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### ULTRA-REFINE- MENT IN LOCO- MOTIVE REPAIRS

It has often been remarked by Americans that European locomotives are built like watches, and the regret is implied that similar refinement in workmanship is not to be expected of the American mechanic. This to a certain extent is true. The design, construction and repairs of locomotives in this country have assumed simplicity as a keynote, and in consequence there has been developed a class of railway mechanics to whom 1/32 in. has become absolutely meaningless. Superficially this might be considered unfortunate, but on the other hand there seems little reason for working to 0.001 in. on bearings which will be running 1/16 in. loose long before the time when the engine is considered ready for an overhauling. In this country it is a rule that the needs of economical operation are best conserved when the locomotive mileage is kept high, and this in turn means long intervals between shoppings together with the minimum of tinkering between trips. Parts so designed as to require extraordinary care and skill in fitting are not likely to survive either the heavy stresses or the rapid wear of railway service, and a construction which involves their use should be changed in preference to the alternative of keeping the engine out of service while delicate adjustments are being made.

### THE SATURATION OF THE DOLLAR

Although the address recently given by Samuel Insull before the Investment Bankers' Association in Chicago dealt specifically with the subject of electrical securities, several points were brought out that may be of interest in the electric railway field, particularly in the case of companies having both transportation and light and power properties. According to Mr. Insull, there are

two classes of engineering—engineering as it is usually understood, which deals primarily with construction, and selling engineering, which covers the getting of business after construction. We agree with Mr. Insull that too much importance can hardly be attached to the latter. In most circumstances when the construction engineer has completed his work the capital investment is fixed until further additions or betterments are necessitated, and it becomes the problem of the selling or commercial engineer to make the best possible showing for the investment by keeping every dollar of it working as many hours per day and as many days per week as is possible, with due regard to the safety of operation and the permanency of service. The question of filling up the valleys in the load curve through the recognition of the diversity of load factor thus becomes one of unlimited importance. Mr. Insull uses a particularly felicitous phrase in this connection—"the saturation of the dollar." In explanation he says that the investment per customer of the Commonwealth Edison Company has been lowered, the output raised and the relation of income to investment changed from 13½ per cent in 1898 to 21 per cent in 1912. In other words, through the activities of the selling organization every dollar of the capital investment has been made to work harder and its potential energy has been increasingly transformed into a kinetic energy that brings in more dollars and cents.

### VOCATIONS OF COMMISSIONERS

The vocation of men appointed to serve as members of public service commissions is receiving greater attention than it did a few years ago. Experience has shown the need for careful consideration of this matter. In the past lawyers have generally predominated on commissions. It is recognized that many of the issues brought before a commission require legal consideration and lawyers are especially qualified by their training to write the decisions which are a large part of a commission's work. It has been found, however, that other knowledge and experience than those provided by a study of the law are really essential in commission membership. At present a movement is under way looking to the appointment of engineers on the Public Service Commissions of New York State. This is clearly in the interest of a well-balanced study of regulative issues. The lawyer needs the judgment of the engineer, and the engineer needs the ability of the lawyer. Both can serve the public working together as equals better than if one was the recognized employee of the other. An illustration of the tendency in commission membership which should be commended is that of the appointment of S. L. Tone, of Pittsburgh, to the new Pennsylvania commission, which will assume jurisdiction over utilities on Jan. 1 1914. There can be no question regarding Mr. Tone's technical

qualifications. He is well equipped to act on questions affecting the operation and finances of public utility corporations. The fact that he comes from a public utility company makes him better able to understand the problems of such companies. He will not need to take time to acquire a preliminary acquaintance with public utility questions, as has been found necessary by members who have taken office in some of the other new commissions. As we stated long ago, we see no reason why capable men should not pass from public utilities to public service commissions, or from commission service to company employment. There ought to be nothing in the service of one which should deprive a fair and judicial-minded man from employment by the other. A fair settlement of the problems is the desired and, in fact, the necessary end of regulation by commissions if that regulation is to be successful.

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#### BUS OPERATION HERE AND ABROAD

Mr. McCollum's report to the Board of Estimate and Apportionment, city of New York, on the respective merits of the street car and omnibus is a most illuminating document. As presented in our abstract in this issue, he shows that the wide use of the motor bus in England is not owing to any overwhelming technical or economic superiority of the bus over the tramcar. It has been due chiefly to the fact that the bus business has been free to expand at will, whereas the tramway system throughout Great Britain has been shackled by the most archaic restrictions and by discriminative, if not oppressive, taxation. Moreover, there is a striking difference in the assistance to the development of the city as a whole on the part of each transportation enterprise. The street railway system covers the city and necessarily must take the lean with the fat; the bus operator need serve only the routes that seem surely profitable. Such facts as the foregoing have been stated before, but this time they are brought home to the American operator owing to the fact that this report was prepared because four different applications for bus franchises are now before the city of New York. In commenting on the lessons of European experience, Mr. McCollum takes the broad and just ground that the question must be solved from the standpoint of the general welfare and with due regard to the money now invested in good faith for street railway service. He would not countenance bus operation over routes which are already adequately served with traffic facilities nor grant franchises which did not place buses under conditions of control similar to those applied to street railways.

To the investor a comparison of operating and ultimate costs of buses and street railways is of vital moment, but the question of broader interest is: Which form of transportation is most beneficial to the public? Mr. McCollum's figures indicate that the superior schedule speed of the bus is due largely to the fewer stops consequent upon its smaller capacity, and he points out further that speed restrictions upon motor buses are a dead letter, at least in London. If one should build a bus of capacity equal to a given car, it would be far larger and probably no faster. This statement is confirmed by the calculations of J. B. Hamilton, general manager Leeds Corporation Tramways,

who has found that the seating capacity of the average British motor bus is but 60 per cent of that of a tramcar, and that even its greater speed and flexibility do not enable it to earn more than 80 per cent as much as the car. It appears then that even in England, where the street cars are notoriously slow, the bus falls 20 per cent behind in capacity. It cannot be too frequently emphasized that, with the ever-increasing congestion of our city streets, capacity is the keynote just as it has been in the electrification of congested steam railroad lines, and that maximum capacity has not yet been attained with a vehicle which must carry its own power station. Under such unequal conditions as prevail in England, the bus can injure the street railway but it cannot do the work of the street railway with the same satisfaction to the public.

Much has been made of the ability of the bus to go anywhere, but it is doubtful whether this feature is one that is appreciated by the unfortunate pedestrian. The accident figures quoted by Mr. McCollum show that the flexibility of the bus is indeed a source of great danger on crowded city streets. With all the foreign experience before them, it is inconceivable that the authorities of New York or other large American cities will be willing to permit the unrestricted development of bus service. If the bus is placed on a parity with the street railway, its principal field for city service will be on "show" streets at fares *de luxe*.

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#### HOW ABOUT THE THREE-WIRE SYSTEM?

Might it not pay at this stage of affairs for engineers to take up again and carefully consider the use of the three-wire system for street railway service? As our readers will remember, it was tried on at least three systems in the United States nearly twenty years ago and after a relatively short period was abandoned. It was also tried with a moderate degree of success abroad yet has been dropped out of account in all recent European construction. Now, a good many things tried and abandoned early in the art have been at later stages taken up again and worked out to a successful conclusion, and the New York, New Haven & Hartford Railroad is planning to make just such a revival of three-wire working with its 11,000-volt, single-phase overhead conductors. In this system, which is briefly outlined in a paper read by H. Parodi before the British Institution of Electrical Engineers, the running rails would be connected to the center of a 22,000-volt transformer with its terminals connected to the overhead conductors for adjacent tracks, the primary being in series with the 11,000-volt generator. Consequently the voltage between each track conductor and the rails would remain at 11,000 volts, although the transmission of power would be accomplished at 22,000 volts, provided the loads on the two tracks were balanced. The feeders for the overhead lines could, of course, be transposed as often as desired to reduce inductive interference with telegraph lines and to assist in balancing the system, the rails remaining neutral at all times and carrying current only over short stretches.

