return indication magnets. This latch is lifted after the track switch has completed the movement, when the control lever can be sent to the end of the stroke. This feature prevents the towerman

When the switch has been thrown, the towerman presses the lever controlling the No. 2 signal. This lever will move inward, provided it is not locked through the towerman having given a conflicting route to another car. At the start of the stroke the circuit to the red light is broken, and at the end of the stroke the circuit to the green or "proceed" light is made. When the stroke is completed a latch drops and locks the signal lever in the reverse or "clear" position. This signal lever is worked against a compression spring which forces the lever to its normal position when the signal lever latch is lifted. As the car passes out of the crossing, its plow actuates a signal lock contact, which completes a circuit through the signal lock coil. The latter coil lifts the latch on the signal control lever, allowing the lever to return to its normal position.

The manner of attaching the actuating mechanism to

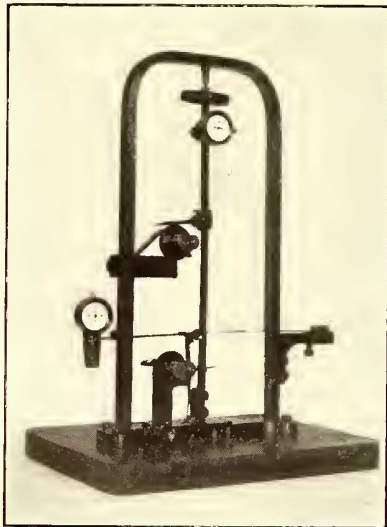
the track switch is shown in one of the illustrations. This device is operated by a solenoid, and by means of a reversing cam plate movement is given to the switch, first in one direction and then in the other.

The mechanical interlocking makes it impossible to give the motorman the "clear" signal until the switch is in a safe position, and does not permit the switch lever to be thrown until the car is over the crossing and the signal lever is restored to normal. The several interlocking combinations are shown on the diagram. The interlocking required here is different from regular steam railway practice in that one green light is given for the car to proceed, whether the switch lies to the right or to the left, while in steam practice one signal is given to proceed to the right and another to the left. This requires different interlocking when the switch sets one way than when it sets the opposite way, and is accomplished by the swinging latch shown on levers Nos. 1, 3 and 5, which carry out the additional locking when the levers are reversed.

INSTRUMENT FOR TESTING TRACK

The Pennsylvania Railroad Company and various subsidiary companies will this year award nearly \$11,000 in prizes to employees for excellence in track maintenance. Of this sum \$5,400 will go to supervisors and their assistants on the main line between New York and Washington, and Philadelphia and Pittsburgh. The purpose in offering these premiums is to encourage those in charge of the tracks over which the bulk of the company's passenger trains run to keep their sections as free as possible from low joints and other irregularities. To test the track, a

committee of maintenance of way officers goes over the line every few weeks during the year in a car attached to one of the regular high-speed trains. Two glasses of water are placed on the sills of two rear windows, and every spill of water is counted against the score of the section of track over which the train is passing. An instrument has also been specially designed to register every vibration of the car, either vertically



Instrument for Recording Rough Track

or horizontally. This instrument, which is placed on the floor of the car, has two stems of flexible steel, with a weight on the end of each, so that they vibrate, one vertically and the other horizontally. The movements of the stems are recorded by pedometers, giving the number of vibrations, while cyclometers record the entire distance covered by the vibrations for the trip. Thus a severe vibration gives a greater cyclometer record than a slight irregularity. When the record made by this instrument is averaged with the number of pedometer readings and "spills" of water, and some allowance made for relative speeds, a fairly accurate estimate is had of the riding qualities of the various sections of track. Upon the records so obtained the prizes are awarded.

CALIFORNIA 1200-VOLT D. C. LINE

In a paper read on Feb. 26 before the San Francisco section of the American Institute of Electrical Engineers, S. B. McLenegan, general manager of the Central California Traction Company, presented a description of the 1200-volt d.c. system used by that company between Stockton and Lodi. This road is now 15.5 miles long, but several extensions are planned. The standard car equipment consists of four 1200-volt GE-205 motors rated at 75 hp each. They are geared 23:51 for passenger service to make a maximum speed of 50 m.p.h. and 16:58 for freight cars. An empty passenger car with this electrical equipment weighs about 35 tons. For 2 miles from the center of Stockton the cars are operated on 550 volts at a maximum speed of 22 m.p.h. On the right of way current is collected at 1200 volts from a third-rail. The latter differs from the conductor rails on other California lines, as it is of the New York Central type except that a 40-lb. section of 400,000 circ. mil capacity is used instead of a bullhead conductor. This rail is suspended every 12 ft. from malleable-iron brackets spiked to 10-ft. ties. Mr. McLenegan stated that he did not consider the present wooden covering sufficiently durable to withstand the alternate wet and dry seasons of California, although there has been no trouble thus far. He recommended for future protection an impregnated covering of ordinary rough lumber cut in 3-in. and 6-in. widths in lengths to suit the distance between insulators.

The substation is equipped with motor-generators which have been fitted with fibrous barriers between the brush-holders.

Probably the most distinctive feature of the 1200-volt car equipment is the dynamotor, the armature of which carries a commutator on each end of the shaft. The motor or 1200-volt end takes current direct from the third-rail and the other generates and delivers 600 volts for the operation of the auxiliary equipment. The armature coils for the 1200-volt end are on top while those connected with the 600-volt end are on the bottom of the same slot. The dynamotor has a rated capacity of 10 kw and the current generated operates the motor-control circuit, lights, air compressor and heaters. The dynamotor contactor box adjoining contains one 600-volt and one 1200-volt contactor, which control admission of current to the dynamotor or the reverse, according to the section of the line in which the car is operating and the voltage employed. When the car passes from the 550-volt to the 1200-volt section there is a short stretch of dead trolley, in passing under which the 550-volt contactor drops out automatically. When the third-rail shoe makes contact with the electric rail the 1200-volt contactor closes, causing the dynamotor to start and thereby furnish current for the auxiliary circuits. When the conditions are reversed and the car passes from 1200-volt to 550-volt circuits the 1200-volt contactor opens automatically and the dynamotor ceases to operate as the auxiliaries then take current direct from the trolley. In this case, however, the motorman closes the 550-volt contactor by means of an electrically operated switch in the cab before the trolley current is available. Both contactors cannot be closed at the same time so long as they are in operating condition. In passing from either trolley to third-rail, or vice versa, the motorman also throws an electrically operated transfer switch. This device admits current from either the trolley or third-rail and cuts off the one not in use. Both of these movements are made while the car is under full speed. The usual form of the Type M control is used. All wiring

is in loricated conduit. The motor leads are encased in brass wire armor, but the author considered it doubtful whether this is advisable as shorts may be caused by their chafing through the insulation. Good rubber hose is preferable for this purpose and in the speaker's experience it has given the best results.

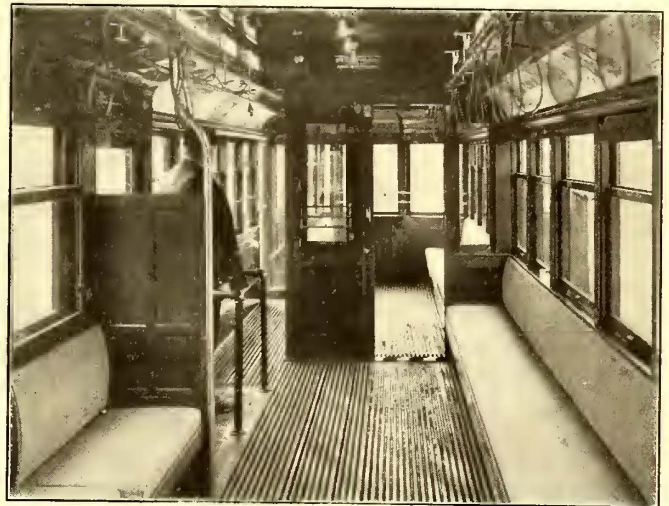
The installation so far had proved very satisfactory. Mr. McLenghan did not consider 1200-volt motors adapted or necessary for ordinary street railway transportation, but they were desirable for interurban roads 25 miles or upward in length. The constructed portion of the Central California Traction Company is hardly of sufficient length to indicate the motor's efficiency, but with the extensions planned there is every reason to believe that the results will amply justify the continued use of the 1200-volt equipment. The company was given an excellent opportunity to make tests of the comparative efficiency of GE-73 railway motors temporarily supplied to operate at 550 volts and the GE-205 at 1200 volts, both motors having the same rated capacity. A temporary substation was also equipped on the site of the future 1200-volt station. This combination supplied identical conditions except that the generators of the Stockton substation operated in parallel with the interurban plant, which gave 550-volt operation every advantage. Under these conditions the power consumption per car-mile for a period of six months averaged 5.23 kw-hours. With 1200-volt operation during the following six months the power consumption per car-mile fell to an average of 4.74 kw-hours, a saving of 9.1 per cent despite the fact that the 1200-volt generators were not working at the most efficient point. During fully one-third of the time the machines were without load and during the remainder the load was hardly one-half the rated capacity of the machine. The power consumption was measured on the a.c. side of the motor-generators, so the foregoing figures include not only generator, third-rail and track losses, but the power consumed at the car. It required about 150 amp at 1200 volts to start and accelerate a given car, gradually dropping back to 70 amp at full speed.

An important factor in the use of 1200 volts lies in the elimination of substations on lines of considerable length. The cost of operating a substation, exclusive of interest and fixed charges, is about \$300 per month, and when once established this expense becomes practically a fixed charge. If, therefore, one substation operating at 1200 volts can be

weeks, was a hard test for this new equipment, yet after a daily run of 200 miles or more every day in the week the temperature of armatures and fields rarely exceeded 150 deg. Fahr. According to this the insulation should last almost indefinitely. During the winter it was necessary at times to operate in places where tracks were covered with water to a depth of 5 in. or 6 in. While ordinary prudence was observed under these conditions, no special precautions were taken other than to provide against wheel wash and to run slowly. Under both extremes of heat and cold the 1200-volt equipment gave less car failure than the speaker had ever experienced during his connection with electric railway work. Not a field armature or other electrical part was lost by a burn-out or any other cause.

PREPAYMENT CAR OF CORRIDOR TYPE TRIED IN PITTSBURG

On April 8 the Pittsburg Railway Company placed in service a new form of prepayment car, invented by Charles B. Price, Pittsburg, Pa., and built for him by the Niles



Pittsburg Corridor Prepayment Car—Conductor at Exit Facing the Entrance Aisle

Car & Manufacturing Company, Niles, Ohio. As shown in the accompanying views and plan, the unusual features of this car body for city service are the elimination of



Pittsburg Corridor Prepayment Car—Entering at the Rear and Leaving at the Center

made to perform the same work ordinarily requiring two 550-volt or 600-volt stations and at the same time effect a saving of from 10 per cent to 20 per cent in power, it will best show the value of this new system. The summer heat, which varied from 90 deg. to 105 deg. Fahr. for

platforms, the presence of a side corridor through which passengers must go before paying fare and entering either compartment, and the central exit under the immediate control of the conductor.

The car is for single-end operation. It is 43 ft. long

over all, 8 ft. 1 in. wide and has a monitor deck and steam coach hoods. The interior finish is of cherry, and the longitudinal rattan benches seat 50 passengers. The weight of the car body alone is 16,280 lb., which is asserted to be 15 per cent to 20 per cent less than long-platform cars of similar length and smaller seating capacity. The trucks were furnished by the St. Louis Car Company, and, like a

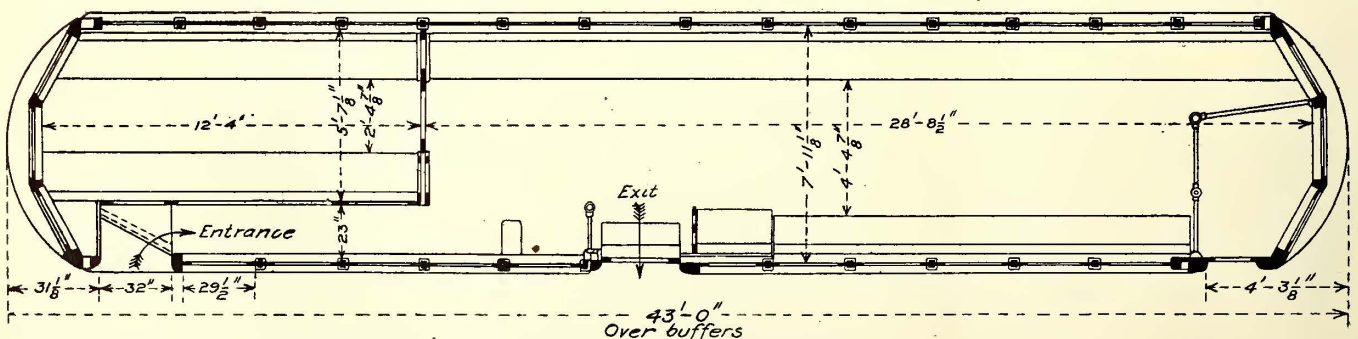


Pittsburg Corridor Prepayment Car—Illustrating the Positions of the Motorman and a Departing Passenger

number of other cars used in Pittsburg, are supplied with connecting rods.

Since the car has no platforms or vestibules, the motorman stands inside, but a protective railing saves him from jostling by passengers. The regular exit is at the center of the car, so that the motorman is obliged to watch the 20-in. exit door at his end only when the conductor opens it in emergencies.

Persons boarding the car enter at a 32-in. opening in the rear, and then proceed along a 12-ft. x 23-in. corridor between the side of the car and the partition of the smoking compartment. As they reach the end of the aisle they pay their fare to the conductor stationed near the exit, and then proceed into either compartment. The regular exit door is of the pneumatic sliding type and is 32 in. wide. It is believed by the designers of this car that the



Pittsburg Corridor Prepayment Car—General Plan, Showing the Entrance Aisle, Central Exit and Division of the Body Without Platforms

central door will aid the unloading materially, because passengers will not have to push their way through the entire length of the car. Aside from its novel features as a prepayment car, the closed ends of this design have greatly simplified the problems of heating and ventilation.

A gasoline weed burner is being operated on the suburban right of way of the Los Angeles-Pacific Company.

THE 600-VOLT LIGHTING SYSTEM WITH GROUNDED CIRCUITS USED BY THE BROOKLYN RAPID TRANSIT COMPANY

Particular interest is attached to the 600-volt series lighting practice of the Brooklyn Rapid Transit Company inasmuch as standard lighting apparatus is designed for straight 110-volt or three-wire, 220-volt systems, while at the same time this company has exercised great care in eliminating fire risks from electric circuits in its shops, car houses and offices. All of the contracts made for such lighting demand that the work shall be done according to the regulations of the New York Board of Fire Underwriters and the New York Department of Water Supply, Gas & Electricity. The following typical details were embodied in the wiring specifications for the line and track department headquarters of the Brooklyn Rapid Transit Company.

CONDUITS

In general all work is of 600-volt series railway lighting and is run in conduits; all wires are Okonite or equal thereto. The conduits are of iron or steel material known as "Galvaduct" or an equally good brand approved by the engineer of the company. The inner surfaces of the conduit are smooth and free from blisters, burrs or other imperfections. The conduits are of ample size to permit wires to be withdrawn and reinserted whenever desired. No conduit smaller than 1/2 in. diameter is employed and 3/4 in. diameter is specified if it is laid in concrete.

The conduit is perfectly water-tight and put up without fish wires or leads of any kind for pulling in wire. All joints are made with whitelead and the ends of the conduit must butt together squarely and not leave openings between the ends. The ends are reamed carefully before the joint is made. Unconcealed conduit is painted to match the prevailing color of the room. Fire-alarm, telephone and call-bell circuits are run in the regular lighting conduit.

PANEL AND OUTLET BOXES

Conduits are brought into the boxes as near to the back as possible, ending just inside of the wooden box. From these points the wires are encased in flexible tubing to the terminals on the board. All conduits must be

fastened to the panel and outlet boxes with nuts on both sides and each end of conduit is fitted with an insulated bushing.

The panel box is made of 1 1/2-in. polished slate in a hardwood box with 3-in. gutter space in all sizes, a common back of hardwood and lined with 1/2-in. slate. The gutter is lined with sheet iron, covered with black paint and cut for the outlets. All woodwork is fireproof and varnished

on all sides with an insulating and fireproofing paint. These boxes are provided with a door casing having a wrought-iron door. The casing covers the entire space between the panel board and the outer box and is secured by substantial brass screws. The door is fitted with brass hinges and latch, lock and key. The part of the casing coming over the gutters is lined with sheet iron and thoroughly covered with black paint.

The panel board of these boxes is of 1½-in. polished slate, on which are mounted single-pole, quick-break, 600-volt knife switches, each provided with either a "D & W" or "Noark" enclosed fuse. The panels are constructed with a positive bus across the top of the board of sufficient length to permit the placing of the switches in line with the fuses in a single row below the bus. The bus and the bottom fuse posts are provided with copper lugs of the proper size to receive the several circuits.

All connections are made on the front of the board and all posts are of ample size to carry their current without heating. The busbars and posts are fastened to the marble slab with pins so as not to be displaced by screwing on or off of fuses or lugs. Each branch circuit is controlled by a single-pole knife switch with a fuse on the "outside" of switch. The fuses are fastened with thumb screws, slotted to receive a screw driver. The panel boards are fastened to the box with round-headed copper screws to match the other metal work, all of which is finished and lacquered.

The negative connections are made in the gutter and are soldered to the single conductor returning to the main panel board. The positive wire from the main panel board is fastened to the positive bus with a lug. The switches controlling centers of distribution are covered by iron-clad boxes with covers and latches approved by the engineer.

The outlet boxes are pressed or cast iron mounted flush with the wall inside of buildings.

FIXTURES AND RECEPTACLES

The five, four, three and two-light clusters are of the "Benjamin" wireless type with brass shells and porcelain enameled steel reflectors with marine finish. The ceiling lights and clusters are suspended by conduit with a canopy and at the proper height above the floor. The five-light side clusters are mounted so that the reflectors are at an angle of 45 deg. with the horizontal. Where desirable vapor-proof clusters of the type shown on page 1492 of the Dec. 5, 1908, issue are used. The single-light receptacles are of the keyless approved type and where used in the wall have the necessary wall plate to cover holes in the wall. The wall plate matches the other fixtures in finish and appearance. The single-light receptacles are approved receptacles with 8-in. porcelain enamel steel reflectors.

MAIN PANEL BOARD

The main panel board for power and lighting is of 2-in. polished slate with ½-in. beveled edges mounted on angle irons, carefully insulated from ground, securely fastened and firmly braced at the top of the adjacent wall and placed 3 ft. from the wall. The panels carry the following apparatus and switches: On the main panel: One circuit-breaker of the Westinghouse type "C" design; single-pole, quick-break, double-throw, 600-volt switches with lugs for the cable; "D & W" or "Noark" enclosed fuses; 500-volt to 600-volt Thomson recording voltmeter, back connected. On the distributing panel: Quick-break, single-pole, single-throw switches with fuses of the "D & W" or "Noark" enclosed 600-volt design.

At the front and at the top of the distributing panel board there are mounted two bracket lights with green

glass shades and holders. On the wall back of the board 6 ft. from the floor there is installed a light which together with the two on the board is connected in circuit with the hydrant lights.

The negative bus is run at the bottom of the board and all the return wires connected there by soldered lugs of ample capacity to carry the current. All connections are made on the back of the board. The positive busbars extend across the board on the back at the top lugs of switches.