In early installations for street railways there were two practical objections to the three-wire system—first, complication on the switchboard and in overhead crossings,

and, second, the difficulty in practice of getting such a degree of balance as would insure a good degree of saving in the conductors. These objections were originally valid, but it is an open question whether they are necessarily valid now. The burden of feed wires is getting progressively more and more serious as the distributions become more and more extensive, and if any considerable measure of relief can be obtained by three-wire distribution the subject deserves at least a thorough re-examination.

The two difficulties mentioned are to a certain extent concurrent, for the difficulty with overhead conductors is largely dependent on the particular arrangement required by the overhead service. The scheme in the early stages of the art was tried in several forms, sometimes by working the cars on the two sides of a double track, plus and minus respectively, and again by the use of a zone scheme of distribution or the arrangement of certain districts plus and minus. The saving in copper secured is almost entirely dependent on the details of this overhead distribution, and this therefore is, from the economic standpoint, the first thing to be worked out. The main trouble in such a distribution would seem to be due to the extremely shifty character of the load imposed by a railway system. The wandering of the load, in fact, is one of the principal troubles in electric distribution generally.

We are not aware that details of any close study of the subject have ever been made public, and it would certainly be worth while for someone to go into the matter thoroughly, showing the variations of load in some city throughout a given distribution territory at various hours. This could readily be done, following the principle of a relief map of which the ordinates should be the normal loads in various sections, and a series of such maps modeled to show the topographical load conditions at various hours would give a wonderfully good insight into the distribution conditions which would have to be met in applying a three-wire system. In studying the details of the matter it might be necessary to consider the two sides of a double-track line separately as making contiguous stretches of hills and valleys.

With such data at hand the first step toward the study of the three-wire situation would have been taken, and an examination of the data would readily show how great a saving in copper could be accomplished. The possible gain might then turn out to be worthy of further study in the details of overhead work in switching arrangements. Our general impression is that the early trials showed a saving insufficient to justify the added complication, yet those particular conditions may not now hold to anything like the same extent. Certainly complications are less to be feared than they once were, considering the advance which has been made in material and methods.

In lighting and general power service the three-wire distribution is, of course, standard, but lighting and power service differs from street railway work very widely with respect to the magnitude and character of the wandering load. This is the thing which primarily needs to be determined, and the task would be an extremely interesting one for some of our engineering schools to take up in a study for advanced students as a preliminary to an investigation from a rigorous engineering standpoint.

## RECTITUDE IN RAILWAY AFFAIRS

An editorial in the last issue of the *Railway Age Gazette*, which we reprint in this issue, calls attention to the growing tendency of the public to hold railroad officials to a very strict code of ethics in connection with their relations with those who sell supplies to the railroads. The point to which attention is called particularly at this time is that of the giving of Christmas presents by representatives of supply companies to officials of railroad companies, a practice which the *Age Gazette* says is on the wane but is still in evidence to some extent. The argument is made, not that such an act is necessarily dishonest, but that, in the glare of publicity in which all railroad officials from now on must expect to live, any practice which has even the appearance of evil is reprehensible and will react on both giver and taker.

During the present week we have instances of the investigation being conducted into the effect which the outside enterprises of the officers of the 'Frisco may have had upon the recent receivership of that railroad and the statement that in Louis Brandeis' opposition before the Interstate Commerce Commission to the increase of freight rates in New England he will go thoroughly into the question of interlocking directorates and will seek to determine to what extent they have influenced the orders placed by the companies for supplies and any other business relations of the railroads.

There is no doubt that the codes of morals formerly thought adequate will no longer be considered to apply. An example of the extent to which the large steam railways have gone to avoid even the appearance of any scandal is shown by the rules put in force two years ago at the annual convention of the Master Mechanics and Master Car Builders at Atlantic City in June. Formerly, all entertainment at these conventions was furnished by the manufacturers, but, beginning two years ago, the railway associations insisted that the expense of the entertainment should be cut down to the simplest character and that all expenses should be defrayed jointly by the railway associations and the supply association in the proportion in which the attendance at the convention represented the supply men or the railway men. Even the provision for the free use of roller chairs was abolished in the endeavor to avoid all ground for suspicion.

We have referred to this subject not because we believe that there is any extensive practice in the electric railway field of this kind which should be checked. We cite the matter simply as an evidence of a changing condition. Electric railway officials are no less liable to examination in connection with these matters than steam railway officials. If they are not subject to the Interstate Commerce Commission, their acts are open to review by the state commissions, and at no previous time has there been a closer scrutiny of the financial affairs of the electric railway companies than at present. As our contemporary says, it behooves every railroad man to put his "house in order," so that, in case the question should be raised, the investigators will not find anything connected with the company or with the acts of subordinate officials which the manager would not like to have found or on which a wrong construction might be placed by the public at large.

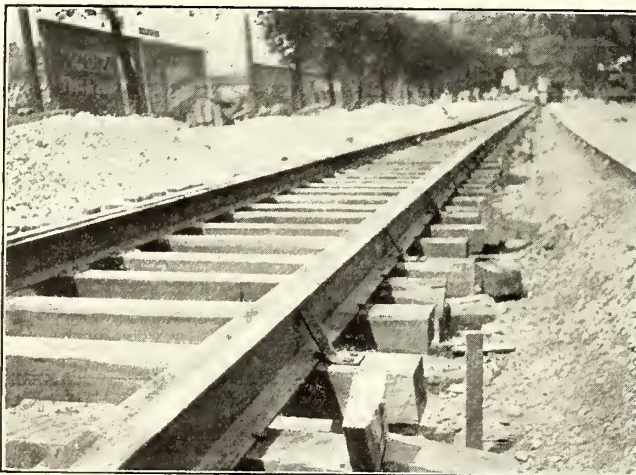
# Cincinnati Traction Company's Track Construction Methods

During the Past Few Years This Company Has Been Engaged in a Large Amount of Track Rehabilitation and by the Establishment of a Standard Form of Construction and Standard Methods of Installation the Work Has Been Highly Systematized, Resulting in Very Material Reductions in Cost

During the past few years the Cincinnati Traction Company has engaged in a large amount of track rehabilitation and construction, as it has approximately 230 miles of wide-gage track (5 ft. 2½ in.), of which a large part has reached the limit of its life under existing traffic conditions. Prior to beginning construction on a large scale the company adopted a standard track design for both extensions and rehabilitation. It consisted of 140-lb., 9-in. girder-grooved rail, laid on 6-in. x 8-in. x 8-ft. white oak ties and spaced at 2-ft. intervals, the ties being embedded in 14 in. of 1:3:7 concrete. This provides a sufficient depth of concrete to obtain 6 in. or 8 in. of foundation under the ties and at the same time serves as a base for the pavement. The paving is granite block laid on a 1½-in. sand cushion with 1:2 sand and cement grout filler.

Tie rods were not used in the construction owing to the difficulty in obtaining workmen who could lay uniform joints in the pavement around them, and they were re-

used when it is impossible to divert traffic from a parallel track or when a temporary track cannot be laid in the street. If the material is removed by wagon, it is hauled to some convenient dumping ground, and it removed by cars it is taken to the railway company's property in need of filling material. At its material yard the street railway company has about ½ mile of track on steel ties assembled in 30-ft. lengths. This is used where it is necessary to lay a temporary track on the street surface. A locomotive crane is employed to load this track onto flat cars, and after the track sections have been set on the pavement at a construction job, they are bolted together with angle bars. The railway company also has several portable cross-overs and a portable Y. The latter is used to turn cars where a portion of the old track is disconnected during the construction period. In many instances, however, one of the old double tracks is used as single track during the reconstruction work, and Kerwin portable cross-overs are



Cincinnati Track Construction—Standard 9-in., 140-lb. Girder-Grooved Rail Track Construction

placed by pressed-steel rail braces installed at every fourth tie. These rail braces are spiked independent of the rail, which is fastened to the tie with one spike on the inside and two on the outside of the base. A cast-welded joint, 13 in. in length, requiring about 200 lb. of metal, is used in all standard construction. Iron low in sulphur is specified for these cast joints, and in order to maintain the low percentage of sulphur coke is employed as a fuel in the melting process.

## EXCAVATION

The usual procedure in rehabilitating or constructing new track in paved streets has been carefully planned. According to a prearranged program, any section of track to be rebuilt is given over to the construction department, regular service being either detoured over connecting lines or handled by means of a temporary track laid on the street surface. Following the removal of traffic, the old track is torn up to make way for a Thew electric shovel, which excavates either concrete or earth. Generally the bottom of the trench made by the power shovel is about 21 in. below the surface of the street. The excavated material is loaded into wagons or dump cars, the former being



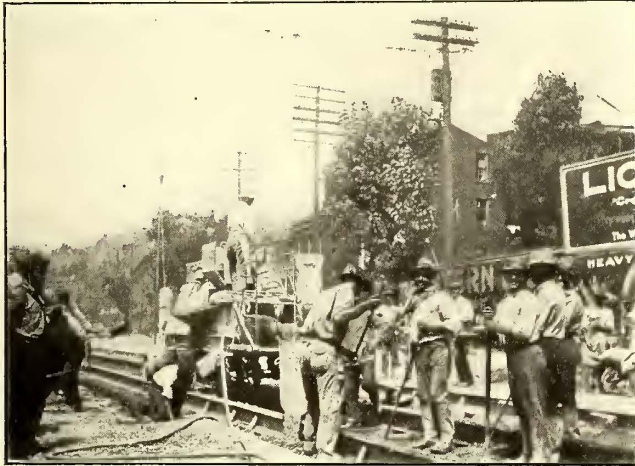
Cincinnati Track Construction—Double-Sheared Plow Casting Used to Remove Concrete Beam from Rail

provided at frequent intervals to facilitate car movements.

Some of the old lines now undergoing rehabilitation are of concrete beam construction. One of the difficulties experienced in tearing up this type of track to make way for the electric shovel has been the removal of the rail which is partly incased in the concrete beams. The cost of breaking the concrete away from rail by hand was found to be not only expensive but too slow for practical purposes, and a novel means was devised to accomplish it both quickly and economically. A section of 85-lb. A. S. C. E. rail was securely bolted to the rear truck of the locomotive crane and bent from the horizontal so that the projecting end was in contact with one-track rail. A cast-steel shoe was then bolted to this projecting end. This shoe was provided with a slot to fit over the ball of the rail and between the under side of the rail groove and the rail base on the inside of the track. The casting thus serves as a double-pointed plowshare or rooter, and as the crane car moves forward the concrete is wedged away from the web of the rail on one side. After the concrete has been separated from the rail the remainder of the beam is broken up and removed by the electric shovel.

After the bulk of the material has been excavated by the electric shovel, the final subgrade surface is prepared by hand. This work is followed by thoroughly rolling the trench with a 7-ton or 10-ton road roller. The next step in preparing the subgrade is to excavate a small trench, 1 ft. wide x 1 ft. deep, at the center of the track. An

plates which are removed when the permanent joint is applied. As a rule the delivery of crushed stone and sand follows the track laying, so that the cars on which they are loaded may be run over the new track and the stone or sand dumped on the shoulder of the trench. All material is distributed with a view of eliminating unnecessary



Cincinnati Track Construction—Discharge End of Concrete Mixer



Cincinnati Track Construction—Charging End of Concrete Mixer

ordinary 4-in. farm drain tile laid with open joints is placed in this trench on a 3-in. layer of washed river gravel. A second 3-in. layer of washed gravel is deposited over the top of the tile and thoroughly tamped around it, care being taken, however, to keep the tile in perfect line and surface during tamping. The top layer of gravel is covered over with earth, which is also packed with tampers. This track drain is connected to the city sewer system at intervals of 600 ft. where the track grade is continuous and at all breaks in grades. Surface drainage is provided by concrete inlets set in the flangeways inside the rails. Every precaution is taken in applying the grout filler to make the pavement thoroughly waterproof.

TRACK LAYING

After the subgrade has been prepared, the ties are brought to the job in dump cars which run on the track paralleling the one undergoing reconstruction. The side boards on one side of these dump cars are raised so that the ties will slide into the trench when the car is tilted. As a general rule ninety ties are loaded in each car, and they are dumped at intervals so that the distributing may be done each way from the tie pile. After the ties have been spaced in the trench, the outside end of each tie, if in double track, is marked at a uniform distance from the end. This mark indicates the outside position of the rail base when it is spiked to the tie. The gang of spikers on

handling. A sufficient quantity of cement for each day's run is delivered to the work by wagons, and this is set on the sidewalk close to the curb line. While the concrete materials are being delivered the new track is surfaced on 6-in. x 6-in. x 12-in. yellow pine blocks with shims and wedges to take up slight variations in alignment and surface.

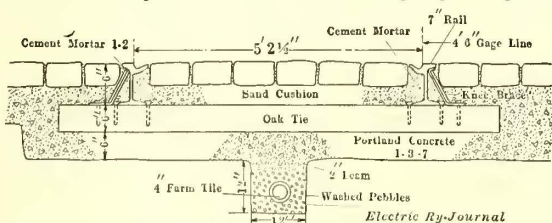
CONCRETING AND PAVING

At this point in the progress of the work an electrically operated concrete mixer is run onto the new track. This mixer is of the continuous type, and energy for its operation is obtained through a pole and flexible cord connection to the trolley wire.

During the early stages of the construction work the continuous mixer was operated in connection with a batch board, the mixed concrete being dumped on it and shoveled to the point where it was required in the trench. However, this necessitated four shovelers on the batch board in addition to the workman who dumped the concrete under the ties and leveled it off, and to reduce the number of men a pivoted spout was attached to the discharge end of the mixer, which made it possible to deposit the concrete where it was required. This arrangement permitted a reduction of five men in the concrete gang and represented a saving of \$10 per day. Other slight modifications have also been added to the machine to produce maximum economy in operation.

In the construction and rehabilitation work during the past summer an average of approximately 200 cu. yd. of concrete had been placed each ten-hour day. This quantity of material was handled with twenty-five men in the concreting gang, divided as follows: Two men shoveling stone, four men shoveling sand, three men handling cement, three men tamping ties, one man flat-tamping, one topman, one spout man, one water boy and a foreman. In order to maintain a continuous discharge of mixed concrete, the men shoveling stone were divided into two gangs of five each which alternately rest and shovel at ten-minute or fifteen-minute intervals. With this force an average cost, dependent upon local conditions, of between 28 cents and 33 cents per cubic yard for labor and superintendence has been obtained.

After the foundation has been in place a sufficient length of time to set, the sand cushion is cast in place and leveled

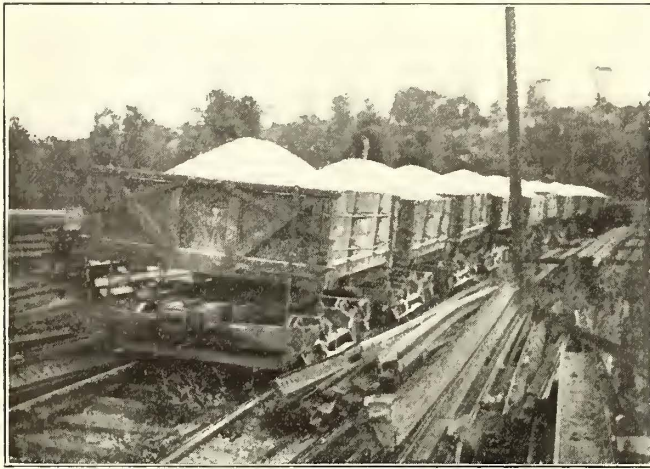


Cincinnati Track Construction—Cross-Section of Standard Track

the outside rail works a little in advance of the gang on the inside rail and adjusts the ties to the mark.