The main panel has two positive supplies coming in separate conduits and porcelain tubes from the single-pole, double-throw switch. The negative wire is run in conduit from the board to the outside and down the wall to the usual rail return. The negative bars in the distributing panel are protected by a transite covering.

MOTOR PANELS

The motor panel boards are made of 2-in. polished slate mounted on angle iron insulated from the steelwork and ground, and so placed as to give free access behind. Upon each of these boards are a quick-break, single-pole, single-throw, 600-volt knife switch and an automatic circuit-breaker of Westinghouse type "A" design. The starting boxes are mounted on the panels and the whole apparatus connected ready for service, including starting boxes, controllers, etc. The negative wires are run back to the main panel board and connected to the negative bus. The wiring is not grounded to the structure at any point.

CALGARY TRAMWAYS

Work on the tramway system at Calgary, Alta., Can., is being pushed rapidly forward. It will consist of 12 miles of track, of which about 5 miles will be double track. Lorain sections, 80 lb. and 60 lb., are being used. The bonding will be the Ohio Brass Company all-wire, solid terminal bonds except that on a short stretch of track soldered bonds will be used. Steel poles will be employed on the main street, cedar poles for the rest of the system. The feeders are of aluminum.

Power will be supplied from the municipal plant which is now being extended to meet the requirements of the system, and will consist of one Robb-Armstrong high-speed, 750-hp engine connected to a 500-kw Allis-Chalmers-Bullock generator. To ensure a continuous service a 300-kw Allis-Chalmers-Bullock synchronous motor is also being installed as well as 1000 hp of Babcock & Wilcox water-tube boilers fitted with superheaters and the induced-draft system. Twelve semi-convertible pay-as-you-enter cars are now on order with the Pay-as-You-Enter Car Corporation, and it is expected that four more will be required in the near future and a car house is now being erected for 16 cars.

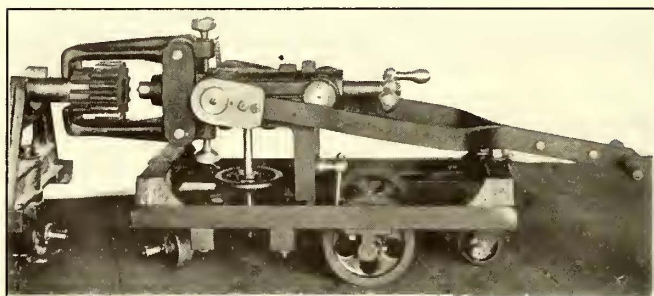
The city of Calgary is managed by a paid commission of three, the Mayor of which is chairman. The commissioners will also have control of the street-railway as well as the electric-lighting and water-works systems, etc. It is estimated that the tramway system will represent an investment of \$450,000. Thomas McCauley, of Port Arthur, Ont., will be the superintendent of the street railway.

The mountain railway of Wildbad, Germany, is a cable road, the cable being driven by a 60-hp motor. Energy is supplied from the lighting system of the city, but in order to equalize sudden changes of load a storage battery is provided.

AN IMPROVED PORTABLE PINION PULLER

The American General Engineering Company, New York, specialist in railway shop tools, is now manufacturing the Austin-Hunter rapid pinion puller. This device is particularly commended because its adjustment is simple and it can be easily transported from place to place and operated by a boy. It is designed to pull pinions of the most stubborn character without the use of a sledge hammer for a starter or by other antiquated methods, thus saving the pinion and the bearing. The pinion-pulling mechanism is mounted on an A.G.E. truck, and can be lowered or raised by a vertical screw and hand wheel. The ram of the puller is adjusted by slightly loosening the vise-handle screw, then the centers are found and the screw is tightened. The center in the end of the ram acts simply as a finder, for when the strain comes it disappears, leaving the pressure to be taken up by a spring.

The jaws are adjusted by hand screws until they touch the shaft behind the pinion. Power is then applied by a lever fastened to right and left eccentrics working on machine-steel trunnions fastened in the body. The lever first is raised to a vertical position and the ram is screwed up until it jams on the shaft. The lever is then pulled down, causing a movement of 3/32 in. The lever is again raised



Portable Pinion Puller

to the vertical and the feeds again jammed on the shaft, then the lever is pulled down so that the feed screw can be operated individually. Therefore, the most stubborn pinion can be loosened and pulled off by two movements of the lever and feed, which should require no more than 10 seconds. The handle of the power lever operates from either end to move the puller from place to place. The strains are taken up by parts made of cast steel or of malleable iron.

The machine only requires the support necessary to carry its own weight, and does not need a specially strong place on the shop floor for operating the puller.

In a recent test a piece of 1/2-in. solid fiber was punctured by this pinion puller. The pressure required to puncture this fiber was 40 tons, whereas it requires 5 tons to remove an average keyed pinion. It would take a pull of 6 tons to shear a 3/8-in. steel pin fastened in the shaft and pinion. This, coupled with the required pull on the pinion, would allow the pinion to be pulled off the shaft and the pin to be sheared at an approximate pressure of 11 tons. This test showed that the pinion puller has a capacity of about four times that required to remove a standard keyed pinion from the shaft.

The Town Council of Dundee, Scotland, has reported favorably on the project to build an experimental trackless trolley system along the esplanade, at an estimated cost of \$25,000.

A NEW FORM OF REDEEMABLE CASH FARE RECEIPTS

A number of electric railway companies in New England have recently adopted an ingenious system of redeemable cash fare receipts, patents on which have been granted the Edwin A. Denham Company, New York. The railway companies have nothing to do with the redemption of the receipts, this being arranged for through local merchants who give cash refunds on cash purchases of \$1 or more. In general, the refund is equivalent to the amount of carfare paid. An additional feature of the scheme is the award of cash prizes monthly by the Denham Company to collectors of the fare receipts.

The basic principles of the redeemable-fare receipt system are illustrated by the reproduction of the 5-cent fare receipt in use on the

Norwich & Westerly Railway, a 24-mile interurban line in eastern Connecticut. This road is divided into seven 5-cent fare zones. Passengers boarding cars at intermediate stations pay

3 NOTCH PERFORMANCE 09
ISSUED UNDER THE DENHAM SYSTEM.
Globe Ticket Company, Phila., Pa., Licensees

RECEIPT FOR ONE FIVE CENT FARE TO BE KEPT IN PLAIN SIGHT UNTIL CALLED FOR BY CONDUCTOR.	GOOD ONLY ON TRIP ON WHICH ISSUED VOID IF DETACHED	NORWICH & WESTERLY RAILWAY 55623	NORWICH & WESTERLY RAILWAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 55623 JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC. REDEMPTION CERTIFICATE 55623
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These Redemption Certificates are **Valuable** as the Norwich and Westerly stores named on the back of this Certificate have entered into an arrangement with THE EDWIN A. DENHAM CO., of New York, which enables the stores to pay **5 Cents in Cash** to anyone presenting a Certificate at any one of the stores named, when paying for a cash purchase amounting to at least one dollar, and made within 10 days from date of issue. Each cash purchaser is entitled to present for redemption a number of certificates equal to the number of dollars purchased. **AND WILL BE PAID 5 CENTS IN CASH FOR EACH CERTIFICATE.**

In addition VALUABLE AND IMPORTANT CASH PRIZES are awarded monthly by THE EDWIN A. DENHAM CO. in connection with these Certificates. **FOR PARTICULARS APPLY AT ANY OF THE STORES NAMED.** Conductor is called upon to issue a Redemption Certificate (with FARE RECEIPT Coupon attached) in exchange for each 5 cent fare. **SO INSIST ON ITS DELIVERY when paying fare.**

5c	Any of the following stores will pay 5 CENTS IN CASH for this certificate on the terms described on the other side. One Certificate may be presented for each dollar purchased.	5c
NORWICH		
THE REID & HUGHES CO. (The Boston Store.) S. KRONIG & SONS, Manhattans, Dry Goods, etc. THE PLAUT-CAODEN COMPANY, Jewelry, Pianos, Music. THE F. A. WELLS CO., Clothg., Furniture, etc. SCHWARTZ BROS., Dry Goods, etc. J. C. McPHERSON, Men's Fur Clothing. T. H. ELDRIDGE, Hardware. ENGLER & SMITH, Drug Store. MURPHY & McGARRY, Clothing & Furnishings. MORLEY'S HAT STORE. H. D. BARRDWS, Shoes and Rubbers. H. R. WOODWARD, Jewelry, Optical Goods & C. FRED C. CRDWELL, Paints, Hardware, & C. SOMERS BROS., Meat, Fruit and Vegetable Market.		
WESTERLY		
THE NEW YORK STORE Dry Goods—Small Wares. R. G. BLIVEN & CO., Clothing and Regal Shoes. C. W. WILLARD HARDWARE CO. D. S. ILLMAN, Stationery, Toiletries, Fancy Goods. H. D. BARRDWS, Shoes, Rubbers, Dry Goods. H. B. GAVITT CO., Furniture, Carpets, etc. GEO. W. TIMBURY, Crockery, etc. CHAPPELL & CHAPMAN, Pawcatuck Market. A. L. CASTRITIUS, Jewelry, Art Goods, etc. I. B. CRANDALL CO., Clothing, Hats, Furnishings and Trunks. C. F. BERRY, Horse Goods, Trunks and Bags. JOHN H. MURPHY, Stationery, Sporting Goods, etc.		
GET YOUR CERTIFICATES STAMPED AT ONE OF THE ABOVE STORES ... VALUABLE CASH PRIZES ...		
5c	are awarded monthly by the Edwin A. Denham Co., 48-50 Broadway, New York, in connection with these certificates.	5c

Front and Back of Redeemable Cash Fare Receipt Used by Norwich & Westerly Railway

fare through to destination upon entering the car, receiving in exchange the proper number of 5-cent fare receipts, each consisting of a transportation coupon with a redemption certificate attached.

One coupon is collected and rung up at each fare limit, the passenger retaining the redemption certificates. Each of these 5-cent redemption certificates entitles the holder to a cash refund of 5 cents on a purchase of \$1 made within 10 days of date of issue at any one of the 26 stores in Norwich or Westerly listed on the back of the certificates. The passenger does not surrender the redemption certificate when redeeming it at a store, but presents it for refund and cancellation, retaining the certificate to send to the Denham Company or its local agent at the end of the month,

in competition for cash prizes, which amount to \$75 each month in the case of this particular road. The prize contests involve no lottery feature. The prizes are awarded to the persons sending in the largest number of redemption certificates. All redemption certificates sent in, whether cancelled or uncanceled, are counted in awarding these cash prizes.

Another form of redemption certificate issued by the Norwich & Westerly Railway is a 35-cent certificate attached to a through strip ticket, consisting of a certificate and seven 5-cent fare coupons, which is given to passengers on payment of the through fare of 35 cents. These 35-cent certificates are good for 30 days instead of 10 days, and may be used at one store after another during that period, or until seven 5-cent refunds have been obtained thereon. Other interurban roads which are using the same or similar forms of fare receipts are the Ashaway & West-

which are using the system are charged against the conductors at face value, the conductors being allowed to turn back only fare receipts which are still attached to the original pads. Conductors' trip reports must show the number of fare receipts issued, the number of transportation coupons taken up and the number of passengers rung up on the register, and these three totals must correspond exactly with each other and with the amount of cash turned in.

Another way in which the system can be used on city lines charging a single 5-cent fare and issuing transfers is shown in the accompanying reproduction of the fare receipt used by the Cape Girardeau-Jackson Interurban Railway, which operates as yet exclusively within the town limits of Cape Girardeau, Mo. The redemption plan and prize features are the same on this road as in the case of the New England companies referred to, but it will be noted that one purpose of the ticket shown is to decrease transfer traffic. Each passenger paying cash fare receives one of these fare receipts, which is not good as a transfer unless one of the intersecting lines is punched. It will be seen that the fare receipt is thereby rendered "Not redeemable and not eligible for prizes," as indicated by the punch mark on the reverse side. This provision is also counted upon to influence passengers to refrain from asking for transfer privileges for other than their own personal use. These redeemable fare receipts are not issued to passengers who present tickets which are sold six for 25 cents in payment of fare. This particular form of fare receipt has, therefore, a fourfold purpose—stimulation of traffic, substitution of cash for ticket traffic, decreasing transfer traffic, and checking up of conductors.

Issued under the Denham System. Pat. Feb. 23, '09.
Globe Ticket Company, Phila., Licensees.

<p>5¢ THE FOLLOWING 5¢ Cape Girardeau Stores WILL PAY 5 CENTS IN CASH to anyone presenting this Ticket when paying for a cash purchase amounting to at least one dollar and made WITHIN 10 DAYS FROM DATE OF ISSUE. ONE TICKET MAY BE PRESENTED FOR EACH DOLLAR PURCHASED.</p>		<p>GLENN MERCANTILE CO., 27 North Main Street</p>	
		<p>S. CHARLES HOTEL PHARMACY H. A. NUSSBAUM, General Merchandise, 623 Good Hope Street</p>	
<p>AUGUST LUEBBERS, Grocery, 711 Broadway</p>		<p>LOUIS H. GRAESSLE, General Merchandise, 421 Broadway</p>	
<p>GET YOUR TICKETS STAMPED AT ONE OF THE ABOVE STORES. VALUABLE CASH PRIZES are awarded monthly by The Edwin A. Denham Co., 300 Broadway, New York, in connection with these tickets. For particulars apply at any of the above stores.</p>			
<p>If this Ticket is used as a Transfer, it is a courtesy extended by this Company, and is good only for this current trip, when used, before time punched, and in direction named. Issued subject to the rules of the Company.</p>			
<p>NOT REDEEMABLE AND NOT ELIGIBLE FOR PRIZES IF PUNCHED WITHIN THIS ENCLOSURE</p>			

<p>213578 CAPE GIRARDEAU-JACKSON INTERURBAN RAILWAY LINE 213578</p>	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	1	2	3	4	5	6	7	8	9	10	11	12
	13	14	15	16	17	18	19	20	21	22	23	24
	25	26	27	28	29	30	31					
	<p>Not Good for Transfer Unless Junction and Time are Punched</p>											
	<p>This Ticket is issued to each passenger paying cash fare. Entitles passenger to transfer on first car leaving Junction punched after time indicated.</p>											
	<p>This Fare Receipt is Valuable—See Other Side.</p>											
	<p>Issued under the Denham System. Pat. Feb. 23, '09. Globe Ticket Company, Phila., Licensees.</p>											
	<p>BROADWAY NORTH MAIN SPANISH AND INDEPENDENCE GOOD HOPE (WEST) FREDERICK BOULEVARD (WEST)</p>											
	<p>P. M.</p>											

Front and Back of Combined Cash Fare Receipt and Transfer Used by Cape Girardeau-Jackson Interurban Railway

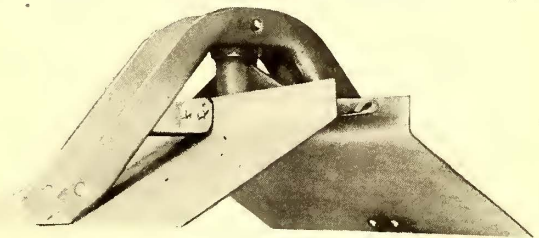
erly, the Hartford & Springfield and the Pawcatuck Valley. The prize contests are conducted along the same lines as for the Norwich & Westerly Railway.

The Hartford & Springfield Street Railway Company issues the form of 5-cent fare receipt described and also a 20-cent ticket which enables passengers to obtain a refund of the total amount of the carfare paid in going to and from Hartford, although the company's cars operate for part of the distance into Hartford over the lines of another company, which collects two fares and which does not issue redeemable fare receipts. This is an indication of the elasticity of the system, which, it is claimed, can be adapted to meet almost any condition of the average street railway company.

All fare receipts issued to conductors by the companies

AN IMPROVED TROLLEY GUARD FOR STEAM RAILROAD CROSSINGS

A number of improvements have recently been made in the construction of the automatic trolley guard manufactured by the Automatic Trolley Guard Company, Buffalo, N. Y. As formerly made the guard consisted of two plates of aluminum-coated steel riveted to angular yokes of T-section. The trolley wire was supported by special clamps bolted to the apex of the T-iron hangers or yokes. In the new design the yokes are made of channel section, as shown in the accompanying engraving, and this permits the wire to be carried by any standard car which can be bolted to the web of the yokes. The flanges of the yokes



Automatic Trolley Guard

are punched at three points to attach them to the messenger cable and to the guy wires on each side. Part of the web on each leg of the yokes is cut out and bent down to form a brace, to which the bent-up top edges of the guiding plates are riveted. The construction of the guard is such that if the wheel jumps the wire it makes contact instantaneously with the guide plates and is forced back to a central position, where it will again run on the wire. The guard is made in sections 8 ft. long and can be erected easily either over straight track or on curves.

News of Electric Railways

Cleveland Traction Situation

Creditors of the Municipal Traction Company have been paid \$556,618, Judge Tayler of the United States District Court having signed the order to that effect on April 10. By so doing the receivers were not required to list this amount for taxes, which would have entailed an additional expense of about \$20,000. The amount ordered paid from the money in the receivers' hands is about half the total debt of the company. It includes 50 per cent of the face value of the claims reported by the master commissioner as operating expenses (total, \$301,546), or \$150,773; the promissory notes of the Cleveland Railway Company, endorsed by the Municipal Traction Company, \$182,000; accounts incurred by the Cleveland Electric Railway prior to April 27, 1908, assumed by the Municipal Traction Company, \$33,844; an amount to the Cleveland Railway Company sufficient to pay the accrued interest on the floating debt of about \$1,000,000, or \$40,000, and to the Cleveland Railway on account, \$150,000.

Among the claims in the accounts payable, Municipal Traction Company, for maintenance and operating expenses, approved by H. J. Davies, H. J. Crawford and W. B. Stewart, and those added by the special master, are the following:

C. L. Ayers Coal Company.....	\$15,340	
Barrett Manufacturing Company.....	6,917	Lien.
Bassett-Presley Company.....	1,741	Lien.
Cuyahoga Telephone Company.....	1,393	
Cameron Electric Manufacturing Company.....	1,897	
Cleveland Frog & Crossing Company.....	12,926	Lien.
Climax Refining Company.....	3,411	Lien.
Columbia Machine Works & Malleable Iron Company.....	2,347	
Consumers' Rubber Company.....	2,973	Lien.
Electric Railway Improvement Company.....	1,954	Lien.
Electric Storage Battery Company.....	4,986	
Glidden Varnish Company.....	1,308	
Goldschmidt Thermit Company.....	2,669	
Kelley Island Lime & Transport Company.....	5,226	
Lorain Steel Company.....	8,837	
Monongahela Consolidated Coal & Coke Company.....	22,271	Lien.
Macbeth Iron Company.....	4,047	Lien.
National Car Wheel Company.....	2,605	
W. M. Pattison Supply Company.....	3,869	
Pittsburgh Plate Glass Company.....	3,339	Lien.
Rochester Printing Company.....	5,075	
John A. Roebling's Sons Company.....	4,054	Lien.
Standard Underground Cable Company.....	6,726	Lien.
Van Dorn & Dutton Company.....	7,240	
George Worthington Company.....	9,213	Lien.
Youghiogheny & Ohio Coal Company.....	6,284	

In the list allowed by the special master for purchases made subsequent to April 27, 1908, as maintenance and operating claims, but objected to by the Cleveland Railway, the following among others are noted, only the larger being mentioned:

Cleveland Bronze & Brass Works.....	\$3,955	Lien.
Cleveland Savings & Trust Company.....	4,000	
Cuyahoga Lumber Company.....	5,367	Lien.
Ingersoll-Rand Company.....	2,518	
Lorain Steel Company.....	46,072	
Martin-Barris Company.....	4,787	Lien.
Ohio Brass Company.....	5,200	

Following are some of those classified under the head of general claims:

Burrell Advertising Company, stock exchange advertising...	\$1,502	
Clark & Winthrop, attorneys.....	5,407	
Crawford & Soper, inspecting automobile.....	125	
J. H. Donahey, cartoon.....	17	
Garfield, Howe & Westenhaver, attorneys.....	3,500	
The Hofbrau Haus, lunches for directors.....	731	
Lorain Steel Company, rolls.....	4,500	
Westenhaver, Boyd, Rudolph & Brooks, attorneys.....	9,059	

Among the claims dated April 27, 1908, and prior, owed by Cleveland Electric Railway, the following are the largest:

Cleveland Frog & Crossing Company.....	\$3,961	
M. B. & H. H. Johnson, attorneys.....	9,295	
Youghiogheny & Ohio Coal Company.....	7,695	

Claims dated April 27, 1908, and prior, owed by Municipal Traction Company, are in part as follows:

Garfield, Howe & Westenhaver.....	\$5,000	
Cleveland Trust Company, registrar.....	2,000	
United Banking & Trust Company.....	5,100	

Claims against the Forest City Railway Company, dated April 27, 1908, and prior, are all small and the aggregate amount is in the same proportion.