The girder-grooved rails are transported from the material yard to the construction work on a crane car. The rails are unloaded into the trench, and before they are spiked in position they are connected temporarily with fish-

with a wooden templet. This is followed by the paving gang, which lays the granite block in place in the track allowance and applies the grout filler. Openings in the paving surface and concrete foundation are left around the rail joints, and these are filled after the rail joints have been cast-welded.

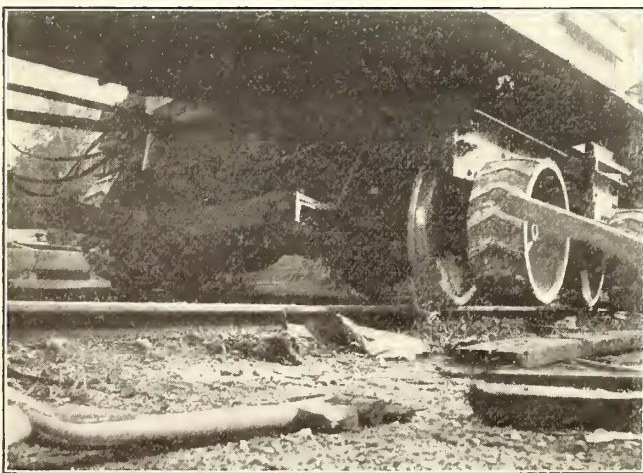


Cincinnati Track Construction—Type of Dump Cars Employed in Track Work

In welding the rail joints the temporary joint plates are all removed and replaced by steel plates which form the cores around which the cast joints are poured. Before any joint is welded, however, the rail surface is cleaned of all scale by a sand blast, after which the molds are set in position and packed so that there will be no leakage of the metal around them. After the welding operation is complete and the remainder of the pavement has been laid, all joints are ground to obtain a uniform surface across the abutting rails.

#### LABOR-SAVING EQUIPMENT

Almost all classes of track material are delivered by steam roads at a large material yard, where they are held in storage until needed. Ties are unloaded from the cars by the use of roller conveyors. Stone and sand are unloaded by a crane with a clam-shell bucket either into bins



Cincinnati Track Construction—View Showing Application of Traction Wheels and Motor to Truck of Electric Shovel

where the material is retained in storage or direct into dump cars for transportation to the construction work. Rails and special work are also handled by cranes, and scrap iron and steel is loaded into cars by an electromagnet.

The electric shovel previously referred to is of the Thew automatic type. Two novel improvements have been added

to it, however, since it was received from the manufacturers, and they have greatly increased its efficiency in operation. A GE-800 motor has been mounted on the shovel truck, and it is connected to the back axle by reduction gears and to the front axle by a chain and sprockets. This extra motor was added to make it possible to propel the shovel over the street railway tracks at a higher speed than was attainable by the self-propelling gear mechanism which originally accompanied the shovel. The other feature which has been added to the shovel consists in a 24-in tractor wheel mounted beside each one of the four 26-in car wheels on an extension of each axle. The tractor wheels have 9½-in. ribbed flanges. Both the car wheels and tractor wheels have been applied to the extended axle with a taper fit, and their application makes it unnecessary to provide a temporary track in the trench at the time the shovel is in operation. When the shovel begins work the temporary track is stub-ended where the trench begins and as soon as the car wheels leave the rails the load is transferred to the tractor wheels. The shallow trench excavated by the shovel makes a comparatively rapid forward movement and to accomplish this without a temporary track would require either exchanging the car wheels for tractor wheels or else the construction of a temporary track in the trench. The presence of tractor wheels on the truck makes both of these operations unnecessary.

#### A REMARKABLE DELAY RECORD

An example of what may be accomplished toward eliminating failures of single-phase motor-car equipment will be found on the New York, Westchester & Boston Railway. During the months of August and September of this year only two delays due to the cars or equipment occurred, one during each month, although the trains operated for the two months numbered respectively 6321 and 6115. The following table gives the delay records in detail:

GENERAL STATISTICS		
	August	September
Total number of trains operated.....	6,321	6,115
Total number of trains delayed.....	40	44
Total number of trains on time.....	6,281	6,071
Percentage of trains on time.....	99.37	99.28
Trains delayed between five minutes and fifteen minutes .....	39	44
Trains delayed more than fifteen minutes.....	1	0
CAUSES OF DELAYS		
Delayed on tracks of N. Y., N. H. & H. R.R.....	25	29
Failure of power supply.....	9	9
Delayed by signals (not signal failures).....	5	5
Failure of equipment.....	1	1

In explanation of the above causes for the delays it should be stated that the New York, Westchester & Boston Railway reaches its New York terminal after a run of several miles over the tracks of the New York, New Haven & Hartford Railroad, which crosses a navigable stream by means of a drawbridge not far from the end of the Westchester tracks. Practically all of the delays from late delivery were due to this cause, the remainder being caused by trains held up for operating reasons in passing through the New Haven terminal yards.

The delays due to failures of power supply were brought about by temporary interruptions of the service for various electrical reasons outside of the lines of the railway company. Power is purchased from the New Haven Railroad power station at Cos Cob and is transmitted over a line about 13 miles in length.

The delays on account of signals should not be classed as equipment failures of any kind but rather as operating failures because they were caused by trains being properly held by stop signals either on account of regular trains in advance or the unexpected presence of work trains or cars on the line. No signal failures occurred during either of the two months in question. Of the two equipment failures, one was really chargeable as a "man failure," the motor-man having been unable to discover and remedy the cause of a minor difficulty with the air brakes.

# The Illumination of Street Railway Cars\*

The Authors Discuss the Changes in Methods of Lighting Which Have Been Brought About by the Introduction of Tungsten Lamps, Outlining the Effects of Reflectors and Interior Coloring and Giving the Results of Tests on Several Different Lamp Arrangements

BY L. C. PORTER AND V. L. STALEY

Until very recently little has been done toward improving the lighting of street cars. Modern methods of efficient and economic illumination have been in vogue in almost every other phase of industrial, public and private enterprise. So far, however, the great majority of street cars are lighted with the clear, bare carbon lamps. While these lamps may have given sufficient light for reading purposes when a car system was originally built, they very soon became inadequate, owing to increase in street railway schedules, growth of the community, etc. Even under the best of conditions, the lamps as installed without shades or reflectors do not afford efficient utilization of the generated light; nor is the lighting free from annoying glare. At certain rush hours there is a drop in voltage, which with carbon lamps produces a marked decrease in the illumination. When the tungsten-filament lamps were produced, it was recognized that they had characteristics which made them highly advantageous for railway service. Their increasing resistance with increase of voltage was a large advance toward steady illumination with fluctuating voltage, and their high operating efficiency enabled a large increase in illumination with actual reduction in energy consumption. The tungsten pressed filaments at first manufactured were too fragile to withstand the severe vibration of street car service, but now the strength of the lamp is such that it withstands even surprisingly bad operating conditions. With its high efficiency, about 1.25 watts per candle, it has practically eliminated the use of the tantalum lamp.

The first of the recent changes in the lighting of the car bodies has consisted in replacing the carbon lamps, lamp for lamp, with 23-watt or 36-watt tungsten lamps. This brought about an increase in the illumination at normal voltage of 6 per cent where 23-watt tungsten lamps were used and 66 per cent where 36-watt lamps were used. At 80 per cent normal voltage there was an additional increase of 43 per cent over the carbon, due to the better regulation of the tungsten lamps. This gain was obtained at a power saving of 65 and 44 per cent respectively, depending upon whether 23-watt or 36-watt lamps were used.

Owing, however, to the very high intrinsic brilliancy of the tungsten filament in the lamps, the glare was increased, so that it became quite evident. It was also realized by illuminating engineers, from tests which had been conducted on various installations in buildings, that a large percentage of the total light flux generated by the lamps was being wasted. This was due to the fact that much of it fell on dark walls and headlining and was largely absorbed or passed out of the windows. In other words, the lighting with clear bare lamps was neither comfortable nor efficient. This led to a study of possible reflector equipments.

Investigation showed that the use of scientifically designed reflectors giving the so-called intensive type of distribution would not only largely reduce glare but also raise considerably the efficiency of light utilization of the installation. It was found that two principal reflector locations could be used to advantage, one being the use of a single row of lighting units down the center line of the

car—i. e., center-deck lighting—and the other being a double row of units, one down each half deck. As far as uniformity of distribution, absence of sharp shadow and efficiency were concerned, either method gave equally good results. The center-deck system, however, had the advantages of fewer fixtures to install, less wiring, less cleaning and maintenance and the use of larger, hence stronger and less expensive per candle-power, lighting units. That is to say, both initial installation and maintenance costs were lower with this system. In the center-deck system lighting units were also placed higher and a little further out of the direct line of vision of seated passengers. For both systems the lamps were wired on alternate circuits.

The question of the intensity of light required is one which has had considerable attention. It has been found that from 2½ to 3 ft.-candles were desirable on the reading planes (45 deg. and 3 ft. above the floor), or the position in which the average reader holds a paper. With either center-deck or half-deck lighting, where efficient intensive type reflectors are used, approximately 82 lumens per running foot of car body will supply this illumination. With the present efficiencies of the railway tungsten lamps this corresponds to about 10 watts per running foot, or 1.25 watts per square foot of floor area. Indirect or semi-indirect lighting systems have also been tried. These required the use of very light headlining, and even then it is necessary largely to increase the energy required for direct-lighting systems. Glare, however, is practically nil. The power required, together with the necessity of frequent cleanings of both reflectors and headlining for satisfactory service, and the low head room in street railway cars, makes the direct-lighting system usually preferable.

There are many types and styles of reflectors on the market both for direct and indirect lighting. Many of these are perfectly satisfactory for car use, choice of the particular type being dependent upon the artistic taste of the individual making the selection. A few general considerations, however, were found applying to all types.

## FIXTURES AND REFLECTORS

The passengers in a street car must be protected against accident. With the addition of glass reflectors to the car comes the need of some form of special holder which will absolutely insure the reflector against jarring loose and falling. Several types of holders have been designed to meet this demand. Of these, two have proved very satisfactory. Both of these utilize a cone-shaped wedge which screws down, thus forcing springs against the neck of the reflector and locking them there. One holder uses spring fingers, the other a coiled helix to grip the reflector neck. These holders also contain the lamp socket and can be either screwed or bolted to the car. Another holder is under construction in which a spring is used for the socket of the lamp shell, similar to the marine type socket. This will absolutely prevent the lamp from shaking loose.

Even the very best holder requires the use of a good rugged reflector. These should be made of fairly heavy glass to assure their strength. For direct lighting either clear prismatic or opal glass reflectors will give excellent service. If satin-finish or sand-blasted reflectors are used, more frequent cleaning is necessary to maintain their efficiency. For the average car having a ceiling of 7 ft. to 8 ft. and a width of 8 ft. reflectors giving the intensive

\*Abstract of a paper read before the Chicago Section of the Illuminating Engineering Society, Nov. 12, 1913.

type of distribution were found to give the most satisfactory results. The intensive type of distribution was found best because it delivered the greatest percentage of the total generated lumens or light flux where it was most needed, namely, on the passengers' reading matter. Opaque reflectors are not recommended for direct-lighting systems because of the dark, gloomy appearance they give to the ceiling. For indirect lighting, however, they are excellent.

Reflectors should be used which have sufficient depth to prevent the lamp filament from being visible to any except the passengers almost directly beneath the lighting units. Any system of semi-indirect or indirect lighting requires a very light headlining, which should have a matte surface. If a glossy surface is used, the direct reflection of the lamp filaments may result in considerable objectionable glare.

#### INTERIOR CAR FINISH

The question of the color and finish of the interior of a street car is one which warrants a great deal more attention than has so far been given to it. Whether the lighting system be indirect, semi-indirect or direct, the finish of the car has a very appreciable effect not only on the resultant illumination but also upon the passengers' comfort. A light color finish has several advantages. It gives the car a cheerful appearance and in this manner serves indirectly as an advertisement for the railway company. It makes the contrast between the lighting units and the rest of the car less conspicuous, thus making the illumination more pleasing. Of still more importance, however, is the fact that with a light finish a considerably higher percentage of the light is reflected down on the reading plane.

Tests have shown that with the common dark-yellow finish of street cars the efficiency of light utilization is approximately 15 per cent where no reflectors are used and 30 per cent with a good direct reflector system. In one car in which the finish of the walls and ceiling was white as high as 60 per cent utilization efficiency was obtained. While it is in most cases impracticable to use white finish, a great deal of improvement is possible over present practice. Upon the finish of the car depends to a certain degree the amount of light that it is necessary to furnish. This in turn involves the type of illuminant used.

#### LAMPS

The first incandescent lamps used were the 16-cp, 64-watt carbon lamps. They were especially selected for the amperes to burn in series. Later the 54-watt gem or metallized carbon lamps came into considerable use. These were followed by the 40-watt tantalum and the present four sizes of tungsten lamps.

On a system having considerable voltage variation between different points lamps should be chosen whose voltage approximates the average voltage of the system, taking into account the time element and distance factor. Tungsten lamps have several very decided advantages over carbon lamps. Owing to their positive temperature coefficient, their candle-power changes less on fluctuating voltage. Thus on low voltage at the ends of a long line during the rush hours, or in climbing hills, they will still give considerable illumination when carbon lamps may be practically extinguished. Their power consumption per candle-power is very much lower than carbons and their light is whiter.

Improvement in the method of drawing tungsten wire, of course, resulted in improved strength of tungsten lamps. This, together with advancement in the methods of mounting, makes possible the use of these lamps under the severest conditions of street car service. The lamp manufacturers are now able to draw tungsten wire to exact diameter. This assures the fact that in series operation all lamps will operate at the same efficiency. Lamps of exact amperes instead of those covering a range can be supplied. Thus the railway companies can be sure of obtaining at

any time lamps which will operate satisfactorily in series with those already installed, resulting in uniform brilliancy.

It is present practice in the manufacture of tungsten railway lamps to use one size wire for each size lamp, regardless of voltage; that is, the filament diameter is selected for lamps of a certain wattage rating at 115 volts and cut longer or shorter, depending upon the voltage desired. Hence the wattage of the lamps will be slightly higher for voltages above 115 and slightly lower below that figure; but this variation is not great enough to be objectionable. Street railway lamps are operated at a slightly lower efficiency than those for regular multiple service, chiefly to obtain the long life necessary to justify their higher first cost with very low power rates.