Claims in dispute and held for further consideration are as follows:

Citizens Savings & Trust Company.....	\$700	
City of Cleveland.....	7,061	
City of Cleveland, water department.....	21,547	
Clifton Park Association.....	6,158	
Underwood Typewriter Company.....	74	

Notes of the Cleveland Railway payable to the Municipal Traction Company, indorsed and delivered to creditors, follow:

Allis-Chalmers Company.....	\$3,000	
Charges to:		
Cleveland Electric Railway Company.....		
Barrett Manufacturing Company.....	\$11,000	
Charges to:		
Maintenance and operation.....	\$2,905	
Cleveland Electric Railway.....	1,770	
Construction and betterment.....	175	
Neutral Street Railway.....	6,150	
Electric Storage Battery Company.....	\$33,000	
Charges to:		
Maintenance and operation.....	\$32,243	
Cleveland Electric Railway.....	500	
Forest City Railway and Municipal Traction Company.....	257	
G. C. Kuhlman Car Company.....	\$17,000	
Charges to:		
Maintenance and operation.....	\$2,126	
Pay-as-you-enter cars.....	14,874	
Lorain Steel Company.....	\$50,000	
Charges to:		
Neutral Street Railway.....		
National Car Wheel Company.....	\$6,000	
Charges to:		
Cleveland Electric Railway.....	\$4,398	
Forest City Railway and Municipal Traction Company.....	1,602	
Ohio Brass Company.....	\$6,000	
Charges to:		
Construction and betterments.....		
John A. Roebling's Sons Company.....	\$5,000	
Charges to:		
Maintenance and operation.....		
Standard Underground Cable Company.....	\$15,000	
Charges to:		
Neutral Street Railway Company.....	\$3,141	
Forest City Railway and Municipal Traction Company.....	11,859	
Youghiogheny & Ohio Coal Company.....	\$36,000	
Charges to:		
Maintenance and operation.....		

Exceptions to the classification of their claims have been made by a number of creditors, who assert that they should have been placed in the preferred list. The largest of these claims are those of attorneys who were employed by the Municipal Traction Company. Westenhaver, Boyd, Rudolph & Brooks, Garfield, Howe & Westenhaver, W. H. Boyd and Clark & Lathrop state that their services were rendered in the ordinary operation of a street railway system and that their claims should be on the preferred list for that reason. P. C. O'Brien, who has a small balance for food stuffs furnished for the directors' lunches, has put in a claim for preference on the same basis. Several days were spent in arguing this matter before the special master. The Hofbrau Haus, which has a claim for the lunches served, has not yet filed exceptions, although it is more heavily interested than Mr. O'Brien. The Burrell Advertising Company, which placed the advertising for the free stock exchange; St. Vincent's Charity Hospital, James Newkirk, stenographer, and Dr. Joseph E. Cook have also filed exceptions to their classification.

The report of operation of the Municipal Traction Company for March follows:

Gross earnings from operation.....	\$505,297
Operating expenses.....	309,029
Net earnings from operation.....	\$196,268
Miscellaneous income.....	2,873
Gross income, less operating expenses.....	\$199,142
Taxes.....	24,103
Income, less operating expenses and taxes.....	\$175,039
Interest.....	39,517
Other deductions.....	936

Net income.....	\$134,586
Cleveland Railway rental.....	73,378

Surplus..... \$61,208

The assets on April 1 were \$978,093, while the liabilities totaled \$1,026,160, leaving a deficit of \$48,067. The accrued rental due the Cleveland Railway amounts to \$337,539. The receivers have on deposit, \$800,289; in hands of the cashier, \$7,500, and undeposited cash runs, \$21,462, making total cash, \$829,251.

The receivers have been discussing the summer schedules. Regarding the fare to Euclid Beach, it has been decided to charge 5 cents. It is also probable that both the St. Clair Street and Euclid Avenue routes will be used. The Municipal Traction Company changed all the cars from Euclid Avenue to St. Clair Street last summer to the inconvenience of people east of 105th Street, as two transfers were necessary in some cases. From some portions of the city the fare was almost double the former rate. If the receivers carry out their present intentions, the fare over the line will be uniform.

The Council committee of the whole voted on April 5 that the initial fare under the proposed new franchise shall be 3 cents, with 1 cent for transfer, and that the maximum shall be seven tickets for 25 cents without charge for transfers, the cash fare to be 5 cents. The Council will control

routing and schedules rather than submit questions of dispute to arbitration. These things, together with the idea of re-valuing the property for the purposes of another franchise caused Horace E. Andrews, president of the Cleveland Railway Company, to state that a settlement could never be reached under such terms; that it would be impossible to finance improvements under the conditions the Council intended to impose and that all the work that had been done toward a settlement was rendered useless by the Council's stand in this matter.

At the meeting of the Council committee, on April 12, an endeavor was made to arrive at a basis for a new contract with the interurban railroads for an entrance to the city over the tracks of the Cleveland Railway. The time was taken up in discussing different phases of the matter. T. H. Hogsett and S. H. Ginn, attorneys, and J. T. Ross, chief engineer, represented the Lake Shore Electric Railway. Mr. Hogsett, asked by Mayor Johnson if he was opposed to fixing a per car mile cost of operation higher than that of the city cars, replied that he would be willing to guarantee a fair return. The Mayor said that he felt that the cost of operating interurban cars over city tracks is about 50 per cent higher than that of city cars. Regarding the damage to track in wear and tear, Mr. Ross said that much would depend upon the weight of rails, type of construction, frequency of stops and other features, as well as the character of special work used. The pavements, he said, should be built so that the wheels would not strike them. Maintenance and depreciation charges of interurban cars are about $3\frac{1}{2}$ cents per car mile, Mr. Ross said, while the charges for city cars are $2\frac{1}{2}$ cents. The interest on the investment of the Cleveland Electric Railway is about 5 cents per car-mile, it was stated.

The Mayor stated that Horace E. Andrews, president of the Cleveland Railway Company, estimated the cost of operation of interurban cars at 30 cents per car mile and of local cars at 17 cents. He stated that he was willing to concede $16\frac{1}{2}$ cents for the local cars as a basis of negotiations. Mr. Hogsett stated that the Lake Shore Electric Railway would be willing to pay 18 cents per car mile, including interest. Regarding interest, Mr. Ross said that this should be proportioned by the car mile, if the operation of the interurban cars adds anything to the investment or interest charges of the local company. Otherwise he thought that no interest charge should be made. The Mayor said that practically all of the property of the city company is used by the interurban companies operating over city tracks. He made a suggestion that the interurbans pay 21 cents per car mile, exclusive of interest, which would make the charge $25\frac{1}{2}$ cents. President Andrews stated that he believed that the wear on the tracks by the interurban cars is much greater than the proportion shown by the weight of the cars. He also said that the large cars used on some of the roads would require three times as much current as the city cars, and that the cost of operating them is 100 per cent more than for the latter. Mayor Johnson stated on this authority that he believed the cost to the interurban companies should be represented by adding 50 per cent to the cost of operating a city car a mile, including everything but interest, for which a separate charge should be made. Objections were made to this and the question is to be taken up later.

City Solicitor Baker presented a new draft of his ordinance on April 12. Among the provisions outlined in it is that the company shall have in service 450 pay-as-you-enter cars within five months after the passage of the ordinance, if the money for this improvement can be secured. The money used for securing the cars and 75 per cent of that used for reconstruction of old cars shall be added to the capital account. The new draft also gives the Council exclusive control of the schedules and routing. Arbitration is provided in case the company believes that any service required will not yield enough to pay the expense of operation and interest on the investment at the maximum fare provided. The street railway commissioner will be in reality a technical adviser to the City Council.

All differences between the city and the company, subject to arbitration, shall be submitted to three arbitrators, one chosen by the company, one by the city and one appointed by the judge of the United States District Court. Attorney John G. White objected to the term "board of arbitrators" used in the draft and to the idea of having such a board. He wants the men chosen to adjust disputes known simply as arbitrators.

The maximum rate of fare is fixed at 7 tickets for 25 cents, with 1 cent for transfer, to be refunded. The rate charged on interurban cars shall be 5 cents. The charges to interurban companies for operation are left blank, but the requirement that they shall make up any deficits shown in operation and turn over any surplus to the interest fund of the local company is retained.

In the new draft the wording regarding the assumption of the bonded indebtedness is somewhat more reasonable. The city is to assume and provide for the payment of the bonded indebtedness if the law at the time contains a provision allowing it to do so.

The new draft was submitted to both Judge Tayler and Attorney John G. White. Both made suggestions and criticisms and stated that it must not be understood that they approved it. They want to be at liberty to make such further suggestions and criticisms as they see fit or to object to anything that may hereafter seem to be undesirable.

Terms of the Grant to the Hudson & Manhattan Railroad

The Public Service Commission of the First District of New York made public on April 9 the form of the franchise for the extension of the Hudson & Manhattan Railroad from Thirty-fourth Street and Sixth Avenue, New York, to the Grand Central Station at Fourth Avenue and Forty-second Street, which will be suggested at the hearing on April 23. The franchise follows generally the terms of the present franchise to the Hudson & Manhattan Railroad, being of an indeterminate character, so that the city may purchase the property at the end of 25 years or thereafter. The payments to the city are substantially the same as for the franchise under which the company now operates in Sixth Avenue and to the Hudson River. The tentative draft suggests stations at Forty-second Street and Fifth Avenue and Thirty-eighth Street and Sixth Avenue. It stipulates that the payment to the city for each of the stations shall be \$500 annually for each entrance or exit, from the date that trains are placed in operation. The other payments stipulated in the franchise are to be at the rate of 50 cents a year for each linear foot of track and station platforms after the beginning of operation for the first 10 years, and thereafter \$1 a year for each foot of such tracks and platforms from the end of the first 10 years to the time of readjustment of the terms of the original grant to the company for its Sixth Avenue line.

In addition, the Hudson & Manhattan Railroad is to pay to the city \$9,000 a year for 10 years for rights under streets, parks and public places. According to the estimate of the commission, this is 3 per cent of the anticipated gross earnings annually thereafter until the existing franchise becomes subject to readjustment, in 1933. As rental for vault space, not including station platforms and space otherwise specified, the company is to pay a sum equal to 4 per cent a year on the valuation of the horizontal area of such space, this value to be based upon the value per square foot of the neighboring land, exclusive of buildings, as fixed for taxation for 1909. For the first 10 years of the franchise one-fourth of this value is to be taken as the value of the vault space and thereafter one-half, until the date when the franchise comes up for readjustment. The company is to file a bond of \$200,000 before beginning construction, and it must obtain the consent of the Board of Estimate and Apportionment within six months after the franchise is granted, and the consents of the owners of one-half the value of the property in the streets under which the tunnel passes within one year.

The report that the Hudson & Manhattan Railroad Company, which operates under the Hudson River between New York and New Jersey, would extend its line to Montclair and Orange is denied by William G. McAdoo, president of the company. Mr. McAdoo said: "Not only have we no plans for such an extension, but there is no probability that we will build such a line. My brother, M. R. McAdoo, is interested in the North Jersey Rapid Transit Company, which plans to construct an electric railway from Paterson to Suffolk in New Jersey, and perhaps that company has been confused with the Hudson & Manhattan Railroad. That is the only reason I can assign for the report."

Cambridge Subway Bids Opened.—The Boston Transit Commission has opened bids for the construction of the Boston section of the Cambridge subway. The bids were classified according to free air and compressed air construction. The free air bids ranged from \$749,655 to \$469,097 and the compressed air bids from \$1,011,148 to \$531,940. The lowest bidder in each case was Patrick McGovern, Boston, and he received the contract for Section 1 on his bid of \$469,097.

Monorail System Approved.—The Public Service Commission of the First District of New York has approved the application to equip the City Island Railroad, New York, with the American monorail system. The City Island Railroad is owned by the Monoroad Construction

Company, New York. It is operated with horses now. If the proposed motive power should not prove successful, it is stipulated that the road shall be restored for operation with horses or that another railroad shall be installed. The line is 2 miles long.

Suit Resulting from Sale of New York Properties Settled.—The suit of the Metropolitan Securities Company against the estates of William C. Whitney and William L. Elkins and against Thomas F. Ryan, P. A. B. Widener and Thomas Dolan to recover \$965,607, alleged to have been received by the defendants out of the purchase price paid to Anthony N. Brady for the securities of the Wall & Cortlandt Street Ferries Railway has been settled, the defendants sending a check for \$692,292 to the Metropolitan Securities Company.

Request for Subway Commissioners.—The Public Service Commission of the First District of New York has applied to the Appellate Division of the Supreme Court for three orders for the appointment of commissioners to determine and report whether the proposed subways known as the Canal Street route, the Manhattan Bridge route, revised, and the Third Avenue route, ought to be constructed and operated. The appointment of commissioners is asked under the Rapid Transit Law in lieu of obtaining consents of property owners for the construction of the subways. Decision was reserved.

Indiana Railroad Commission Constitutional Body.—The Supreme Court of Indiana has decided that the law creating the Indiana Railroad Commission is a constitutional act, and that the Legislature has the power to delegate legislative and quasi-judicial functions to the commission. In this connection the court held that an order made by the commission fixing rates to be charged by a railroad within the jurisdiction of the commission must be attacked in the Circuit Court within 30 days, as provided in Section 6 of the Railroad Commission Law. The rates ordered become binding and conclusive if the action to review them is not begun within 30 days.

Referee on New York City's Debt Limit.—Benjamin F. Tracy, who was appointed referee by Justice Blanchard of the Supreme Court in the suit brought by Jefferson M. Levy, David Meyer and the Fleishman Realty & Construction Company, against the Mayor and the Board of Estimate and Apportionment of New York and the Public Service Commission of the First District of New York to ascertain the amount of the city's indebtedness on June 30, 1908, filed his report with the County Clerk on April 8. Mr. Tracy finds that the amount of the permanent indebtedness at that date was \$517,884,346 and that the margin of the constitutional limit would exceed \$106,205,715. This margin will permit the construction of the Lexington Avenue line, to cost \$60,000,000; the Canal Street loop, to cost \$7,000,000, and the Fourth Avenue subway, Brooklyn, to cost \$16,000,000.

Fire in Interborough Shops.—A serious fire occurred between 9 p. m. and 10 p. m. on April 7 in the shops of the Interborough Rapid Transit Company at 129th Street and Third Avenue, New York, where the company overhauls most of its equipment. Three alarms were sounded. It is said that there was some delay in summoning the fire department, and before the fire apparatus arrived the shops were in flames. In all 17 cars were largely destroyed. Eleven of these were of steel and six were copper-sheathed trailers. There were no motors on the cars, as they were in the shop for overhauling and repainting. The car bodies, however, were badly injured, the steel cars as much, if not more, than the wood cars. Some of the air-brake equipments under the cars escaped without much loss. The total loss is estimated at about \$100,000.

New York Central Electric Power Association.—The employees of the New York Central & Hudson River Railroad Company occupied in the maintenance, operation and construction of the Electric Zone have formed what is known as the Electric Power Association of the New York Central & Hudson River Railroad Company. Lectures and discussions by the members on topics of especial interest to the different departments are features of the monthly meetings. A question box is open at all times to members, and many interesting subjects are brought up for discussion in this manner. After a year of pronounced success the association has decided to have a social gathering of its members on April 20 at the Railroad Men's Building, Forty-fifth Street and Madison Avenue. At the next educational meeting, C. H. Quereau, superintendent of electrical equipment, will give an address.

Six Tracks Urged for the Subway Station at the Brooklyn Bridge.—The Public Service Commission of the First District of New York has issued in detail the reply which it made recently to the request of the Board of Estimate for

information as to plans for the operation and connections of the subway loop lines in New York to connect the Williamsburg, Manhattan and Brooklyn Bridges. Incidentally the commission explains its efforts to induce the Board of Estimate to appropriate enough money so that the subway station at Brooklyn Bridge may be equipped with six or four tracks. The work on the subway station was suspended at the request of the Mayor. In his letter the Mayor explained that the subway station was to be the site of the proposed municipal office building and asked delay until Bridge Commissioner Stevenson and the Public Service Commission had an opportunity to confer about the plans. The commission says that a six-track station can not advantageously be made out of a four-track station. The total cost of land, of constructing the extra tracks and of strengthening the subway in order to support the proposed new municipal office building is about \$1,850,000.

Clubrooms Opened at the New Quarters of the Third Avenue Railroad.—The new clubrooms for the employees of the Third Avenue Railroad, New York, which are located in the general office building at 130th Street and Third Avenue adjoining the reconstructed car house, were opened on April 12 with an informal reception and luncheon to the men under the personal supervision of F. W. Whitridge, receiver. The entertainment continued all afternoon and evening so that the employees of every department could become acquainted with the cozy quarters fitted out for their benefit. The refreshments were served by the wives and daughters of the company's officers and several of their friends. Miss Eleanor Whitridge, daughter of the receiver, was in charge of this pleasant task and was assisted by Miss Martha D. Bowers, Miss J. Whitridge, Mrs. James A. Roosevelt, Miss Marjorie Curtis, the Misses Robinson, the Misses Marks, Mrs. Jane Craine, Miss Kathleen Maher, Miss Anne Morgan, Mrs. Douglas Robinson and Mrs. E. H. Harriman. The clubrooms are furnished with complete pool and billiard equipments and facilities for a dozen house games. The library is a branch of the New York Public Library, so that a variety of books will be available for the men. The total equipment includes seven shower baths.

Subway Proposal in Cleveland.—Thomas P. Schmidt filed an application with the City Council of Cleveland on April 5 for a franchise for the construction of a subway by the Cleveland Subway Company under the principal streets of the city, including Euclid, Superior, St. Clair and Cedar Avenues and Broadway. Subsequently articles of incorporation for the Cleveland Subway Company were filed with the Secretary of State. The capital stock of the company is \$10,000. Among the incorporators are: F. A. Mehling, W. A. Greenlund, A. L. Lang, William C. Fischer and Thomas P. Schmidt. Mr. Schmidt says that the details of the project which the company has in contemplation will not be made public until after the City Council has considered the application of the company. W. R. Hopkins, who is promoting a belt line for steam roads at Cleveland, was reported as being interested in the Cleveland Subway Company. He says, however, that the belt line has no connection with the Cleveland Subway and that his plan calls for the construction of a subway from the present depot of the Nickel Plate Railroad to the center of the city, so as to afford an entrance to the city for the interurban electric railways. The plans of the company which he represents are not sufficiently well matured at this time for him to make them available for publication.