Four tungsten lamps have been especially developed for railway service, namely:

23-watt S-19	bulb operating at 1.34 watts per candle
36-watt S-19	bulb operating at 1.34 watts per candle
56-watt S-21	bulb operating at 1.20 watts per candle
94-watt S-24½	bulb operating at 1.20 watts per candle

All four types are giving a laboratory life of 2000 hours and are so rated in the manufacturer's data books. This life under service conditions may be estimated at 1200 to 1500 actual burning hours. From these figures it is easy to see that these lamps are economical. Take, for example, a 34-ft. car equipped with twenty-five lamps. If 64-watt carbons are used, the following figures are obtained:

Renewals per hour; cost of lamps at list price of 14 cents (14 cents × 25 ÷ 1200 hours).....	\$0.0029
Cost per hour of energy delivered at the car, 1600 watts at 1 cent per kw-hour (64 × 25 × 1 cent ÷ 1000).....	0.0160
Total .....	\$0.0189

If 23-watt tungsten lamps are used, by similar calculation the results will be:

Lamp renewals (35 cents × 25 ÷ 1200).....	\$0.0075
Energy (23 × 25 × 1 cent ÷ 1000).....	0.0057
Total .....	\$0.0132

This shows an actual net saving of \$0.0057 per car hour, in addition to obtaining better illumination. If ten 56-watt tungsten lamps and reflectors are used, the saving becomes \$0.0096 per car hour, while the useful illumination is practically doubled. This saving in 1466 hours' operation would pay for the eight reflectors and eight special holders necessary. Thus, after five months' operation (at ten hours per night) the equipment will have paid for itself, and from then on a clear saving of \$0.0096 per hour would accrue to the company, to say nothing of the advertising value of well-lighted cars. This saving on 500 cars (assuming that 33⅓ per cent of them are lighted on an average ten hours per night) amounts to \$5,670 per year; and who can state the advertising value? The ultimate saving will eventually warrant the rewiring of old cars to enable the use of tungsten lamps and reflectors. Where new cars are under construction the installation cost to the builder will be lower with the tungsten lamp and reflector system.

In order to check up the estimated advantages of the use of tungsten lamps in street railway service, a considerable number of both illumination and service tests have been conducted. As a result of these tests several railway companies, both large and small, have standardized the tungsten lamp and reflector center-deck system of car lighting, are having it installed in all new cars and are rewiring some of the old ones.

#### TESTS

It may be of value to give a brief summary of tests conducted on typical types of cars and typical lighting equipment. In Table I tests A and B were made on ordinary small cars, A being lighted by the not uncommon systems of grouping 64-watt carbon lamps on the center deck. In car A there were four lamps in the center of the car, two lamps located 4 ft. to each side of the center and one at each end. This resulted in very uneven illumination, there being a maximum of 9.75 ft.-candles in the center of the



car, which fell to 1.5 at the ends. Car B was a similar car, lighted with five 56-watt tungsten lamps and clear prismatic reflectors in the car body. The illumination in this car was very uniform, having a value of 6.5 ft.-candles in the center and 2.25 at the extreme ends. This was ob-

on the question of glare, to call attention to the fact that the more light thrown directly in the eyes of an entering passenger the more brightly illuminated will the car appear. To an outside observer or an entering passenger at first glance the car lighted with properly diffused light

TABLE I—SUMMARIES OF RESULTS IN DIFFERENT LIGHTING TESTS

Railway Company	Size of Car Body	Interior Finish of Car Body	Lamps Used in Car Body	Average Foot-candles on 3-Ft. Horizontal Plane	Lumens per Sq. Ft. in Car Body	Effective Lumens per Watt in Car Body	Total Watts on Car for Lighting, Body, Platform and Signs	Cost of Illumination of Car at 1 Cent per Kw-hr.
Massachusetts & Northern Street Railway Co., Athol, Mass.	A 8 ft. x 24 ft.	Light mahogany and bird's-eye maple headlining	10 64-watt carbon	4.0	8.58	1.3	960	\$0.01135
	B 8 ft. x 24 ft.	Dark green	5 56-watt tungsten with clear prismatic reflector	4.0	11.48	2.9	560	0.00935
Bay State Street Railway Co., Boston, Mass.	C 8 ft. x 34 ft.	Dark yellow	15 64-watt carbon	1.5	9.15	0.4	1600	0.01892
	D 8 ft. x 34 ft.	Dark yellow	6 56-watt tungsten with clear prismatic reflector	2.9	10.25	2.4	560	0.00935
Capital Traction Co., Washington, D. C.	E 8 ft. x 28 ft.	Mahogany; olive green headlining	11 54-watt gem with flat steel porcelain enamel reflector	3.2	9.2	1.2	810	0.01060
	F 8 ft. x 28 ft.	Mahogany; olive green headlining	8 36-watt tungsten with clear prismatic reflector	5.2	9.5	4.0	360	0.00652
Cleveland Railways, Cleveland, Ohio Brooklyn Rapid Transit Company, Brooklyn, N. Y.	G 8 ft. x 34 ft.	Dark yellow	4 94-watt with alba reflector	37-in. plane 4.2	11.3	3.4	585	0.01064
	H 8 ft. x 28 ft.	Dark yellow	14 23-watt tungsten	2.2	10.6	1.53	460	0.01043
	I 8 ft. x 42 ft.	Red; white headlining	15 23-watt tungsten	42-in. plane 2.7	7.6	2.6	460	0.01043

tained with a considerable power saving and a large reduction in glare.

Cars C and D were typical 34-ft. cars, car C being lighted with fifteen 64-watt carbon lamps in the car body and car D with six 56-watt tungsten lamps equipped with clear prismatic reflectors. Comparison of these two cars shows that the average illumination in the car D is considerably greater than that of the car with carbon lamps; that the effective lumens per watt vary by so great a difference as 0.4 to 2.4 in favor of the tungsten lamps; also that glare was practically eliminated in car D.

Car E was a typical 28-ft. car lighted with gem lamps grouped under flat steel porcelain enamel reflectors, while car F was a similar car lighted with two rows of 36-watt tungsten lamps equipped with clear prismatic reflectors on the center deck. In this car transparent signs were used, which depended for their illumination entirely on the interior light of the car. It will be seen that this car had a considerably higher average intensity which, owing to the absence of glare, gave an effective illumination even higher than the intensity values indicate, as no photometer will measure the effect of glare.

Car G was a 34-ft. car similar to car B, but in which the carbon lamps had been replaced by one circuit of 94-watt tungsten lamps equipped with alba reflectors, four being located in the car body and one on each platform. In addition to these there was one circuit of 23-watt lamps for signs and headlight. The distribution curves show that the illumination in this car, while of excellent intensity and quality, was not quite so uniform as was obtained with the 56-watt system in car D. This was due to the necessarily long spacing where but four lamps were used in a 34-ft. body.

Car H was a typical 28-ft. car in which the old carbon lamps had been replaced, lamp for lamp, by 23-watt clear bare tungsten lamps.

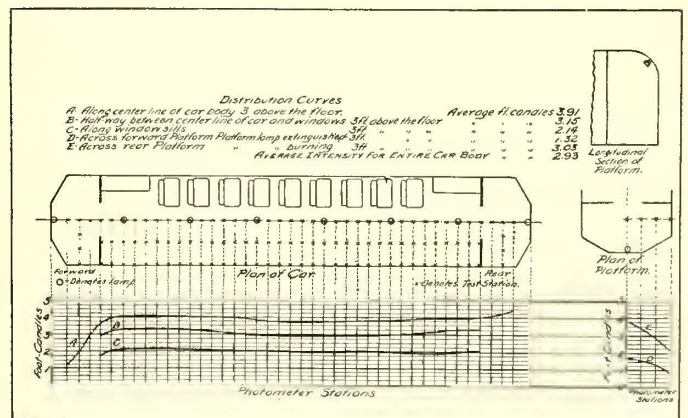
Car I shows well the enormous advantage of white headlining. In this car, though lighted with semi-indirect fixtures, the average illumination with but 23 watts higher power consumption is equal to that of car H, readings taken on a 42-in. plane being accordingly higher than on a 36-in. plane. This is due to the dark yellow ceiling of car H and the white porcelain enamel of car I. After these two cars have been in service for some time, the depreciation in car I will undoubtedly be considerably higher than in car H.

It may be apropos, where so much stress has been laid

will appear darker than one lighted with clear, bare lamps, though the former may actually deliver far more light on the reading plane, where it is of service. A few moments' reading in such a car makes its comfort over the glary one very apparent.

METHODS OF TESTING

In making photometer tests in street cars readings are generally taken on a horizontal plane 36 in. above the floor. The width of the car is divided into five parts and a line of stations is run through the center of each division. Thus in an 8-ft. car one line of stations would be directly down the center of the car, the next 19 in. toward the side of the car and the third 38 in. from the center line. Along these lines stations are chosen over the forward edges of the cross seats. Their location gives the average positions in which passengers hold their reading matter. Where long seats are used the stations are generally taken every 2 ft. lengthwise in the car. Owing to the fluctuating voltage of a trolley circuit it is necessary to take simult-



Car Lighting—Results on 34-Ft. Car with Seven 56-Watt Lamps and Prismatic Reflectors

taneous voltage readings with photometer readings. In order to make one test comparable with another, each photometer reading must be corrected for voltage to the normal voltage of the lamps used.

Usually five readings are taken at each photometer station. In some instances, particularly where relatively great spacing of the lighting units is in use, it is of value to take readings on 45-deg. planes toward each end. The ratio of

these readings multiplied by the horizontal values gives an arbitrary measure of the relative effectiveness of the lighting system.

In order to obtain figures on the cost of operation of different systems which may be applied to any road, the authors submit Table II, figured on the assumption that energy delivered at the car costs 1 cent per kw-hr. and that lamps are purchased on a \$1,200 contract and have a service life of 1200 hours. In figuring the car hours of illumination, account should be taken of the percentage of total cars in service which operate all night and those which operate three-fourths, one-half or one-fourth of the night, etc. The lighting hours vary throughout the year, but an average of ten hours per night is a conservative figure covering all night burning the entire year round.

TABLE II—COST OF STREET CAR ILLUMINATION

Lamps	Cost of Renewals per Hour (1200 Hours' Life). \$1,200 Basis	Cost of Power per Hour at 1c. per Kw-hr.	Total Operating Cost i. e., Renewals and Energy per Lamp per Hour
64-watt carbon .....	\$0.00008	\$0.00064	\$0.00072
23-watt tungsten .....	0.00021	0.00023	0.00044
36-watt tungsten .....	0.00021	0.00036	0.00057
56-watt tungsten .....	0.00027	0.00056	0.00083
94-watt tungsten .....	0.00048	0.00094	0.00142

No figures have been given for the cost of cleaning and maintenance of reflectors, where reflectors are used, as the authors were unable to find any accurate data on this subject.

In conclusion, the authors point out that the use of tungsten lamps in place of carbon is highly advantageous because better illumination is produced at an actual saving in operating expense. Where tungsten lamps are used it is highly desirable to install efficient reflecting devices to reduce glare and increase the efficiency of light utilization. In all cases a light interior car finish is to be desired.

## ENGINEERING COMMITTEES DISCUSS SUBJECTS FOR NEXT CONVENTION

The subjects and executive committees of the American Electric Railway Engineering Association met, respectively, on Wednesday and Thursday, Nov. 19 and 20, to lay out the committee work for the 1914 convention. The subjects committee made a preliminary study on Thursday afternoon which was reviewed the next day by the executive committee. The meeting of the subjects committee was attended by President J. H. Hanna, Washington; ex-President Martin Schreiber, Newark; John Lindall, Boston (chairman of the subjects committee), and ex-Secretary Norman Litchfield, New York. The session of the executive committee was attended by the following members: Messrs. Hanna, Lindall, Schreiber and Litchfield; F. R. Phillips, Pittsburgh; J. P. Barnes, Syracuse; L. P. Crecelius, Cleveland; B. F. Wood, Altoona; H. F. Merker, East St. Louis, Mo.; also by G. W. Palmer, Jr., Boston, chairman of power distribution committee; E. R. Hill, New York, chairman of heavy electric traction committee; C. S. Kimball, Washington, chairman of way committee; W. H. Sawyer, New York, vice-chairman power generating committee, and R. C. Cram, Brooklyn.

President Hanna was empowered to confer with the Transportation & Traffic Association on the subject of train operation. On motion, the president was also instructed to suggest to the chairman of the power generation committee the desirability of informal co-operation with similar committees of other electrical associations, with particular reference to prime movers. On motion, a committee consisting of the president and secretary was appointed to suggest prices for the forthcoming engineering manual, in whole or in part, to future members and non-members.

A new subject was assigned to the power distribution committee for consideration, as follows: the influence of

large short-circuit currents on two and three-phase conductor cable and the dynamical force exerted between conductors during the time the short-circuit lasts. The committee will also continue the subjects of specifications for rubber-insulated wire and cable (with National Board of Fire Underwriters), revision of specifications for trolley wire with American Society for Testing Materials, and sundry line material specifications.

To the committee on power generation were assigned the following new subjects: control of currents in three-conductor, high-tension feeders, so as to limit them to a predetermined value; capacities and efficiency of boiler room, covering relative merits of automatic stokers, pointing out where it would pay to install them; control and safety devices for power stations and feeder circuits, with special reference to reactance; advantages and disadvantages of sixty-cycle apparatus for railway use.

The committee on engineering accounting will be requested to continue the subjects of inter-departmental charges, cost accounting and overhead charges jointly with the Accountants' Association.

The committee then discussed the duties of the Engineering Association's permanent representative to the American Society for Testing Materials. This representative, Norman Litchfield, will have the privilege of bringing to the committee meetings of the Testing Society any members of the Engineering Association who may be needed to act with him as advisory experts. This connection is entirely independent of the creation of possible joint committees.

On motion, it was decided to bring to the attention of the executive committee of the American Association all standards which have been approved by the convention and the committee on standards.

The committee on block signals will be asked to continue its digest of block signal laws and rulings and further study of installations. Its new subject will be the design of standard signal apparatus.

The proposed committee on train operation, which is to be a joint committee with the Transportation & Traffic Association, will continue train operation as applied to passenger, freight and express service and add the effect of car design and equipment on duration of stops.

The committee on buildings and structures is to continue the subjects of fire protection rules (jointly with the National Fire Protection Rules) and will add general specifications and form of contract and power house construction.

The committee on heavy electric traction is to continue the study of locations and clearances of overhead and third-rail working conductors. Its new subject will be a study of electric locomotive design.

The committee on life of railway physical property is to continue that subject.

The committee on way matters is to handle the subjects of proper foundations for tracks in paved streets, with particular relation to width, use of T-rail in paved streets, pavement for girder and high T-rails and use of alloyed steel rails.

The equipment committee will continue the subject of specifications for wires and cables for cars, specifications for solid wrought carbon-steel wheels and specifications for air-brake hose. Lighting and lightning protection of cars will be new subjects.

The subject of education was postponed for the year.

The New York Electric Railway Association has just issued its thirty-first annual report, covering the proceedings of the year 1913, in a handsome cloth-bound volume of 169 pages. Among the papers and discussions contained in this publication are "Construction of Crew and Car Schedules," "The Proper Location of Trolley Wire on Curves and the Corresponding Location of Overhead Frogs," "Coupon Transfers," "Fare Boxes" and "Operation of Trailers in Connection with Peak Load City Service."

# Bus Operation in London and Paris

This Report, Presented by John A. McCollum, Assistant Engineer to the Board of Estimate and Apportionment, City of New York, Disapproves Bus Service Where the Present Railway Facilities Are Ample and Recommends That Any Franchises Granted Should Specify the Character and Speed of the Vehicle Used

Under date of Nov. 5, Harry P. Nichols, engineer, chief of bureau of franchises, Board of Estimate and Apportionment, City of New York, transmitted to Mayor Kline a report on bus operation in London and Paris made by his assistant, John A. McCollum, after a trip to those cities in July, 1913. An abstract of Mr. McCollum's report follows:

## BUS COMPANIES IN LONDON AND PARIS

About 95 per cent of all the buses in London are operated by the London General Omnibus Company, Ltd. The only other company which operates an appreciable number of cars is the National Steam Car Company, Ltd. The larger company is owned by the Speyer Underground interests. It operates on weekdays seventy-three routes, having a total length of 671 miles. On Sundays 79 miles of additional routes are used. The longest regular weekday route is 15.9 miles, and the longest Sunday route 16.9 miles. On weekdays about 2280 vehicles are used, and on Sundays 2380. The average daily mileage of the L. G. O. motor buses is about 110 miles, compared with 63 miles for the earlier horse bus. The National Company operates about 140 buses. In March, 1913, when the London General Omnibus Company employed 2750 buses, it carried 1,588,822 passengers. London also has some Tillings gas-electric buses.