Good Road Prizes Offered by Electric Railway President.—J. P. Graves, president of the Spokane & Inland Empire Railroad, Spokane, Wash., has addressed the following letter to J. C. Lawrence, of the State Railroad Commission: "I have been considering the good roads movement in our State, and have decided to do something toward assisting that in the Palouse country, and have hit upon a plan which I should like to see carried out as an experiment. The following plan suggests itself to me as an illustration to the Palouse people that might be helpful; I have asked President Bryan, of the Agricultural College, Pullman, and President McLean, of the Moscow University, at Moscow, to act as a committee of two, and I am writing you as a third member of the committee, which would have the directing of a plan that I believe would be helpful. I am proposing to give \$3,000 as a bonus, \$1,000 a year, as follows: \$500 as the first premium for the best mile of constructed road tributary to the Spokane Inland division; \$250 as a second prize and \$250 as expenses by the committee in giving directions and awarding premiums to the builders. This to continue for three years; the construction of the road to be under the direction of this committee, who will either issue by circular or such other directions as they might see fit, and will award all prizes accordingly."

John Fritz Medal Presentation.—The John Fritz Medal for 1909 has been awarded this year to Charles T. Porter, Hon. Mem. Am. Soc. M. E., for his work in advancing the knowledge of steam engineering, and in improvements in engine construction. The public ceremony of the presentation of the medal to Mr. Porter took place in the large auditorium of the Engineering Societies Building, New York, on Tuesday, April 13. Besides the simple presentation of the medal, in the presence of invited guests and distinguished representatives of engineering, there were addresses by representatives of the four groups of the profession most concerned. Among those who spoke were: Dean W. F. M. Goss, of the University of Illinois; Prof. F. R. Hutton, of Columbia University; Robert W. Hunt, of Chicago, and Frank J. Sprague, of New York. Professor Hutton, in closing his address eulogizing Mr. Porter, paid a tribute to Prof. Chas. B. Richards, associated with Mr. Porter's early work of designing, and John F. Allen, who had conceived many details of the first high-speed engine which Mr. Porter combined into a harmonious whole. Mr. Porter was born in 1829, and has been identified with engineering all his life. He has not been active in business since 1890. He was a member of the firm of the Porter-Allen Engine Company for many years. In 1867 he installed the only high-speed engines exhibited at the French Exposition, and in later years constructed the Edison station, in Pearl Street, New York.

Publicity Campaign in New York.—The Interborough Rapid Transit Company, New York, published on April 13 the first of a series of newspaper advertisements dealing with affairs of the company in which the public is interested. The title of the advertisement was "What Chokes the Subway." It occupied 78 square inches of space, being 6½ in. wide by 12 in. high. Subsequent advertisements will occupy about 60 square inches of space, being varied from time to time as the exigencies of the situation demand. The advertisement will be carried in all the papers. The gist of the first advertisement was: The subway was built to carry 400,000 passengers a day. It carries (week days) more than 800,000. Meanwhile the elevated lines carry 50 per cent more traffic than they did when the subway was planned. Congestion grows. There is no margin for delay. A 15-minute breakdown on subway or elevated would inconvenience 50,000 people. A two-hour shut-down would demoralize the city's business for a day. The company asks to build at its own expense a two-track subway from Forty-second Street to the Bronx on the East Side and a two-track subway from Forty-second Street to the Battery on the West Side. It will take three or four years to build these subways. To give immediate relief the company asks to be allowed to build an express track on both the Second Avenue and the Third Avenue elevated lines. The company is now planning to enlarge the subway station platforms and to make its express trains up of center-door cars. These improvements will add 25 per cent to the company's facilities for handling rush crowds.

Plans Proposed for Developing Transportation Facilities into Boston.—The metropolitan improvement commission has submitted to the Mayor of Boston and the Governor of Massachusetts an extensive plan for developing the transportation facilities of Boston and enlarging the docking capacity of the port. The plan contemplates the electrification of all the lines entering Boston. The depression of the tracks entering the North and South stations is advised and a four-track subway between those two stations, which shall pass under the market district, is suggested, with a sub-surface station near State Street. It is proposed that express trains shall be run from the New York, New Haven & Hartford Railroad and the Boston & Albany Railroad through the subway to the Boston & Maine Railroad and vice versa. All trains which are not run beyond the city are to be operated through the subway, under this plan. When a passenger train reaches the South station it is to be operated through the subway to the storage yards of the Boston & Maine Railroad north of the Charles River, and the equipment left there until used in a return trip. All trains of the Boston & Maine Railroad are to be run through the subway to the storage yards of the New York, New Haven & Hartford Railroad at South Boston. The commission, taking the judgment of its engineer, proposes this plan to avoid the hauling of empty cars out of the two stations, making every movement a forward one. Thus, all equipment of the Boston & Maine Railroad is to be stored in the yards of the New York, New Haven & Hartford Railroad and all cars of the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad are to be stored in the yards of the Boston & Maine Railroad at Somerville.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Connecticut.—The hearings on the proposal to create a public utility measure were concluded on April 9. Frederick W. Whitridge, receiver of the Third Avenue Railroad, New York, was the first speaker on April 9. He was described by the opposition to the measure as perhaps the person best qualified to expound the fallacies of the New York act, under which the Third Avenue Railroad is subject to the orders of the Public Service Commission of the First District of New York. Mr. Whitridge told about the difficulties encountered by him in trying to comply with demands from the commission which in many cases were unreasonable. He said that he had had no experience with the commission regarding stock issues, and expressed the opinion that stock issues affect investors and are largely of little concern to the public. He concluded with a statement to the effect that he might favor a commission as a concession to a decadent public sentiment. Charles J. Donohue, president of the State Federation of Labor, also opposed the bill. He felt that the giving of such broad powers to a State commission would impose obligations upon the companies that would tend to disrupt the pacific labor relations now existing. William Waldo Hyde, representing the Willimantic & Stafford Springs Railway, Colchester, Norwich & Hartford Railroad and the Willimantic & Southbridge Street Railway, also spoke against the bill. He said the measure usurps the power of the Legislature, and that it should be opposed, if for nothing more, on the ground that the bill provides that those eligible to office as members of the commission shall have had no connection with a public service corporation. He asked how men with no experience in public service corporation management could be expected judiciously to direct the operations of companies with whose workings they were admittedly unfamiliar. Ex-Senator Frank S. Butterworth and John Cairns, president of the Bolton & Coventry Telephone Company, both spoke in favor of the bill.

Illinois.—The charter version bills of the city of Chicago have been introduced. There are 11 of them. Two are of general interest to the electric railways. These provide for the recall of city officials and permit the city of Chicago to own and operate public utilities and regulate them. Among the bills introduced in the House is a measure presented to permit electric railways, whether organized under the railroad act or under the State act applying to street railroads, to make traffic agreements with each other and to consolidate on a majority vote of the stock in each company in favor of the consolidation. The bill introduced in the Senate for a State Public Service Commission is still pending. It has been referred to the Senate committee on corporations and public utilities, and several public hearings have been held. The bill is patterned after the law creating the public service commissions in New York. Two bills, one requiring the removal of all overhead wires before July 1, the other dealing in an equally summary manner with all electric wires, whether for telephone, telegraph, light or power service, have been introduced. A bill has been drawn for introduction to give the city of Chicago power to prescribe by ordinance the motive power by which cars or trains may be operated within the city limits. Under similar legislation track elevation has been accomplished in Chicago and other cities of the State. J. T. Harahan, president of the Illinois Central Railroad, is reported to have said that he considers the attempt by the city of Chicago to secure the passage of an ordinance giving the city authority to prescribe the motive power to be used within the city untimely and ill-advised, especially as the Illinois Central Railroad has plans under way for carrying out work that would more than satisfy the provisions of the new measure.

Iowa.—The Legislature has begun the work of weeding out measures preparatory to adjournment. Up to April 3 the Sammis, Smith and Van Law measures providing for a utility commission and enlarging the powers of the Railroad Commission had all been killed, and the prospects are slim for the introduction of any other measures of the kind. The bill to compel railroads to obey the orders of the State Railroad Commission under penalty of \$50 a day for non-compliance also met a fate similar to that of the Sammis, Smith and Van Law bills. Only one measure of interest to the electric railway has passed both the Senate and the House. It confers additional powers on city councils acting under the commission form of government. Two measures of interest have been passed by the Senate and only one has been passed by the House. Those passed by the Senate require all corporations within the State to file an annual report of their operations and provide that cities and towns shall have the right to condemn and purchase public utilities at the expiration of their franchises. The one passed by the House provides that members of the,

Railroad Commission shall be appointed by the Governor hereafter.

Massachusetts.—The committee on street railways has finished all but one of its hearings for the present legislative session, but has not yet reported its recommendations upon any of the 10 measures still before it. The last hearing of this committee was scheduled for April 13, the bill considered being one authorizing the General Electric Company to use part of the tracks of the Pittsfield Street Railway. The most important measures which this committee has under consideration are the prospective consolidation of the Boston Elevated Railway and the West End Street Railway; the extension of the floating debt of the Connecticut Valley Street Railway; the assessment of expenses for street widening in certain instances upon street railways; the definition of purposes of stock and bond issues; the extension of the Boston Elevated Railway's structure to Medford; regulation of stock and bond issues and the purchase of the Bennington & North Adams Street Railway by the Berkshire Street Railway. Recommendations are expected soon on most of these matters. It is probable that the question of electric railway ownership by railroads as involved in the Bennington & North Adams bill may be set over to the next Legislature in view of the action of the New York, New Haven & Hartford Railroad Company in complying with the decision of the Massachusetts Supreme Court by divesting itself of its electric railway holdings in Massachusetts. The committee on metropolitan affairs continues to receive petitions for the discontinuance of the elevated structure on Washington Street, Boston, and the extension of the Washington Street tunnel southward to Dudley Street, Roxbury. All the important bills relating to transportation projects by tunnel and subway or by elevated structure in the Boston district have been referred by this committee to the Railroad Commissioners and the Boston Transit Commission, sitting as a joint body. The first hearing of these boards was scheduled for April 14, and the question of the Boston & Eastern tunnel was assigned for this date. The committee has asked the two commissions for their opinion as to the terms upon which the Boston & Eastern tunnel should be built, if constructed, connecting the northern suburban district with the city proper. The House has given a first reading to the bill authorizing the Railroad Commission to recommend relocations of stations of railroad corporations and street railway companies. This measure has been placed in order for a second reading.

Missouri.—The bill creating a State Public Utilities Commission of five members, to be appointed by the Governor, has been favorably reported to the House by the committee on ways and means. The bill if passed will abolish the State Railroad and Warehouse Commission and the public utility commissions of St. Louis, Kansas City and St. Joseph. Opposition has been expressed to the bill on the ground that it takes away the home-rule feature of the law enacted at the last session of the Legislature.

Nebraska.—The Senate bill of Mr. Donahue, introduced recently, places all public-service corporations under the jurisdiction of the Railroad Commission and extends the powers of that body. According to Mr. Donahue the measure is similar to the Wisconsin law, being modified only in a few non-essentials which were deemed expedient to make it especially applicable to conditions in Nebraska. It is in the judiciary committee and is soon to come up for public hearing. There is considerable opposition to the measure in various quarters throughout the State. The City Council of Omaha has adopted a resolution declaring the measure "vicious and dangerous" and "an unwarranted assault upon the rights of the people of the various cities and towns of the State."

New Jersey.—Governor Fort has vetoed the Gaunt bill giving electric railway companies the right to carry freight. Objection to the bill was strong in Newark, Jersey City, Trenton and other cities, where the opinion prevailed that regular passenger traffic might suffer if the electric railway companies availed themselves of the provisions of the bill. The Governor said that the giving of unlimited freight rights was not advisable and that cities should have the right to fix the terms under which the companies may carry freight. Senator Gaunt has since introduced a new measure which he believes will overcome the objections of the Governor to the original bill. Governor Fort has also vetoed the special measure authorizing the Atlantic City & Shore Railroad to control and operate the Central Passenger Railway. Reference to this measure was made in the *ELECTRIC RAILWAY JOURNAL* of March 27, 1909. Measures are now being introduced only with unanimous consent and objection to the bill to extend the time for the completion of the Plainfield Horse Car Railroad to July 1, 1912, resulted in its rejection. The House has passed the bill

amending the county roads act so that contracts may be entered into with electric railway companies by which they may pay a portion of the cost of rebuilding county roads.

New York.—On April 12, Governor Hughes sent a special message to the Legislature urging the passage of the Travis-Lee concurrent resolution exempting dock and subway bonds from the computation of New York City's debt limit, and on April 13 the Senate passed the bill. If the bill passes the Assembly, by which it has been reported favorably, and is approved by the people, an additional \$125,000,000 will be available for subway construction in New York after Jan. 1, 1910. A constitutional amendment does not have to be approved by the Governor. Commissioner Bassett, of the First District, strongly urged the adoption of the amendment. A hearing was given on April 7 on the amendment of the Public Service Commissions' law extending the authority of the commissions. Opposition developed to the proposal to increase the powers of the commissions regarding through rates and joint rates, the forms of accounts and reports required, and the amendment stipulating that franchises must be submitted to the commissions for approval before they can be exercised. The Metropolitan Street Railway was represented by R. C. Beatty; the Third Avenue Railroad by F. J. Bickford; the International Railway by Porter Norton; the Utica & Mohawk Valley Railway by F. J. Kernan, and the Brooklyn Rapid Transit Company by Timothy S. Williams. The steam railroads were also well represented. Senator Wagner urged the Senate committee on railroads to report his 5-cent fare bill, by the terms of which the Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad would be compelled to charge not more than 5 cents for a ride over their lines to Coney Island. Representatives of both companies appeared in opposition to the measure. The committee has reported the measure favorably, and has also reported the Schultz bill providing for half fares for school children on surface, subway and elevated railways in the cities of the State. Senator Gledhill's bill requiring surface cars in Kings and Queens Counties to be vestibuled on one side is another measure that has been reported favorably by the Senate committee on railroads. Cars now operated in these counties are largely vestibuled only at the front, the sides being unprotected. It is expected that a resolution will be introduced this week fixing April 30 as the date of adjournment.

Ohio.—Since signing the bill providing for the free transportation of officers of the peace while on duty by electric railways Governor Harmon has approved several other measures, some of which affect electric railways direct and in general and some only remotely. The Mendelsohn measure is the most important thus far to be approved. It provides for the construction of electric underground and elevated railways in cities. Heretofore cities have not been invested with power to authorize the construction of such lines. The measure is intended primarily to aid the interurban railways in Cleveland to secure better terminals in that city, possibly with a union line into the city and a union terminal station. The Lawyer bill relating to a subway for telegraph and telephone lines is another measure which has been approved. The Governor has also signed the Badger bill on the elimination of grade crossings.

Utah.—The only bill of interest to the electric railways that has passed both branches of the Legislature amends the laws of 1907 relating to the winding up of the affairs of corporations whose franchises have expired. It has been approved by the Governor. The House bill to provide vestibules for motormen and specifying the candle-power of street-car headlights was killed in the House. The Senate bill prohibiting trespass on the right of way of railroads and the measure making it unlawful to transport passengers free were killed in committee. As stated in the *ELECTRIC RAILWAY JOURNAL* of March 27, the public utilities bill, introduced in accordance with the recommendation of Governor Spry, failed to pass. Senator Badger, the author of this bill, said he would redraw the measure and introduce it as new legislation, but sentiment against public-utility legislation was so pronounced that the prospect of a second bill meeting the same fate as the first deterred him from making another attempt.

Wisconsin.—As a result of a tabulation of the bills before both houses still to be acted upon the opinion is expressed that it will be possible to adjourn on May 15. The bill providing for the entrance of interurban railways to cities by condemnation is still under consideration. The Assembly committee on transportation has killed the bill giving interurban railways the right to run through towns without obtaining a franchise from the town boards. It has been suggested that street railway companies be added to the light, water, heat and power companies which, according to the Berner bill, are required to accept an indeterminate permit if organized prior to July 9, 1907.

Financial and Corporate

New York Stock and Money Market

April 13, 1909.

The stock market returned after the Easter holidays to the rather active trading and buoyant tone that have characterized it since the beginning of the current month.

A healthy demand for bonds continues and the money market is easy. Call money to-day is quoted at 1/4 to 2 per cent; 90-day loans, 2 1/2 per cent.

Other Markets

In Philadelphia, Rapid Transit was the leader of the market. The daily volume of transactions ran into the thousands and the price advanced steadily.

In the Chicago market there was some return of activity in the various issues of the Chicago Railways Company.

Traction issues in the Boston market, except Boston Elevated, were quiet. There was some trading in Massachusetts Electric, both preferred and common.

In Baltimore, active interest was shown in the bonds of the United Railways & Electric Company. The "incomes" were quoted at 55 and the 4s at 87 3/8.

At the weekly auction of securities in New York, April 8, the following traction securities were sold: \$2,000 Brooklyn, Bath Beach & West End Railroad Company 5 per cent bonds at 97 1/2; \$1,000 Kings County Elevated Railroad Company 4 per cent bond, 86 3/4; \$1,000 Brooklyn City & Newtown Railroad Company 5 per cent bond, 99 1/4; \$2,000 Brooklyn City Railroad Company 5 per cent bond, 103 3/4; \$1,000 Brooklyn Heights Railroad Company 5 per cent bond, 96 5/8; \$1,000 Brooklyn Rapid Transit Company 5 per cent bond, 103 1/2; \$1,000 Brooklyn, Queens County & Suburban Railroad Company 5 per cent bond, 99, and \$1,000 Nassau Electric Railroad Company 4 per cent bond, 81 1/4.

Quotations of various traction securities follow:

	Apr. 6.	Apr. 13.
American Railways Company	45 3/4	45 3/4
Aurora, Elgin & Chicago Railroad (common)	437 1/2	439
Aurora, Elgin & Chicago Railroad (preferred)	488 3/4	490
Boston Elevated Railway	130 1/2	131 1/4
Boston & Suburban Electric Companies (common)	16	15
Boston & Suburban Electric Companies (preferred)	70 3/4	70
Boston & Worcester Electric Companies (common)	111 1/2	111
Boston & Worcester Electric Companies (preferred)	156	156
Brooklyn Rapid Transit Company	70 1/2	70 3/4
Brooklyn Rapid Transit Company, 1st ref. conv. 4s	85	85 1/2
Capital Traction Company, Washington	133 1/8	137
Chicago City Railway	185	190
Chicago & Oak Park Elevated Railroad (common)	44 1/2	44 1/2
Chicago & Oak Park Elevated Railroad (preferred)	111	111
Chicago Railways, pteptg. ctf. 1	112	112
Chicago Railways, pteptg. ctf. 2	111	111
Chicago Railways, pteptg. ctf. 3	129	129
Chicago Railways, pteptg. ctf. 4	111 1/2	111 1/2
Cleveland Electric Railway	76	78
Consolidated Traction Company of New Jersey	76 1/2	76 1/2
Consolidated Traction Company of New Jersey, 5 per cent bonds	106	105 1/4
Detroit United Railway	58 1/2	58
General Electric Company	158 3/4	158 1/2
Georgia Railway & Electric Company (common)	80 5/8	83
Georgia Railway & Electric Company (preferred)	85	87 1/2
Interborough-Metropolitan Company (common)	14 1/2	15
Interborough-Metropolitan Company (preferred)	42 1/2	43
Interborough-Metropolitan Company, col. 4 1/2s.	78 1/8	78 1/4
Kansas City Railway & Light Company (common)	142 1/2	142
Kansas City Railway & Light Company (preferred)	143	143 1/2
Manhattan Railway	143	143 1/2
Massachusetts Electric Companies (common)	14 1/2	14 1/4
Massachusetts Electric Companies (preferred)	72 1/2	72
Metropolitan West Side Elevated Railway, Chicago (common)	118	118
Metropolitan West Side Elevated Railway, Chicago (preferred)	52	52
Metropolitan Street Railway	23	23
Milwaukee Electric Railway & Light Company (preferred)	—	110
North American Company	80 1/2	83
Northwestern Elevated Railroad (common)	222 1/2	223
Northwestern Elevated Railroad (preferred)	268 1/2	269
Philadelphia Company, Pittsburg (common)	42 3/4	41 1/2
Philadelphia Company, Pittsburg (preferred)	43	41 1/4
Philadelphia Rapid Transit Company	30	32 1/2
Philadelphia Traction Company	92 1/2	92 1/2
Public Service Corporation, 5 per cent col. notes	100 1/2	100
Public Service Corporation, ctf.	82 1/2	82 1/2
Seattle Electric Company (common)	91 1/2	91 1/2
Seattle Electric Company (preferred)	98	98
South Side Elevated Railroad, Chicago	56	55 1/2
Toledo Railways & Light Company	12 7/8	12 3/4
Third Avenue Railroad, New York	28 1/2	29 1/2
Twin City Rapid Transit Company, Minneapolis (common)	104 1/2	104
Union Traction Company, Philadelphia	55 3/8	56 1/4
United Railways & Electric Company, Baltimore	11 1/2	11
United Railways Investment Company, San Francisco (common)	35	40
United Railways Investment Company, San Francisco, (preferred)	54	57
Washington Railway & Electric Company (common)	44	43 1/2
Washington Railway & Electric Company (preferred)	91 1/2	91
West End Street Railway, Boston (common)	93 3/4	96 1/4
West End Street Railway (preferred)	110 1/2	110 1/2
Westinghouse Electric & Manufacturing Company, 1st preferred	117	117
a Asked. * Last sale.		

Report of Chicago Railways Company for Year

The comparative report of the Chicago Railways Company for the years ended Jan. 31, 1909, and Jan. 31, 1908, follows:

	1909.	1908.
Gross receipts	\$11,037,071	\$10,560,571
Expenses, 70 per cent	7,725,950	7,392,400
Balance	\$3,311,121	\$3,168,171
Deduct 5 per cent interest on valuation	1,739,684	1,566,158
Net income	\$1,571,437	\$1,602,013
Division of net income:		
City of Chicago, 55 per cent	\$864,290	\$881,107
Chicago Railways Company, 45 per cent	707,147	720,906

The decrease in the amount paid to the city of Chicago for the year ended Jan. 31, 1909, as compared with the year ended Jan. 31, 1908, is due to the rapid increase in the amount of rehabilitation performed and the consequent increase in the city valuation price, upon which a deduction of 5 per cent is allowed to the company.

The inventory of the property as of Feb. 1, 1908, placed the purchase price to the city at \$32,589,047, while the inventory as of Feb. 1, 1909, placed the purchase price at \$39,007,353.

Operations of New York City Railway

A preliminary abstract of the report of the New York City Railway for the year ended June 30, 1908, has been issued by the New York Public Service Commission, First District. The report covers the results of operation of the Metropolitan Street Railway and its lessee roads and also the following: Fort George & Eleventh Avenue Railroad; Fulton Street Railroad (to June 1, 1908, when operation ceased); Kingsbridge Railway (until March 1, 1908, when operation was placed under the jurisdiction of the receiver of the Third Avenue Railroad); Thirty-fourth Street Crosstown Railroad, and Twenty-eighth & Twenty-ninth Streets Crosstown Railroad. The operations of the Third Avenue Railroad are included until Jan. 11, 1908, when a separate receiver was appointed. The length of road operated was 134.58 miles and there were 127.27 miles of second track and 24.79 miles of all other tracks, making a total of 286.64 miles.

The income statement includes for purposes of comparison with the preceding fiscal year the operations of the Third Avenue Railroad under a separate receivership from Jan. 12, 1908:

	Fiscal year, 1908.	Increase, 1907.
Revenue.		
Passenger revenue (including chartered cars)	\$16,539,162.67	*\$675,588.70
Freight and other car earnings	37,181.35	*12,743.44
Advertising	236,874.96	39,874.96
Rent of track	14,809.28	*1,340.72
Rent of equipment	77,639.79	48,201.26
Sale of power	17,394.83	3,678.88
Miscellaneous	36.85	36.85
Total street railway operating revenues	\$16,923,189.73	*\$597,880.91
Expenses.		
Maintenance of way and structures	\$1,385,079.06	\$507,348.08
Maintenance of equipment (exclusive of horses)	2,588,969.28	1,204,669.15
Renovals of horses, harness, etc.	192,434.41	68,304.66
Operation of power plant	647,050.49	*1,379.25
Provision and stable expenses	387,234.50	22,335.72
Operation of cars	4,946,622.54	449,467.14
Damages (including legal expenses)	1,404,546.39	*206,031.20
General expenses	945,670.79	271,012.12
Total street railway operating expenses	\$12,497,607.46	\$2,315,726.42
Taxes accrued	\$1,478,126.75	\$474,527.66
Net Revenue.		
Operating income (earnings over expenses and taxes)	\$2,947,455.52	*\$3,388,134.99
Non-operating income	569,389.64	*368,648.39
Gross income applicable to corporate and leased properties	\$3,516,845.16	*\$3,756,783.38
Deductions.		
Interest on funded debt	†\$117,607.52	\$70,500.77
Other interest	86,469.90	*7,887.79
Interest on funded debt of companies whose roads are operated under agreement	112,916.67	*32,083.33
Claims against companies in hands of receivers	383,197.27	383,197.27
Rentals:		
Interest	2,164,666.66	*2,307,430.20
Dividends	2,456,103.03	*3,363,033.00
Corporate expense	13,210.05	*1,922.24
Additions and betterments charged to income	69,474.90	69,474.90
Total deductions from income	\$5,403,646.00	*\$5,200,183.62
Deficit for period	1,886,800.84	*1,443,400.24

* Decrease.
† Interest on funded debt other than on \$5,000,000 has not been paid or accrued. (In 1907 this item was included in "Rentals.")

The passenger traffic for the year on the various routes was as follows:

PASSENGER TRAFFIC FOR YEAR ENDED JUNE 30, 1908.		receipts per car-mile.	
Route.	Car-miles.	Revenue passengers.	Transfers
Electric:			
*Second Avenue.....	3,068,775	22,001,757	12,980,743
Third Avenue (to Jan. 12, 1908).....	6,348,152	19,346,818	7,873,272
Lexington Avenue.....	4,793,996	28,636,766	12,277,133
Fourth Avenue and Williamsburg Bridge.....	217,235	896,090	272,529
Williamsburg Bridge.....	211,384	3,397,939
Fourth Avenue.....	5,307,141	28,996,627	15,101,698
†Fourth Avenue, Grand Central and 23d Street.	158,215	1,263,511	432,905
Broadway and Amsterdam Avenue (from Feb. 17, 1908).....	862,851	4,508,695	1,512,072
Broadway and Columbus Avenue.....	4,849,011	38,837,749	12,330,305
Sixth and Amsterdam Avenues.....	4,494,901	27,263,692	14,965,713
Seventh Avenue.....	453,102	2,029,410	846,746
Canal Street.....	96,213	98,556	113,607
Eighth Avenue.....	4,686,279	27,973,348	14,692,546
Ninth Avenue.....	1,345,091	6,768,165	4,836,389
Kingsbridge (to March 1, 1908).....	383,047	938,278	424,542
145th Street.....	113,800	619,159	355,340
125th Street (to Jan. 12, 1908).....	483,394	3,382,721	1,729,290
116th Street.....	824,003	5,393,888	5,902,037
86th Street.....	899,830	5,349,867	6,115,521
59th Street.....	1,084,171	7,026,922	13,152,947
34th Street.....	1,392,156	10,599,233	11,452,475
23d Street.....	2,148,884	18,295,891	11,437,247
14th Street.....	2,583,622	15,931,402	8,377,525
Christopher and East 23d Street.....	636,502	3,612,927	2,224,223
Eighth Street.....	1,563,734	9,786,875	5,409,519
53d Street (to March 1, 1908).....	11,947	6,430	7,183
Avenue A (to March 1, 1908).....	139,838	235,689	98,610
Mount Vernon.....	153,838	418,454	55,673
Total, electric lines.....	46,653,570	293,616,868	164,978,390
Horse:			
Sixth Avenue.....	121,964	267,986	143,428
East Belt and First Avenue.....	896,276	3,087,010	1,088,449
West Belt.....	858,799	4,496,580	1,503,942
17th and 18th Streets....	46,766	63,443	53,022
Bleecker Street.....	18,523	5,071	851
Avenue C (Prince and Houston Streets).....	724,005	3,063,859	1,971,101
Metropolitan Cross-town (Spring and Delancey Streets).....	415,416	2,434,667	1,571,219
Clambers Street.....	446,708	2,572,022	1,488,153
Fulton Street (to June 2, 1908).....	86,885	443,864	180,333
28th and 29th Streets....	568,149	2,939,582	1,468,891
Total, horse car lines....	4,183,491	19,374,084	9,469,389
Grand total.....	50,837,061	312,990,952	174,447,779

* The First Avenue Branch from 50th Street to 125th Street was completely electrified and operated Feb. 5, 1908.
 † Route withdrawn March 1, 1908.

The following statistics, contained in the report, relate to the accidents and the rates of wages:

ACCIDENTS.	July 1 to Sept. 24, 1907.		Sept. 25, 1907, to June 30, 1908.	
	Number of accidents causing personal injury.....	4,793	9,758	
Of which, number of persons killed.....	43	108		
Of which, number of persons seriously injured..	188	550		
Of which, number of persons otherwise injured..	4,562	9,100		
Divided as follows:				
Passengers.....	2,947	5,229		
Employees.....	1,016	1,852		
Others.....	830	2,677		

HOURLY RATE OF WAGES OF MOTORMEN AND CONDUCTORS, JUNE 30, 1908.

Motormen:	First year, number.		First year, rate, cts.		Second year, number.		Second year, rate, cts.		Third to fifth year, number.		Third to fifth year, rate, cts.		After fifth year, number.		After fifth year, rate, cts.		Total number.
	Standard cars.....	Pay-as-you-enter cars....	22 1/2	24	23 1/2	25	27 1/2	28 1/2	24 1/2	26	26	27 1/2	26	27 1/2	26	27 1/2	
Standard cars.....	1,103	127	22 1/2	24	23 1/2	25	27 1/2	28 1/2	24 1/2	26	26	27 1/2	26	27 1/2	26	27 1/2	2,224
Pay-as-you-enter cars....	127	24	24	25	25	26	26	27	26	26	27	27	27	27	27	27	316
Conductors:																	
Standard cars.....	1,346	197	21 1/2	23	22 1/2	23	23 1/2	24 1/2	23 1/2	25	25	26 1/2	26 1/2	26 1/2	26 1/2	26 1/2	2,193
Pay-as-you-enter cars....	197	23	23	24	24	25	25	26	25	25	26	26	26	26	26	26	280
Conductors of horse cars, 20 cents an hour.....																	319
Drivers of horse cars, 20 cents an hour.....																	331
All employees.....																	10,932

Berkshire Street Railway, Pittsfield, Mass.—The Berkshire Street Railway has petitioned the Massachusetts Railroad Commission for authority to issue debenture bonds to the amount of \$248,000, to be used to retire obligations, for the construction of an extension at Cheshire Harbor and for bridge repairs, and reconstruction near Farnham Station, Cheshire.

Boston (Mass.) Elevated Railway.—A meeting of the stockholders of the West End Street Railway was called for April 14, "to see what action the stockholders will take with regard to a sale of the property, privileges and franchises of the West End Street Railway to the Boston Elevated Railway, and a consolidation of the properties and franchises of said two companies as authorized by chapter 551 of the acts of the Legislature of the Commonwealth passed in 1908 or in reference to any pending bills now before the Legislature of the Commonwealth, or to be hereafter introduced before the Legislature of the Commonwealth, authorizing or relating in any manner to a consolidation of the properties and franchises of said two companies, and for the transaction of such other business as may lawfully come before such meeting."

City Island Railroad, New York, N. Y.—The City Island Railroad and the Pelham Park Railroad have each applied to the Public Service Commission, First District, for permission to issue \$50,000 of 5 per cent 25-year bonds, the proceeds to be used in connection with the installation of the mono-rail system on the City Island Railroad, mention of which is made on page 746 of this issue of the ELECTRIC RAILWAY JOURNAL.

Las Vegas Railway & Power Company, Las Vegas, New Mex.—Dr. J. M. Cunningham, president of the San Miguel National Bank, bid in the plant, franchises, etc., of the Las Vegas Railway & Power Company for \$65,000 at master's sale. The sale was the result of foreclosure proceedings brought against the company by the Trust Company of St. Louis County, trustee, to satisfy a mortgage for \$313,000. It is understood that Dr. Cunningham, Frank Springer, W. J. Mills, F. D. Bullard, H. W. Kelly, Jacob Gross and A. M. Blackwell, of the original Las Vegas Light & Fuel Company, are associated with the United States Light & Traction Company, of Denver, in the purchase of the property.

Metropolitan Street Railway, New York, N. Y.—The 7 per cent dividend on the stock of the Sixth Avenue Railroad, guaranteed by the Metropolitan Street Railway, to one of whose subsidiaries it is leased for 800 years, has been passed. Frank Curtiss, president of the Sixth Avenue Railroad, has issued this statement in explanation: "Because of the unsettled state of affairs of the lessee company, and the fact that certain franchise taxes imposed on its companies' property have not been paid by the lessee company, which taxes are in litigation, your directors have decided it wise not to make the dividend at present." Justice Bishoff, of the Supreme Court, has reserved decision on an application of bondholders of the Fulton Street Railroad for an order to compel the receivers of the Metropolitan Street Railway to issue transfers with the Fulton Street Railroad. The bondholders also asked that the receiver of the Fulton Street Railroad be ordered to resume the operation of the line which was discontinued about one year ago.

Montoursville (Pa.) Passenger Railway.—A. L. Scholl, J. Harry Spencer and Dr. F. L. Moyer, Montoursville, have concluded the negotiations for the purchase of the Montoursville Passenger Railway and the property of the Montoursville Electric Light, Heat & Power Company, owned by the Railways Company General, and these gentlemen will formally assume active control of the above companies on May 1.

New York, New Haven & Hartford Railroad, New Haven, Conn.—The Public Service Commission of the Second District of New York has authorized the New York, New Haven & Hartford Railroad to purchase all the stock of the New York & Portchester Railroad and the New York, Westchester & Boston Railway. This will eliminate the Millbrook Company as a holding concern for the New York & Portchester Railway and the New York, Westchester & Boston Railway.

New England Investment & Security Company, Boston, Mass.—At a recent meeting of the trustees of the New England Investment & Security Company, preliminary steps were taken for a legal separation of the New York, New Haven & Hartford Railroad from the New England Investment & Security Company. Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, retired as president and trustee of the New England Investment & Security Company and was succeeded in both positions by Lucius S. Storrs, Springfield, who is president

of various individual electric railways which are controlled by the New England Investment & Security Company. The New England Investment & Security Company has been under legal control of the New York, New Haven & Hartford Railroad since the electric railway companies were taken over. Originally all the directors of the holding company were also directors of the New York, New Haven & Hartford Railroad, but with Mr. Mellen's retirement the last director of the New York, New Haven & Hartford has severed his connection with the New England Investment & Security Company. Plans now call for legal separation of the two interests before May 1. Notes or bonds amounting to \$15,000,000 in the treasuries of the subsidiary companies and of the New York, New Haven & Hartford Railroad itself will be made negotiable and disposed of. These notes have been held by the New York, New Haven & Hartford Railroad as simple promissory notes. At the meeting a settlement was effected of all matters of account between the New York, New Haven & Hartford Railroad and the New England Investment & Security Company and mutual releases were exchanged. Mr. Storrs as the successor of Mr. Mellen will hereafter be responsible only to the trustees of the New England Investment & Security Company.

North Mount Vernon Railroad, Mount Vernon, N. Y.—The property of the North Mount Vernon Railroad has been sold under foreclosure to John Johnston, Brooklyn, N. Y., for \$500. Mr. Johnston assumes obligations against the company of more than \$25,000 in taxes, assessments, etc. The property of the company will be formally turned over to Mr. Johnston by W. W. Ladd, receiver of the New York City Railway, on April 29.

Rhode Island Company, Providence, R. I.—The answer of the Rhode Island Company to the Government's merger suit, to compel the New York, New Haven & Hartford Railroad to relinquish its control of the Rhode Island Company, has been filed in the United States Circuit Court. The Rhode Island Company contends that the three judges before whom the Government seeks to have the case tried on its merits do not constitute a Circuit Court. This claim, previously submitted by the other defendants, has been disallowed, and it was filed by the Rhode Island Company merely in order that the Rhode Island Company might be included with the others in case the suit should reach the Supreme Court.

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil.—The stockholders of the Rio de Janeiro Tramway, Light & Power Company will vote on May 3 on the question of increasing the capital stock of the company from \$25,000,000 to \$40,000,000. Of the new stock only \$6,250,000 will be issued at present, and this will be offered to stockholders of record to the extent of one share of new stock for every four shares held by them. The new issue is to provide funds for financing the purchase of the Carril de Jardim Botânico and for extensions and improvements.

United Railways Company, St. Louis, Mo.—The United Railways Company called for payment on April 9 \$1,200,000 of collateral trust 5½ per cent gold notes dated July 1, 1907, and due July 1, 1909.

At the inauguration of the new City Council of Chicago on April 12, Mayor Busse discussed among other subjects the necessity for unification of all of the surface and elevated railways in Chicago, and their operation as one complete system. He said: "I believe that none of us can better serve the interests of the people of Chicago than by doing everything that lies within our power to bring about unification of the transportation service at the earliest possible date. In no other way can we get rid of the friction that at the present time hampers the service and prevents proper co-ordination of transportation routes." Referring to subway construction, Mayor Busse said: "When we have united operation of local transportation systems then subways can be planned which will accurately fit into and supplement the present service. The construction of subways with separate ownership and operation would only add another complicating element to the situation." On the question of electrification of railway terminals, Mayor Busse reported progress in that the Illinois Central Railroad was already committed to the policy of electrification and he hoped a way would be found to advance beyond the stage of discussion in the near future in the case of other railway companies entering Chicago. Legislation is now pending in Springfield which is intended to give cities specific authority to require electrification of the railway terminals in the same way as the authority conferred to require the elevation of tracks. If passed, this act will assist the city in its solution of this problem.

Traffic and Transportation

Report to District Commission on Pay-As-You-Enter Cars

H. C. Eddy, executive officer and secretary of the District Electric Railway Commission, Washington, D. C., has submitted to the commission a report in regard to the design and method of operation of the pay-as-you-enter cars recently placed in service in Washington. An abstract of the report follows:

"It is the purpose of this report to reply to the criticisms received and point out what appear to the writer to be the undesirable as well as the desirable features of the pay-as-you-enter cars, particularly as far as the public welfare and interest are concerned. It is also my purpose to compare these cars with others of the pay-as-you-enter type which are being operated in other cities.

"Summarizing the letters received [from District residents] it will be seen that the general opinion is unfavorable to the cars, not so much because of the pay-as-you-enter feature but because of the seating arrangements and the consequent wide aisles which provide a standing capacity equal to perhaps twice the seating capacity, incidental to which is the alleged necessity of forcing one's way through these crowded aisles to the front exit.

"From reports received from the city officials of municipalities where pay-as-you-enter cars are in operation, it appears that in most cities the cars are equipped with cross seats and a short longitudinal seat at each end. Exceptions to this rule are Columbus, Ohio; New York City, and Des Moines, Ia. In the two first-named cities longitudinal seats are used exclusively, although a recent order for cars on the Third Avenue Railroad in New York calls for cross seats. The cars in Des Moines are equipped with a longitudinal seat on one side and cross seats on the other side. In Newark, N. J., I am informed that while the cars now in operation are equipped with cross seats all cars ordered in the future will be equipped with longitudinal seats only. The reason for this change is not given. Passengers are allowed to leave by the rear-exit door, especially when cars are crowded, in every city which I have heard from, but the front exit is ordinarily used. In Des Moines the rear exit is used exclusively.

"The platform arrangements differ from each other only in detail, the general arrangement being a pipe railing adjustable on double-end cars and fixed on single-end cars. In regard to public opinion concerning these cars all reports state that it is favorable to the pay-as-you-enter type, the report from Chicago, where this type of car has been in service for a longer period than in any other city, stating that 'public opinion in regard to the pay-as-you-enter car is enthusiastic as against any other street car now in operation,' adding that the entire equipment in Chicago within 15 months will consist of this type of car. Continuing, the writer, Bion J. Arnold, who is the traction expert for the city of Chicago, says: 'The companies, as well as the city (which participates in the net profits of the earnings), very materially profit by the use of the pay-as-you-enter car as against the old type. One or two reasons will be sufficient, I believe, to justify the statement. In the first place all fares are collected, while in the old style of car during the rush hours many passengers evade the conductor and the fare is not collected. Another important feature of the pay-as-you-enter car is almost the entire elimination of accidents when passengers are boarding and alighting. The passenger boarding the car is doing so under the eye of the conductor. Consequently, he does not give the signal to start until the passenger is safely aboard. It is practically impossible to leave the car until it comes to a stop and the door is opened by the motorman.'

"Several of the reports received state that the companies' receipts show an increase since the pay-as-you-enter car was put in operation by them.

"My assistants and myself have been making very careful observations of the construction and operation of these cars in use on the lines of the Capital Traction Company, and from these observations, and the reports received from other cities and data secured from various other sources, including my own observations of the operation of prepayment cars in Pittsburgh and Philadelphia, I am of the opinion that the prepayment car as a type is a long step in the right direction toward the solution of successful street car operation in the interest of the public as well as of the operating companies. I am also of the opinion that cross seats are to be preferred to longitudinal seats and that the rear exit should be opened for passengers sitting or standing adjacent thereto when cars are well filled. Under all other circumstances I believe the front exit only should be used, as by this means the time and inconvenience of loading and unloading will be reduced to a minimum.

There are many arguments for and against sliding and swinging exit and entrance doors leading from car body to platform, but I believe the two sliding doors at each end with only a stanchion between them as adopted in New York City after exhaustive tests and experiments will prove to be the most satisfactory.

"A large platform, while objectionable in many respects from an operating and construction point of view, is by no means impracticable and has the great advantage of allowing several passengers to board the car while waiting to pay their fare instead of standing in line on the street.

"The sign 'pay as you enter' should be placed conspicuously on the dasher instead of in the vestibule window where it obstructs the motorman's view. Passengers are not allowed to stand on the platforms, which is, on the whole, advantageous to the public as it tends to eliminate accidents as well as to facilitate the entrance and exit of passengers.

"I have also observed that passengers are frequently allowed to leave the car by the rear exit when cars are well filled, although this practice is not always followed, as I believe it should be. The practice of not allowing passengers to alight from a car while in motion I believe is most excellent. Statistics of the Police Department show that more than half the street car accidents which occurred in the District of Columbia during the year ending June 30, 1908, were either boarding or alighting accidents, and I understand this is the case in most cities.

"The success of the pay-as-you-enter car depends largely on the co-operation of the public, and as it is a radical change from what the public has been accustomed to it always requires a considerable time for people to adapt themselves to the new order of affairs when these cars are first introduced. If the pay-as-you-enter cars now in operation on the Fourteenth Street line were equipped with cross seats and passengers were allowed to leave by the rear door when cars are full it is believed that but little objection would be raised to the new cars.

"The crowding of these cars is undoubtedly a serious matter and this is due in a large measure to the wide aisles which are consequent to the unusual width of the cars and the use of longitudinal seats, a large space for standing room being thus provided. It is believed, however, that if the longitudinal seats were replaced with cross seats this cause of complaint would be greatly reduced. The general question of the crowding of cars having been already acted upon by your commission, doubtless this difficulty as complained of on the pay-as-you-enter cars will be further reduced by this means."

The Experiment with Special Cars for Women

Daniel L. Turner, general inspector of the Public Service Commission of the First District of New York, has submitted to the commission a report covering the operation of the women's car by the Hudson & Manhattan Railroad for the first four days of the experiment, namely, from March 31 to April 3. Mr. Turner says:

"As well as can be determined from a short period of operation, the 'exclusively-for-women' cars have demonstrated their efficacy under the conditions prevailing on the Hudson & Manhattan Railroad."

The report further finds that while the women's cars carried the heaviest loads during the rush hours, as might be expected, they are well patronized during the whole period of their operation. Of 672 cars noted, 170 of which were the cars for women, the average loads on the women's cars for the entire period were 38, compared with an average of 53 passengers in the other cars. The women's cars carried more people from New York at night than to New York in the morning, the average being 45 during the evening rush hours westbound, and 20 during the morning rush hours eastbound.

The report says that at the peak of the rush hours, the women's cars carried very nearly their proper proportion of the train loads, indicating that their use does not interfere with the proper distribution of the passengers throughout the trains. No confusion or interference whatever, which tended to retard or obstruct the movement of the trains, was noted during their operation. However, the train interval is never less than three minutes.

The Hudson & Manhattan Railroad has submitted figures to the commission which show that the average number of women using the cars increased steadily from the first day. The largest number of women carried in one car on the first day was 90 and that was during the evening rush hours westbound. On the first day, March 31, the women's cars on 41 trains carried eastbound 959 passengers, or an average of 23 16/41 per car; on the same day in the evening on 50 trains the women's cars carried 2156 passengers, or an average of 43 3/50 per car. On April 1 the

women's cars on 41 trains carried eastbound in the morning 1305 passengers, or an average of 31.83 per car; in the evening, on 50 trains, the women's cars carried 2038 passengers, or an average of 40.56 per car. On April 2 the women's cars on 41 trains in the morning rush hours, eastbound, carried 1199 passengers, or an average of 29.24 per car; on the same day, westbound, the women's cars on 50 trains carried 2154 passengers, or an average of 43.08 per car. On April 3, in the morning rush hours, eastbound, the women's cars on 41 trains carried 1201 passengers, or an average of 29.29 per car; on the same day, the cars on 50 trains carried 2411 passengers, or an average of 48.22 per car. On April 5 (no women's cars having been operated on April 4, Sunday) the women's cars on 41 trains, eastbound, during the rush hours, carried 1382 passengers, or an average of 33.71 per car; on the same day, westbound, on 50 trains, they carried 2236 passengers, or an average of 44.72 per car.

The Public Service Commission of the First District of New York issued an order on April 12 calling for a hearing on April 20 on the question whether the Interborough Rapid Transit Company should not be compelled to provide separate cars for women on its express trains in the subway.

Trip of Indianapolis, Columbus & Southern Traction Company Car, Louisville to Cleveland

A synopsis of the results attained on the trip of a special car from Louisville to Cleveland and return, at the time of the last meeting of the Central Electric Railway Association, has been received from A. A. Anderson, general manager of the Indianapolis, Columbus & Southern Traction Company. The maximum number of persons carried on the car at any one time was 56, but 96 different persons were on the car at some time during the trip. The following summary shows the record made by the car:

Louisville to Cleveland, 509 miles; running time.....	16:49	Speed Rate.	29.66
Lay-over time	2:41		
Night Stop (Fort Wayne, Ind.).....	8:42		
Total	28:12		

Lv. Louisville	2:03 p.m.,	3-23-09
Ar. Cleveland	6:15 p.m.,	3-24-09

Cleveland to Indianapolis, 378 miles; running time.....	14:37	Speed Rate.	25.86
Lay-over time	0:52		
Night Stop (Mansfield)	11:14		
Total	26:43		

Lv. Cleveland	6:37 p.m.,	3-25-09
Ar. Indianapolis.....	9:20 p.m.,	3-26-09

TOTAL MILES.

From Greenwood to Louisville.....	105	
From Louisville to Cleveland.....	509	614
Extra miles run in Cleveland and Mansfield.....	15	
From Cleveland to Greenwood.....	378	393
	1,007	1,007

	Miles.	Running hours.	Lay-over.	Nights.
First day, March 23..	346	11:59	2:33	Fort Wayne, Ind. 8:42
Second day, March 24..	268	9:02	1:06	Cleveland 24:22
Third day, March 25..	100	3:30	0:04	Mansfield 11:14
Fourth day, March 26..	293	12:02	1:03
	1,007	36:33	4:46	44:13
Tuesday, March 23, 1909, 8:53 a.m. }				
Friday, March 26, 1909, 10:30 p.m. }				35 hours and 37 minutes

Starting from Greenwood and Louisville on March 23, the car, in traveling to Fort Wayne, Ind., covered 346 miles in 11 hours and 59 minutes, making an average speed of 28.87 m.p.h. From Seymour to Indianapolis, 62 miles, the speed was 35.22 m.p.h.; and from Muncie to Bluffton, 42 miles, 34.06 m.p.h.

Traveling from Fort Wayne to Cleveland, 268 miles, on March 24, the running time was 9 hours and 2 minutes, an average of 29.67 m.p.h. Between Lima and Findley, 32 miles, the speed attained was 34.91 m.p.h.

The return trip from Cleveland was made by way of Mansfield, Ohio.

More Pay-As-You-Enter Cars for Columbus, Ohio.—The Columbus Railway & Light Company, Columbus, Ohio, has ordered 30 pay-as-you-enter cars of the same type used on the Oak Street line for the last year from the American Car Company.

No Complaints in New York.—The Public Service Commission of the First District of New York did not receive any complaints on April 1 and 2. The commission was es-

tablished in July, 1907, and up to April 1 received on an average, 16 complaints a day.

Question of Increased Service in Toledo.—The committee on railroads and telegraphs of the Toledo Council has adopted a schedule for morning and evening service, prepared by Councilman J. R. Cowell, which calls for the operation of more cars than are run at present. If the ordinance meets with the approval of the Council it will be presented to the company for adoption. The company says that as many cars are being operated as business at the present time warrants.

Inland Empire System Fruit Special.—Attractive mailing card invitations were distributed recently by the Inland Empire System, Spokane, Wash., calling attention to the second annual fruit special demonstration train which was operated over the road on March 31 and April 1, 2, 3. Interesting and instructive lectures and demonstrations were given by representatives of the State agricultural institutions. The purpose of the fruit special is to promote fruit-growing in the territory served by the Inland Empire System.

Rowdies Fined.—The Interborough Rapid Transit Company, New York, has recently been annoyed by rowdies who travel on its Third Avenue elevated line and insult passengers and make themselves generally obnoxious. On April 5 the police arrested 25 of the offenders and arraigned them before Magistrate O'Connor in the Yorkville Police Court on April 6. Each was fined \$10. The magistrate said that public outrages of the kind perpetrated by the hoodlums were altogether too frequent, and that he proposed to deal summarily with all offenders against public decency who were arraigned before him.

Hearing on Express Rates.—A hearing was held before the Public Service Commission of the Second District of New York on April 6, regarding the increase in express rates by the United Traction Company, Albany, and the Electric Express Company. E. S. Fassett, general manager of the United Traction Company, said that a plan is being perfected to combine the express business of the Electric Express Company, the United Traction Company and the Hudson Valley Railway under the Electric Express Company, and that the contract between the companies would be submitted to the commission for its consideration and approval.

Fare Question in Philadelphia.—The case of the Philadelphia Rapid Transit Company against the city of Philadelphia, argued in the State Supreme Court, has been taken under advisement. The company contended that its contract with the city permitted it to charge any fare it wished up to 5 cents, and that if it charged, or had charged, anything less, it was purely voluntary on the company's part. The city contended that the company's contract with the city prevented the company from changing in any way the conditions and fares in force when the contract was signed, unless the company secured the consent of the city to such change.

Limited Service on Ohio Electric Railway.—The Ohio Electric Railway, Cincinnati, Ohio, will establish limited service between Toledo and Lima and between Lima and Bellefontaine on April 18, preliminary to the inauguration of a thorough limited service between Toledo and Columbus. The Toledo terminals have been established at Avondale Avenue and Eleventh Street, but cars will probably be operated to the union interurban station on Superior Street as soon as the building is ready for occupancy. The building at the Avondale Avenue and Eleventh Street terminal will be used for freight and express purposes when the union terminal is completed.

Traffic Suit in Pittsburg.—The City of Pittsburg has brought suit to compel the Pittsburg Railways Company to abandon its downtown loops, to increase the number of cars operated on certain lines during the rush hours and restrain the company from operating the cars of one company over the lines of another company. The suit is generally regarded as a retaliatory measure on the part of the city because of the failure of the State Railroad Commission to uphold the city in its demand for street railway reforms before conducting a thorough investigation. An abstract of the report of Stone & Webster, retained by the commission to investigate traffic conditions in Pittsburg, was published in the *ELECTRIC RAILWAY JOURNAL* of March 20, 1909, page 528.

To Prorate on Freight Shipments Originated by Electric Railway.—C. T. Chapman, traffic manager of the Toledo & Western Railway, Toledo, Ohio, has entered into an agreement with several steam railroads which carries with it the same privileges and conditions regarding the through shipment of freight as are observed among the steam railroads. The steam railroads will prorate on the rates

on freight shipments originated on the Toledo & Western Railroad. The agreement is with the Delaware, Lackawanna & Western Railroad, the Grand Trunk Railroad, the Ontario Central Dispatch Company and the New York, Ontario & Western Railroad and becomes effective on May 1. The Toledo & Western Railway serves a territory in which freight is particularly susceptible to development. Its freight cars are of a standard size and are transferred to the connecting lines at Toledo.

Hearing on Side-Door Cars in New York.—The hearing on the question of operating side-door cars in the New York subway was continued before Commissioner Eustis, of the Public Service Commission for the First District, on April 8. The Interborough Rapid Transit Company was again represented by Frank Hedley, vice-president and general manager, and A. A. Gardner, counsel. Mr. Gardner and Commissioner Eustis disagreed about the attitude of Mr. Gardner more than a year ago regarding side-door cars. Finally the hearing was adjourned until April 29. In the meantime a copy will be made of the records of the meeting at which Mr. Gardner is said to have spoken in favor of side-door cars. The commission has granted the Interborough Rapid Transit Company an extension of 30 days in which to complete and have ready for service the second side-door experimental train. It was announced on April 13 that the Interborough Rapid Transit Company would have its experimental train of side-door steel cars ready for operation on April 19. The eight steel cars now being rebuilt are part of a recent consignment of 50 all-steel cars so constructed that they could easily be changed to the side-door type. They are also intended for use on the express tracks.

Modifying Brooklyn Elevated Brake Equipments.—The Brooklyn Rapid Transit Company has notified the Public Service Commission of the First District of New York that as a result of tests which it has made recently it is prepared to carry out the recommendations of the commission regarding the modification of the braking system in use on its elevated lines. E. W. Winter, president of the company, in writing the commission, said that the company had found the work of substitution considerably more involved than was expected. Mr. Winter transmitted to the commission a letter from William G. Gove, superintendent of equipment of the company, dated April 5, in which Mr. Gove stated that a careful inventory of the whole equipment had been made with special reference to the details of the new apparatus required. Mr. Gove concluded his letter as follows: "We have found that it will be necessary to readjust the system of brake leverage under all cars and are considering the use of slack adjusters to place this installation on a par with the Interborough Rapid Transit Company and the Long Island Railroad in that respect, and in fact, with all of the more modern elevated or subway properties, and with the idea of making our installation better, if possible, than any other similar service."

New Commutation Rates Between Washington, Baltimore and Annapolis.—On April 1 the Washington, Baltimore & Annapolis Electric Railway established a 60-trip monthly ticket between Washington and Baltimore at \$12, a reduction of \$1.75 over the old rate. At the same time the company also established a rate of \$12 for 60-trip tickets between Washington and Annapolis. This is a reduction of \$2 over the previous rate. The company is making a special effort to secure regular commuters, and as part of the company's campaign G. H. Gall, general passenger agent, addressed the following letter to government employees at Washington who reside in Baltimore: "Your name has been given to me as a daily traveler between Baltimore and Washington. I beg to call your attention to a new rate and service which we shall put into effect on April 1. The rate will be \$12 for a 60-day monthly ticket, good between the District line and Baltimore. This used in connection with street car tickets at the rate of six for a quarter will make a very low rate, a few cents over \$14 a month. The advantage of this rate is that transfers without further cost will be given to any of the connections of the H Street line of the Washington Railway & Electric Company. The new service will consist in a special limited car to leave Baltimore Terminal Station at 7:20 a. m. and reaching White House Station at 8:30 a. m. As the run from that point to the Treasury is but 18 minutes, you will see that there is ample time to reach any department before 9 o'clock. Our equipment was never in such good condition as it is at present, and we feel justified in soliciting your patronage, realizing that you require a thoroughly reliable service. I trust that you may give this your consideration and, after April 1, your patronage. I inclose time card showing various trains. This, however, does not show the new 7:20 car."

Personal Mention

Mr. George W. Lang has resigned as assistant superintendent of the Ottawa (Que.) Electric Railway, to engage in business for himself at Calgary, Alta.

Mr. Bion J. Arnold has been engaged by the Detroit United Railway to make an appraisal of its entire property. Mr. H. A. Foster will assist Mr. Arnold in the work.

Mr. Thomas R. Cummins has resigned as engineer of maintenance of way of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., effective on April 15, to become vice-president and general manager of the D. Cummins Company, Conneaut, Ohio, packers.

Mr. Dumont Clarke, president of the American Exchange National Bank, New York; Mr. A. A. Tilney, of Harvey Fisk & Sons, New York, and Mr. Charles Francis Adams, 2d, Boston, have been elected directors of the Hudson & Manhattan Railroad, New York, to succeed Mr. G. M. Lane, Mr. Cornelius Vanderbilt and Mr. Andrew Freedman.

Mr. George W. Wells, who for the last two years has been superintendent of the mechanical department of the West Penn Railways, Connellsville, Pa., has resigned from that company to become manager of the electrical department of the H. W. Johns-Manville Company in New Orleans. Mr. Wells is a native of Boston. He took the shop course at the Lynn Works of the General Electric Company and afterwards served in the engineering and sales departments of the company. Subsequently he entered the employ of Stone & Webster, Boston, Mass., and was manager of the electric lighting and street railway systems in Tampa, Fla. Mr. Wells' past experience has equipped him splendidly for his new duties with the H. W. Johns-Manville Company, and the officers and employees of the West Penn Railways expressed regret at his resignation.

Hon. James F. Shaw, president of the American Street & Interurban Railway Association and State Senator of Massachusetts, is being credited in the Massachusetts papers with a large part of the credit for the election last week to the State treasuryship of Senator Elmer A. Stevens, the successful candidate. Up to within recently Senator Shaw had not expressed his preferences in the contest, but shortly before the election announced his position in favor of Senator Stevens, and the election was carried owing largely to this endorsement. Senator Shaw has taken a prominent part in Massachusetts legislative matters during the present session. One of his bills which has been exciting a great deal of interest and popular support, and which is now before the Legislature, authorizes the voters to express their choice for United States Senator at the time of the election of members to the Legislature. Senator Shaw believes that this is the closest possible approximation to direct election of United States Senators by the voters under the constitution. The measure is receiving wide popular support throughout the State.

OBITUARY

E. I. Robinson, formerly of the Laclède Car Company, died in St. Louis on April 10, after a lingering illness of two years. Mr. Robinson was of Scotch parentage and birth and was brought to the United States by his parents when a baby. He was 60 years old at the time of his death, and had been a widower for nine years. He was the father of nine children. For the greater part of his life he was engaged in the manufacture of street cars, and for many years was vice-president and general manager of the Laclède Car Company, St. Louis. He remained with that company until five years ago, when he sold his interests along with other stockholders to the St. Louis Car Company. He remained with the St. Louis Car Company for a short time after the purchase, as manager of its Laclède works.

William Sutton died suddenly a few days ago from heart failure at his country home near Baden, Mo. Mr. Sutton was a native of England, and came to America at the age of 18. He began his career with the Jackson & Sharp Car Works, Wilmington, Del. Later he became chief draftsman of The J. G. Brill Company, Philadelphia, and subsequently general superintendent of that company. Twenty-three years ago he located in St. Louis as superintendent of the Brownell Car Company. Later he organized the Laclède Car Company, which was absorbed by the St. Louis Car Company. Mr. Sutton also assisted in organizing the American Car Company, which was absorbed by The J. G. Brill Company. Six years ago Mr. Sutton became chief mechanical engineer of the St. Louis Car Company. He retired from business in October, 1908, and lived on his estate near Baden.

Construction News

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

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

RECENT INCORPORATIONS

***Arkansas Co-operative Construction Company, Bentonville, Ark.**—Incorporated to build a standard gage electric interurban railway from Joplin, Mo., to northwest Arkansas, about 200 miles. Officers: Winlock Morris, president; H. A. Luekens, vice-president; J. W. Blocher, secretary; Dwight Dickson, treasurer; P. H. Sackett, chief engineer.

Blue Valley Traction Company, Kansas City, Mo.—Incorporated to construct an electric railway from Raytown, Jackson County, to Kansas City, a distance of 10 miles. Capital stock, \$300,000. Stockholders: U. S. Epperson, J. M. Lowc, E. M. Sweetman, C. C. Carver, Sam T. McDermott James W. Jones, J. M. Devine, H. H. Dixon and C. W. Gorman, all of Kansas City, Mo. [E. R. J., April 10, '09.]

***Montana Rapid Transit Company, Helena, Mont.**—Incorporated to build an electric railway, 72 miles long, from Helena to East Helena, Jefferson, Boulder, Basin Calvin to Butte. Two branches are planned, one into the camp of Corbin, and the other from East Helena to Lakeview on Lake Hauser where, it is said, a pleasure resort will be established. It is stated that the preliminary surveys have been made and more than one-half of the right-of-way purchased. Capital stock, \$5,000,000. Officers: Joseph K. Toole, president; H. G. Pickett, vice-president; E. C. Day, secretary.

***Cleveland Subway Company, Cleveland, Ohio.**—Incorporated to construct electric railways under all the principal streets of Cleveland, including Euclid and Superior Streets, Clear and Cedar Avenues, Broadway, Detroit Avcnuc, etc. Application for a franchise was filed with the City Council on April 5. Capital stock, \$10,000. Incorporators: F. A. Mehling, W. A. Greenland, A. L. Lang, William C. Fischer and Thomas P. Schmidt.

***Oklahoma Union Traction Company, Tulsa, Okla.**—Chartered to construct an electric interurban railway from Tulsa to Sapulpa, passing through the counties of Creek and Tulsa, a distance of 20 miles. Capital stock, \$100,000. Incorporators: Albert A. Small, C. L. Holland, E. T. Tucker, G. C. Stebbins and S. A. Orcutt, all of Tulsa.

***Philadelphia Suburban Traction Company, Philadelphia, Pa.**—Application will be made on April 27 for a charter for this company to build an electric street railway from Southampton to Hatboro. The applicants are: W. E. Watt, J. L. Grogan, H. C. Case, J. A. Bonnell and W. A. Merrick, Newtown.

FRANCHISES

San Francisco, Cal.—It is stated that Frank D. Stringham, who recently applied to the Board of Supervisors for a franchise for a street railway from Stockton Street and Market Street to the Bay, has filed an additional application asking for permission to construct a street railway on East Street from the junction of Bay Street to the Presidio. [E. R. J., Feb. 6, '09.]

Lawrence, Kan.—The City Council has granted C. C. Sullivan, representing Dayton, Ohio, capitalists a franchise for an electric street railway in Lawrence. W. Laming, representing the Kansas City & Kansas Southwestern Railway was also granted a franchise for an interurban railway through the city.

Charlotte, N. C.—David Barry, Amherst, Mass., and James W. Barry have been granted a franchise to build an electric railway in Concord and Cabarus County. [E. R. J., Dec. 26, '08.]

***Portland, Ore.**—The Western Oregon Trust Company has applied to the County Commissioners for a franchise for an electric railway on the Barnes road extending from the present terminus at the City Park on Washington Street.

Chehalis, Wash.—The City Council has granted the Twin City Light & Power Company a franchise to build an electric railway in Chehalis. [E. R. J., March 27, '09.]

North Yakima, Wash.—The Yakima Valley Transportation Company has applied for a franchise to use the roads of the Fruitvale district for two extensions, each of which is to be about 3 miles long.

***Seattle, Wash.**—D. C. Conover and E. P. Moran have applied to the County Commissioners for a franchise to construct an electric railway on one of the county roads between Bellevue on the east shore of Lake Washington and a point on the west shore of Lake Sammamish. A

franchise is also asked for a branch line from Medina landing on Lake Washington, 2 miles, to a junction with the main line, also another branch line 1½ miles long.

TRACK AND ROADWAY

***Talladega, Ala.**—It is reported that the Alabama Power Development Company is planning to construct an electric railway from Talladega to the shoals, 9 miles, and thence through Lincoln to the Coosa River to a point below Greensport.

Atlanta Northeastern Railroad, Atlanta, Ga.—J. L. Murphy writes that this company is planning to start work during the summer on the projected railway between Atlanta, Roswell, Alpharetta and Cumming, 47 miles. Steam will be used for hauling freight and it is probable that either electricity or gasoline motor cars will be used for passenger service. Principal office, Candler Building, Atlanta. Officers: J. P. Brooke, Alpharetta, president; Robert P. Jones, Equitable Building, Atlanta, vice-president; J. L. Murphy, Candler Building, Atlanta, secretary; W. T. Spalding, Candler Building, treasurer; M. Mason, Terminal Station, Atlanta, chief engineer. [E. R. J., March 13, '09.]

Lewiston Terminal Company, Ltd., Lewiston, Idaho.—This company, which was recently incorporated to build a street railway in Lewiston, has elected the following officers: M. A. Means, president and general manager; H. G. Darwin, vice-president; E. C. Smith, secretary and treasurer. Material for the construction of 6000 ft. of track, which will be laid simultaneously with the pavement, is being assembled and it is stated that work will be begun just as soon as the City Council grants the franchise. [E. R. J., April 3, '09.]

DeKalb Midland Railway, DeKalb, Ill.—H. J. Burdick writes that this company proposes to construct an electric railway from DeKalb to Sandwich, via Elva, Waterman and Somonauk. It is expected that construction work will be started about July 1. Power will be purchased. Headquarters, 1741 Railway Exchange Building, Chicago. Capital stock, \$150,000. Officers: John F. Pearce, Chicago, president; H. J. Burdick, Elgin, vice-president and treasurer; J. W. McQueen, Elgin, secretary; O. F. Cole, Chicago, chief engineer. [E. R. J., Feb. 20, '09.]

Calumet Traction Company, Hammond, Ind.—This company, which was recently incorporated to construct an electric railway from Hammond to East Chicago, North Calumet and Center, has changed its name to that of the Indiana & Chicago Traction Company. W. J. Riley, East Chicago, secretary.

Logansport, Frankfort & Indianapolis Traction Company, Logansport, Ind.—A. A. Newer, Logansport, advises that this company expects to let contracts for the building of its proposed railway by Aug. 1. It will be 39 miles in length and will extend from Logansport to Frankfort, via Deer Creek, Young America, Burlington, Michigantown, Carroll and Middlefork. At Frankfort connection will be made with the lines extending into Indianapolis. The Strang gasoline motor system is being considered. It is proposed to transport both passengers and freight. A repair shop will be built at Burlington, where the company also plans to establish an amusement park. Officers have not yet been elected. Capital stock, \$100,000. [E. R. J., Nov. 21, '08.]

Terre Haute & Southwestern Railway, Terre Haute, Ind.—H. C. Pugh, president, advises that this company contemplates building a steam railroad and not an electric railway, as was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1909.

Kansas City-Western Railway, Kansas City, Kan.—It is stated that this company will make several improvements to its railway at Brenner Heights during the next 30 days, which will include the construction of a depot, side tracks sufficient to accommodate 20 cars, and a loop. J. W. Richardson, general superintendent.

Kensington (Md.) Railway.—This company is said to contemplate the construction of an extension from Kensington to Sandy Spring. The first section to be built will be 4 miles in length and will extend from Kensington to a point on the Brookeville turnpike about 1 mile above Glenmont.

Excelsior Springs & Suburban Railway, Excelsior Springs, Mo.—It is reported that Henry J. Arnold, Denver, Col., has purchased from W. A. Bell, a controlling interest in this proposed electric railway. It is said that Mr. Arnold will push the construction of the railway which is to connect Excelsior Springs and the Chicago, Milwaukee & St. Paul Railroad, a distance of 2½ miles.

South Flatbush Street Railway, Brooklyn, N. Y.—J. J. Boughman states that this company expects to start construction work about June 1 on its proposed 3-mile street railway from the Brighton Beach line of the Brooklyn

Union Elevated Railroad, at Avenue Q to Avenue Q and Flatbush Avenue, Brooklyn. Two cars will be operated. Power will be rented from the Brooklyn Rapid Transit Company. Capital stock, \$30,000. Officers: L. S. Sadler, Carlisle, Pa., president; J. C. Langdon, 180 Montague Street, Brooklyn, secretary; J. J. Boughman, New Cumberland, Pa., treasurer and general manager. [E. R. J., Feb. 13, '09.]

Elmira Water, Light & Traction Company, Elmira, N. Y.—This company, it is reported, will spend \$150,000 in track improvements this year. It is said to be the intention of the company to relay its track with heavier rails on a large part of its railway.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y.—This company has awarded to I. A. Hodge & Company, Inc., Syracuse, the contract for the construction of its proposed railway from a point between Jordan and Memphis to a line of the Syracuse, Lakeshore & Northern Railroad at Lakeland.

Genesee & Orleans Electric Railway, Rochester, N. Y.—The project of building this electric railway from Batavia north to Oak Orchard Harbor on Lake Ontario via Albion, a distance of 30 miles, is said to have been revived and is being energetically pushed by Geo. W. Mische, Rochester, with intention of commencing construction this summer. The railway will be standard gage, laid with 80-lb. rails and is to be operated by electricity, using Niagara Falls power. [S. R. J., Sept. 7, '07.]

***Elizabeth City, N. C.**—It is reported that D. G. Wilson, Weeksville, is interested in a proposition to build an electric railway from Elizabeth City to Albemarle Sound, 14 miles.

Goldsboro (N. C.) Traction Company.—This company advises that it has about completed a 2½-mile street railway in Goldsboro, extending from the Union depot through East Goldsboro to Rivolo Park, which is owned by the company. Plans are now being considered for the immediate extension of this line to Swan Springs and White Hall, a distance of 16 miles. Four cars will be operated. A repair shop will be erected in East Goldsboro. Headquarters: National Bank Building, Goldsboro. Capital stock authorized, \$150,000; issued, \$45,000; bonds authorized, \$200,000. Officers: E. T. Oliver, Raleigh, president and general manager; S. L. Blackburn, Richmond, Va., vice-president and electrical engineer; J. S. Oliver, Goldsboro, secretary and treasurer; E. R. Austin, Goldsboro, superintendent. [E. R. J., Jan. 23, '09.]

Washington Investment Company, Washington, N. C.—W. E. Jones writes that this company will start construction work at once on its proposed 4 1/3-mile electric street railway in Washington which will also reach Suburban Park, at Washington Heights. It is reported that contracts have already been awarded and the material is now being delivered. A power station and a repair shop will be erected at Washington Heights. Three cars will be operated. Capital stock, authorized, \$100,000. Bonds, authorized and issued, \$65,000. Officers: W. E. Jones, president and general manager; Isaac Buck, vice-president; George A. Spencer, secretary and treasurer, all of Washington. [E. R. J., April 4, '08.]

Wheeling, Cadiz & Tuscarawas Traction Company, Cadiz, Ohio.—This company announces that it expects to be prepared to let contracts about May 15 for the construction of its proposed electric railway, which is to connect Ulrichsville and Wheeling, W. Va., a distance of 55 miles. It is planned to start construction work June 1. The surveys have been made and 13 per cent of the right-of-way has been secured. Franchises have been obtained from several towns. A. E. Townsend, Cadiz, president and general manager; J. E. Tiffany, Cadiz, chief engineer. [E. R. J., Jan. 2, '09.]

Springfield, Wilmington & Cincinnati Railway, Cincinnati, Ohio.—The proceeds of a mortgage in favor of the Carnegie Trust Company, New York, N. Y., to secure \$5,000,000 of bonds will be used by this company to purchase a private right of way from Springfield to Norwood, and to construct an electric railway and terminals. B. M. Barr, president, and H. D. Emerson, secretary.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Engineers in the employ of this company have reached Upper Sandusky the latter part of the week in locating a line that will connect with one which already has an entrance to Toledo. Two routes are being considered. One extends from Marion by way of Carey to Findlay, where it would connect with the Toledo Urban & Interurban Railway, and the other extends from Marion to Fostoria where connection would be made with the Toledo, Fostoria & Findlay Railway. [E. R. J., April 3, '09.]

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio.—It is reported that this company will overhaul its line between Findlay and Fostoria during the next few months, and relay about 5000 new ties and lengthen several sidings.

Valley Electric Railway, Hood River, Ore.—H. B. Langille advises that this company has been organized for the purpose of making preliminary arrangements for the construction of a 20-mile electric railway to connect Hood River on the line of the Oregon Railroad & Navigation Company and the Mount Hood region. It is the intention to organize a permanent company after the plans and estimates have been completed. The surveys are now under way. Power will probably be purchased from the Watt Development Company. Preliminary capital stock, \$5,000. Officers: E. T. Folts, Hood River, president; A. M. Kelly, Mount Hood, vice-president; H. B. Langille, Hood River, secretary; G. W. Dimmick, Mount Hood, treasurer; H. B. Langille, Hood River, chief engineer. [E. R. J., March 27, '09.]

Oregon Electric Railway, Portland, Ore.—It is reported that this company is planning to spend \$200,000 for improvements to its railway this year. This work will consist of completing the ballasting of the railway, station buildings at Forest Grove and Hillsboro, and terminal facilities at Forest Grove. G. W. Talbot, general manager of the company, is quoted as saying that surveys of proposed extensions will be completed within the next 90 days. By that time it will be decided on when work will be started on further extensions of the system. Two surveys are now going forward. One is to Eugene from Albany, and another from a junction with the main line near Tigardville to Newberg and Dallas. The survey from Salem to Albany is practically completed. The mileage of these proposed extensions is about 90.

Oklahoma Midland Electric Railway, Hobart, Okla.—It is stated that this company is in the market for 330 tons of 70-lb. T-rails and 30,000 ties. Address 207 East Fourth Street, Hobart. H. H. Hoover, president.

Oklahoma, Kansas & Missouri Interurban Railway, Miami, Okla.—This company announces that it is making surveys for an extension from Miami to Joplin, Mo. About 5½ miles of track are now completed between Miami and North Miami. It is the intention to operate gasoline motor cars for passenger service and steam for the transportation of freight. Principal office, Miami. Capital stock, authorized, \$200,000; issued, \$100,000. Franklin M. Smith, Joplin, Mo., president; William Phillie, Miami, secretary. [E. R. J., Sept. 26, '08.]

Cumberland Railway, Carlisle, Pa.—This company is reported to have awarded a contract to the Carlisle Construction Company for the building of its proposed electric railway from Carlisle to Newtonville, a distance of 12 miles. W. E. Glatfelter, Balfour, president. [E. R. J., April 10, '09.]

Laurens, S. C.—A. C. Todd, who was appointed on the committee of incorporation by the Commercial Club to look into the feasibility of building an electric railway, writes that at the present time the proposition is only being considered and that a permanent organization will be perfected in the near future. [E. R. J., April 3, '09.]

Bryan, Tex.—It is reported that J. T. Maloney, Mayor, has offered on behalf of himself and associates to build a 5-mile electric railway from Bryan to College Station, if the citizens will raise a bonus of \$10,000. A committee has been appointed with G. S. Parker, chairman, to raise the necessary amount. [E. R. J., Jan. 30, '09.]

El Paso & Fort Hancock Railway, El Paso, Tex.—W. B. Latta advises that this company is making preliminary arrangements for starting construction work on its projected electric railway. It will extend from El Paso to Fabens, 32 miles, but the section extending from El Paso to Ysleta will be built first. Incorporation papers will be filed within a few weeks. Officers: C. N. Bassett, president; Felix Martinez, vice-president; Thomas O'Keefe, secretary; W. Cooley, treasurer, all of El Paso. [E. R. J., April 10, '09.]

***Gainesville, Tex.**—It is stated that the Commercial Club of Gainesville has decided to accept the proposition of capitalists to build a street railway in Gainesville. A committee, composed of J. T. Edwards, Will McKenzie, R. R. Bell and S. M. King, has been appointed to complete all arrangements for the proposed railway. Gasoline electric cars will be operated.

Missouri, Tennessee & Georgia Railroad, Humboldt, Tenn.—This company announces that it has again taken up the project of constructing an electric railway from Humboldt to Dyersburg, via Crockett Mills, Friendship and Bonicord, a distance of 35 miles. A power station and a repair shop will be built at Humboldt. Power will be

furnished for lighting and other purposes. Capital stock, \$1,000,000. Officers: I. H. Dungan, president and general manager; C. H. Ferrell, vice-president; O. C. Sharp, treasurer, all of Humboldt. [S. R. J., Oct. 12, '07.]

***Rockdale, Tex.**—It is reported that an interurban railway is being projected at Rockdale to connect Rockdale with Granger. H. C. Meyer, C. L. Tanner, R. H. Hicks and J. F. Coffield, all of Rockdale, are interested in the project.

Salt Lake & Ogden Railroad, Salt Lake City, Utah.—This company, which is electrifying its steam railway operating between Salt Lake City and Ogden, advises that the preliminary work necessary for the work contemplated is well under way. H. A. Strauss, Stock Exchange Building, Chicago, Ill., consulting engineer of the company, states that it has already purchased the feeder copper, 0000 grooved trolley wire, trolley poles and galvanized span wire and is daily making additional purchases of supplies.

Clintwood, Va.—Columbus Phipps, Clintwood, informs the ELECTRIC RAILWAY JOURNAL that a company has not yet been organized to build the proposed 6½-mile electric street railway from Clintwood to the railroad station. Construction work will be started as soon as grading is begun on the Carolina, Clinchfield & Ohio River Railroad Company's extension through Dickinson County down the McClure River. A power station will be built on the Crowe's Nest River, 2 miles from Clintwood, and the repair shops will be located at Clintwood. [E. R. J., April 3, '09.]

Weston, W. Va.—George I. Keener, who was recently granted a franchise by the County Court for an electric railway between Weston and Bendale, writes that the City Council of Weston has a franchise grant to the company under consideration. Arrangements are being made for starting construction work within a few weeks. It is proposed to build a power station near Weston and a repair shop in that city. [E. R. J., Jan. 9, '09.]

SHOPS AND BUILDINGS

Central California Traction Company, Sacramento, Cal.—It is stated that this company is planning to erect a car shop, and in the future will build its own cars.

Lowell & Fitchburg Street Railway, Ayer, Mass.—This company advises that it expects to build a new car house to replace the one which was recently destroyed by fire.

Old Colony Street Railway, Boston, Mass.—This company is said to be preparing plans for the erection of a paint shop in Fall River, where one of its repair shops is located. The size of the structure will be 150 ft. x 54 ft., and will have four tracks, accommodating 20 cars.

Interborough Rapid Transit Company, New York, N. Y.—Seventeen steel cars of the Interborough Rapid Transit Company were damaged in a fire at the repair shops of the company on April 7. No motor equipments were lost, however. The total damage is placed by the company at \$100,000.

Oklahoma (Okla.) Railway.—It is announced that this company will build a new car house and shops. The main car-storage building will be 160 ft. x 100 ft., with eight tracks. The inspection shed will be 200 ft. x 50 ft., with four tracks; the machine shop will be 125 ft. x 85 ft., with one track inside and two outside; the woodworking shop will be 100 ft. x 50 ft., with two tracks; the paint shop will be 45 ft. x 100 ft. The group of buildings and the connecting tracks will cover about 14 acres. All the buildings will be constructed of pressed brick, with concrete roofing, and all will be one story high excepting a small office building, which will be two stories. [E. R. J., Sept. 19, '08.]

POWER HOUSES AND SUBSTATIONS

New York, Auburn & Lansing Railroad, Auburn, N. Y.—It is stated that the company is considering plans for the erection of a new power station on Fall Creek, on the Ithaca end of its railway.

Rochester Railway & Light Company, Rochester, N. Y.—This company has awarded the contract for the new cable towers to be constructed on each side of the harbor at Charlotte. The height of the towers will be 167 ft., and in accordance with the contract the work must be finished by May 20.

Public Service Railway, Newark, N. J.—This company, which was mentioned in the ELECTRIC RAILWAY JOURNAL of March 13, 1909, as contemplating the purchase of sundry equipment for its substations, has purchased from the General Electric Company rotary converters with a total capacity of 6500 kw and step-down transformers with a total capacity of 3500 kw. The Public Service Railway has also ordered various switchboard apparatus for use in its various stations from the General Electric Company.

Manufactures & Supplies

ROLLING STOCK

East St. Louis & Suburban Railway, East St. Louis, Ill., has purchased five interurban cars from the St. Louis Car Company.

Tampa-Sulphur Springs Traction Company, Tampa, Fla., has ordered four 12-bench open cars from the American Car Company.

Central Pennsylvania Traction Company, Harrisburg, Pa., has purchased 10 cars. They will be equipped with Consolidated heaters.

Union Light & Power Company, Junction City, Kan., has purchased one new 44-ft. interurban car from the Dorner Railway Equipment Company.

Cairo Electric & Traction Company, Cairo, Ill., it is reported, has purchased six 10-bench single-truck open cars from the American Car Company.

Philadelphia (Pa.) Rapid Transit Company has purchased 106 trucks from the Curtis Motor Truck Company, 100 of which are for surface operation and six for elevated service.

Tide-Water Power Company, Wilmington, N. C., has purchased four 20-ft., single-truck, semi-convertible cars and three 50-ft., double-truck open cars from The J. G. Brill Company.

Grand Valley Railway, Brantford, Ont., is in the market for four sets of double trucks and one set of single trucks. It is reported that an order for some new cars will be placed with the Ottawa Car Company.

Augusta Railway & Electric Company, Augusta, Ga., mentioned in the ELECTRIC RAILWAY JOURNAL of March 20, 1909, as contemplating the purchase of new equipment, is reported to be negotiating with car builders for eight single-truck cars for city service.

Indiana Union Traction Company, Anderson, Ind., mentioned in the ELECTRIC RAILWAY JOURNAL of March 20, 1909, as being in the market for several ballast cars, has purchased six second-hand side-dump cars from the Hicks Locomotive & Car Works.

Los Angeles & Redondo Railway, Redondo Beach, Cal., it is reported, will construct six new cars in its shops at Redondo Beach, to be equipped with multiple-unit control. These cars will be similar to 10 already in service, built by the company at its shops.

Pittsburg, Harmony, Butler & New Castle Railway, Pittsburg, Pa., mentioned in the ELECTRIC RAILWAY JOURNAL of April 10, 1909, as having purchased four cars from the St. Louis Car Company, advises that these cars will be duplicates of the 12 cars recently purchased from the St. Louis Car Company.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, reported in the ELECTRIC RAILWAY JOURNAL of April 10, 1909, as being in the market for seven cars, will purchase seven or more 55-ft. interurban cars, trucks, air brakes and other equipment. Bids for these equipments were opened on April 8, 1909.

New York & North Shore Traction Company, Roslyn, N. Y., has ordered three passenger cars from the G. C. Kuhlman Car Company, to be equipped with four GE 40-hp motors each and to be delivered in 60 days. The J. G. Brill Company recently delivered a work car to this company. It will be equipped with four GE 60-hp motors.

Columbus Railway & Light Company, Columbus, Ohio, mentioned in the ELECTRIC RAILWAY JOURNAL of April 10, 1909, as being in the market for 20 city cars, has ordered 30 cars of the pay-as-you-enter type from the American Car Company for September delivery. These cars will be mounted on Brill trucks, will have 28-ft. 8-in. car bodies, and will be similar to those which are now in operation in Columbus.

Galveston (Tex.) Electric Company, mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 30, 1909, as being in the market for new equipment, has purchased through Stone & Webster Engineering Corporation, Boston, Mass., 15 cars from the American Car Company. Five of these cars will be 12-bench open Narragansett cars mounted on Brill double trucks, and 10 will be 9-bench open cars mounted on Brill single trucks.

Mason City & Clear Lake Railway, Mason City, Ia., which was reported in the ELECTRIC RAILWAY JOURNAL of Jan. 9, 1909, as being in the market for two interurban cars, is reported to have placed an order some time ago with the American Car Company for these equipments. The company is also reported to have purchased in the East three additional interurban cars, 57 ft. long, which have been

delivered. Each of these five cars will be equipped with Westinghouse type AMM automatic air brakes.

Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company, Seneca Falls, N. Y., mentioned in the ELECTRIC RAILWAY JOURNAL of March 20, 1909, as having purchased eight cars from The J. G. Brill Company, through Meikleham & Dinsmore, New York, advises that 13 double-truck closed cars were ordered from Wason Manufacturing Company. The cars will have an over-all length of 47 ft., a body length of 36 ft. and a seating capacity of 50. In addition to the details given in previous items the following specifications were drawn:

Weight	54,000 lb.	Curtain fixtures.....	Curtain Supply Company
Wheel base.....	6 ft. 6 in.		
Width over all.....	8 ft. 6 in.	Curtain material..	Pantasote
Height, sill to base.....	12 ft.	Destination signs....	Illuminated
Body	wood		
Underframe.....	wood and metal	Gongs	Dedenda
Axles	Hammond	Journal boxes....	Symington
Bolsters	body	Motors	GE-216
Bolsters, truck.....	cast steel	Roofs ..	Agasote headlinings
Control system....	GE, type M	Step treads....	Mason safety
Couplers	Van Dorn		

The company may, later on, purchase some single-truck cars.

British Columbia Electric Railway, Vancouver, B. C., mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 23, 1909, as building 18 cars in its shops, advises that 24 cars are being constructed. They will be 43 ft. 4 in. over all, will seat 48 and will weigh, complete, 19 tons. The company states that six of these cars will be finished in May, 1909, the others following. It may convert the cars into the pay-as-you-enter type. Other details of interest follow:

Wheel base.....	4 ft. 6 in.	Fare boxes	Coleman
Length of body....	30 ft. 2 in.	Fenders.....	B. C. Electric
Over vestibule....	42 ft. 4 in.	Railway	
Width inside.....	8 ft. 3 in.	Gongs ..	Adams & Westlake
Over all.....	8 ft. 7 $\frac{3}{4}$ in.	No. 36	
Height inside....	8 ft. 6 $\frac{3}{4}$ in.	Hand brakes...Beverly head	
Sill to trolley base.....	9 ft. 6 $\frac{3}{4}$ in.	Motors....Canadian Electric	Company, No. 67
Height from top of rail to sills	33 in.	Paint	Valentine
Body	wood	Sanders...B. C. Electric Ry.	
Underframe.....	wood and metal	Sash fixtures.....	Adams & Westlake
Air brakes ..	Westinghouse	Seats ..	Slatted, spindle back
Car trimmings....	Adams & Westlake	Trolley retrievers ..	Knutson, No. 2
Control system	GE	Trolley attachments ..	Nut-tall, standard base
Couplers	Tomlinson	Trucks	Brill
Autoradial		Varnish ..	Noble & Hoares
Curtain fixtures ...	Curtain Supply Company	Ventilators	Automatic
Curtain material ..	Pantasote	Ventilator Company.	

TRADE NOTES

American Creosote Works, Ltd., New Orleans, La., has changed its name to the American Creosote Works, Inc.

California Pole & Piling Company, San Francisco, Cal., has removed its San Francisco office from 25 California Street to the Fife Building.

Wonham, Magor & Sanger, New York, N. Y., have closed a contract with the Chicago City Railway to equip all the cars of that company with the "H.B." wheelguard.

H. B. Kirkland Company, 253 Broadway, New York, N. Y., has been appointed the New York sales agent for the product of the Chicago Mica Company, Valparaiso, Ind.

Automatic Car Coupler Company, Los Angeles, Cal., has been incorporated by F. R. Bonney, F. H. Norwood, W. H. Soale, K. Elliott and C. H. Wills, with a capitalization of \$50,000.

Dorner Railway Equipment Company, Chicago, Ill., has received an order from the Manhattan City Railway Company, of Manhattan, Kan., for four second-hand closed trailers.

National Lock Washer Company, Newark, N. J., supplying its National "Balance" Curtain Fixture for 200 cars recently ordered by the Third Avenue Railroad Company, New York.

American Bridge Company, New York, N. Y., has been awarded the contract for 1100 tons of structural steel for the new warehouse of the H. W. Johns-Manville Company, New York, at Milwaukee, Wis.

E. W. Pittman, formerly of the Pittsburg Construction Company, has entered the service of the McClintic-Marshall Construction Company, Pittsburg, and is now in charge of the St. Louis office of the latter.

T. N. May, New York, N. Y., has established an office

at 2 Rector Street, where he now is carrying on a general railway equipment and supply business. Mr. May was formerly with the Christensen Engineering Company, the Consolidated Car Heating Company and the Brady Brass Company, New York.

G. S. Ackley, president of the National Brake Company, Buffalo, N. Y., returned to this country on the *Mauretania* on April 3, after an extended business trip abroad in connection with the new Ackley Adjustable brake.

Delta Electric & Manufacturing Company, Chicago, Ill., has been incorporated with a capitalization of \$5,000 to manufacture and sell electrical machinery and appliances. The incorporators are Weldell P. Slayton, Harry E. Kiefer and Frank L. Belknap.

Empire Car Company, Chicago, Ill., has been incorporated with a capitalization of \$15,000 to build and repair railway cars and to manufacture and sell machinery. Joseph B. Koon, P. J. Minogue and M. F. Sullivan are the incorporators.

Botanical Decorating Company, Chicago, Ill., manufacturer of natural preserved plants, artificial flowers, vines, paper novelties and Japanese and papier-mache decorations, will remove its business from 271 Wabash Avenue, Chicago, to 310 Fifth Avenue, Chicago, on May 1.

Jordan Brothers, Inc., New York, N. Y., were mentioned in the issue of April 10 as having received an order for a rotary converter from the Public Service Corporation of New Jersey for its Montclair substation. The item should have stated that the company had received an order for a commutator truing device for the converter described.

W. R. Garton Company, Chicago, Ill., has secured the order for the catenary material of the Chicago, Ottawa & Peoria Railway. The order was taken by the Garton Company in behalf of the Electric Railway Equipment Company, Cincinnati, of which it is the Central Western agent. Several notices in regard to the construction of this railway have appeared in these columns.

Buckeye Engine Company, Salem, Ohio, announces the appointment of Louis Bendit as Kansas City sales manager, with offices at 504 New York Life Building, and J. R. Detweiler, district manager, Wichita, Kan., with offices at 505 Barnes Building. The company has had 62 years of steam engine experience and is also building gas engines suitable for natural or producer gas in various sizes up to 5000-hp units. The steam engines are built in simple, tandem or cross compound types up to 8000-hp units.

Dossert & Company, New York, N. Y., report the receipt of the following large orders recently: 200 solderless, 500,000 circ. mil cable taps, from Chicago City Railway; cable taps for 1,000,000 circ. mil cable, from the Grand Trunk Railway System; 100 large cable taps from the Capital Traction Company, Washington, D. C.; 500 solderless two-way cable connectors from the Pressed Steel Car Company, for use on electrically lighted steel passenger cars; 750 Dossert solderless rail bonds from the Illinois Tunnel Company.

Duntley Manufacturing Company, Chicago, Ill., recently organized under the laws of Maine with a capitalization of \$500,000, has just announced the officers and directors of the permanent organization as follows: President, J. W. Duntley; vice-president, A. W. Maconochie; secretary, F. A. Rautenberg; treasurer, Eugene McComas. Directors: J. W. Duntley, H. W. Davis, M. H. Tichenor, Samuel Deutsch and W. J. Calhoun. The company will manufacture among other things new lines of gasoline handcars and speeders, vacuum cleaners and calculating machines.

American Blower Company, Detroit, Mich., received a letter under date of March 20, 1909, from Provident Chemical Works, St. Louis, Mo., stating that the generator direct-connected to one of the blower company's Type A self-oiling engines, purchased some four or five months before, was doing fine service. The cost of operation has been very small, the company's engineer being confident that it does not exceed \$7.50 per month for about 120 16-cp lamps. The owner believes that the cost of the entire outfit will be saved in less than a year's time from date of instalment.

Fred C. Adams, Chicago, Ill., manufacturer of Palustrol disinfectant, states that this product is being successfully used on the South Side Elevated Railway and the Metropolitan West Side Elevated Railroad, Chicago, Ill., and on several of the large steam railways which have headquarters in Chicago. Palustrol is a product recommended by medical men to destroy all contagious germs. It has been used in the Cook County consumptive hospital, Chicago, Ill., with success for the past three years. Mr. Adams states that he will furnish Palustrol free of charge

to charitable institutions or hospitals maintained for the benefit of the employees of railway companies.

Albany Car Wheel Company, Albany, N. Y., will begin at once the manufacture of chilled iron wheels for steam and electric cars, having recently acquired a suitable foundry. J. A. Kilpatrick is president of the company. He has been in the wheel business for 30 years and is the general manager of the Canada Iron Corporation, Montreal, Que. J. A. MacIntyre, who has been associated with Mr. Kilpatrick for several years, is superintendent of the Albany Car Wheel Company. J. A. Granger, for a number of years with the New York Car Wheel Works, Buffalo, N. Y., and the Griffin Wheel Company, Chicago, Ill., is in charge of sales in the new company.

Keystone Lubricating Company, Philadelphia, Pa., reports a practical test of the economy of pure mineral grease in electric railway work made by the Providence & Fall River Street Railway Company. A car having a new two-motor equipment, geared for about 25 m. p. h., was supplied with lubricants consisting of 25 lb. of Keystone motor grease for the motor and axle bearings at one end, and an equal weight of the ordinary stock grease, that has hitherto been in use by the road, for these bearings at the other end. The car was then put into regular service. A recent report stated that the entire 25 lb. of the ordinary grease and two-thirds of a second charge of 25 lb. had been consumed, whereas less than one-third of the original charge of Keystone grease had been used up.

Cosmos Lubricating Company, Chicago, Ill., is making a lubricating oil which is said to be especially adapted to railway work. The oil has withstood a fire test of 1200 deg. Fahr., has a viscosity of between 580 and 625 deg., and a cold test of between 10 and 14 deg. Fahr., according to the grade of the oil. The grades run from thin to a very heavy oil and from a soft to a hard grease. The combination in one oil of both a high fire test and a low cold test is a feature that is of considerable interest. Another specialty of the Cosmos Lubricating Company is a cylinder oil which it is claimed will not leave a deposit on cylinders. The plant of the company in Chicago is at 9-15 North Ada Street. The directors of the company are J. G. Wiegand, C. H. Wiegand, D. E. Patterson, H. A. Ellithorpe and Charles Heywood.

Climax Stockguard Company, Canton, Ohio, announces that the company has been re-incorporated under the name of the Climax Railway Supply Company. The general offices will remain at Canton, Ohio, and the general sales office, heretofore located at 503 Title & Trust Building, has been moved to 570 Old Colony Building, Chicago, Ill. In addition to marketing the clay and metal cattle guards and the farm-crossing gates which the company manufactures, the new company will act as Western representative of the Nachod Signal Company, the Bonney Vehslage Tool Company, and as the railroad representative of the Durand Steel Locker Company. The officers of the company are H. B. Stewart, president; William Simpson, secretary and treasurer; Fred B. Stewart, vice-president and general manager.

ADVERTISING LITERATURE

Barrett Manufacturing Company, New York, has printed a standard form of roof specification embodying the use of Barrett tarred felt.

Westinghouse Air Brake Company, Pittsburg, Pa., has printed instruction pamphlet No. 5030 on the Type K triple valve. This publication supersedes the issue of May, 1907.

B. F. Sturtevant Company, Hyde Park, Mass., is distributing Bulletins Nos. 161 and 163 respectively, describing economizers as used in the power plants of textile and steel mills.

National Machinery & Wrecking Company, Cleveland, Ohio, has recently published a special bargain list on second-hand railway apparatus, including engines, generators and street car motors.

Delta Electric & Manufacturing Company, 304 Commercial National Bank Building, Chicago, Ill., is distributing a small folder calling attention to its Universal non-inductive ground point, and of the wrench used in installing the point.

Williams Gauge Company, Pittsburg, Pa., is prepared to send on request its publication entitled "Is the Economic Operation of Your Power Plant a Problem?" The booklet discusses the value of the Williams feed-water regulator, steam-operated trap, pump governor and water gage.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has issued pamphlet No. 14, on compact type series and bridging dry battery wall telephones and two-piece desk telephones and pamphlet No. 13 on magneto telephones for electric interurban and steam railway despatching systems.