In Paris the General Omnibus Company, under a contract with the city dated May 28, 1910, has the exclusive right to transport passengers by buses within the walls of Paris and also the exclusive right to operate a system of street railways within the same territory. This company has about 900 motor buses, about fifty of which are kept in reserve. It operates on forty-seven routes, having a total length of 165 miles.

## HOW OPERATING RIGHTS ARE OBTAINED

In London there is no law to prevent anyone from operating an omnibus within the Metropolitan district. This district is much larger than London proper and has an area of about 700 square miles. Only a license from the commissioner of police is required. This is granted almost as a matter of course, provided the vehicle conforms with certain standards. On the other hand, street railway rights must be granted by Parliament and yet may be vetoed by the local borough authority. To prevent this veto it is often necessary to contribute large sums for local street improvements. The borough councils also have power to refuse licenses for omnibuses, and this is occasionally done.

## TAXES AND OTHER PAYMENTS

In London the usual taxes are paid by the omnibus companies upon their realty. The import duty on gasoline is approximately 6 cents per gallon, but the bus companies pay only 3 cents because they operate public conveyances. For one bus this tax would amount to about \$136 per annum, assuming 100 miles as the distance traveled a day,  $7\frac{1}{2}$  miles as the distance traveled per gallon and 310 days as the number of days in operation. Two licenses are required, namely, the five-dollar county license, which is available practically the entire life of the vehicle and the ten-dollar police or hackney carriage license, which is taken out annually. In addition, \$19.50 per omnibus per annum is paid for excise duties. All in all, the total charges per bus amount to at least \$160 per annum, plus \$5 for each omnibus put in service and plus the taxes on realty.

The railways and tramways of London pay the usual realty taxes. The license per car is \$10 a year. The tramways

also pay a tax on permanent way which for the year ended March 31, 1913, amounted on the London County Council Tramways to 4.4 per cent of the passenger revenue. They must also keep in repair the pavement for 18 in. on each side of the rails. The franchises further provide that an appropriation shall be made from the earnings toward the straightening, widening and other improvements of streets in which the railway is operated. The sum appropriated for the last purpose during the year ended March 31, 1913, was about \$350,000, and the total sum expended by the London County Council Tramways up to that date was nearly \$3,000,000.

An entirely different arrangement is in vogue at Paris. Here the municipality requires  $3\frac{1}{2}$  per cent of the gross receipts from annual bus passenger earnings up to \$5,770,000. If the receipts exceed that sum, the company must pay 4 per cent of the amount in excess. These payments are reduced one-half when the buses are used for opening lines with small initial traffic. The street railway franchise of the General Omnibus Company calls for 6 per cent of the gross receipts from passenger earnings received within the city walls. There is also a local benzol tax in Paris of approximately  $10\frac{1}{2}$  cents per gallon, or 2.3 cents per bus mile. However, if the sums paid for bus and street railway rights, together with the tax on fuel, exceed 6 per cent of the combined bus and street railway receipts, the company may claim a reduction to an amount not in excess of 6 per cent of the aggregate receipts.

## EFFECT OF BUS OPERATION ON STREET RAILWAY EARNINGS

On March 31, 1913, the London County Council Tramways operated 138 miles of double track, 10 miles of single track and 1275 cars. Most of the cars are double-deck and are standardized for a capacity of seventy-eight passengers. The capital employed was about \$63,000,000. The sinking fund, which now amounts to nearly \$10,000,000, is obtained by assigning to it annually sums equal to one-twenty-fifth of the value of machinery, plant and track and one-fifty-ninth of the value of land and buildings. In addition to this, as arranged about five years ago, provision must be made for a replacement fund at the rate of 1 1-3 cents per car mile operated.

The London tramways are seriously handicapped by being unable to build tracks within the dense business area of the city, whereas the motor bus operates within this central area and is also not prohibited from operating in the tramway territory. The buses are operated on all routes upon which a profit can be earned, whether identical with the tramways or not. On March 31, 1913, for instance, 62 per cent of the trackage of the London County Council Tramways was identical with bus routes. Notwithstanding the increase in car mileage during the year ended March 31, 1913, the receipts per car mile on the electric divisions decreased from 22.58 cents to 20.08 cents, the operating expenses increased from 13.08 cents to 13.2 cents, and the number of passengers carried on all lines decreased from 533,440,235 to 512,652,653.

The net surplus during the previous years provided for the renewal fund at the rate of 1 1-3 cents per car mile and a substantial general reserve fund, the two aggregating much more than \$1,000,000 in each of the two previous years. Less than \$2,500 was available for these funds during the year ended March 31, 1913. Without doubt, this condition resulted largely from the increased number of motor buses.

In London buses have a monopoly of the best traffic districts of the city, charge a slightly higher fare than the street railways, do not furnish all-night service, contribute nothing toward paving maintenance or street improvements, require small capital account in comparison with earnings, and can operate profitably on a small margin above operating cost. Because of these conditions they are severe competitors of the tramways, and Mr. McCollum believes that their continued competition under these advantages will work disastrous results to the tramways. The safety of the situation seems to lie in regulation or restriction of the routes of omnibuses, which at the present moment seems unlikely to occur, or the control of both tramways and omnibuses by the same interests, thus eliminating competitive operation.

In Paris there is no competition between the surface railways and the omnibuses as the two are under the same ownership. The routes of both systems have been laid out under the franchise with consideration to the work best performed by each. Furthermore, the franchise fixed the rates of fare and the routes upon which both railways and buses may operate and also permitted a readjustment of fares for both services should the conditions be such that either system is not profitable. London fares, however, are not fixed.

All opinion agrees that omnibus and heavy motor traffic on macadam roads caused a largely increased cost for maintenance and replacement. It is also nearly as unanimous that the greater weight of vehicles and increased speeds have caused the breaking up of foundations which had been laid to carry a lighter traffic.

#### COST OF OPERATION

While actual competition in motor bus business does not exist at London, the danger of competition exists because of the ease with which licenses may be obtained. The operating companies are therefore loath to divulge details as to the cost of operation. It would appear, however, that the average operating cost of the gasoline buses of the London General Omnibus Company per vehicle mile amounts to 15 cents, with an addition of 2 cents for interest and depreciation.

The National Steam Car Company, which avoids the gasoline tax by using kerosene, asserts that its cost is a little less. The saving in tax alone would amount to 0.4 cent per vehicle mile. Thomas Tillings, Ltd., submits the following figures as to the cost of operating its gas electric buses 1,387,031 miles in 1912:

Running and maintenance .....	Cents 2.326
Tires .....	2.210
Drivers .....	2.514
Gasoline, lubricating oil, grease and paraffin .....	2.394
Vehicle lighting .....	0.150
Rents, rates, taxes, garage, lighting, water, trade vehicles, depreciation .....	1.972
Conductors .....	1.694
Body upkeep .....	0.470
Traffic expenses .....	0.534
Total cost per mile .....	14.264

The Tillings figures, however, may include the cost of operating the same type of car in other places outside of London.

The Paris company gives the following costs for its four types of gasoline buses. The company states that these figures are approximate and believes that certain of the items are susceptible to reduction in the future.

Maintenance of chassis .....	Cents 4.022
Maintenance of bodies .....	0.928
Maintenance of tires .....	3.714
Brushing, cleaning, lighting and heating of vehicles .....	0.821
Fuel, including the city toll thereon .....	6.574
Oil, grease and waste .....	0.650
Machinist .....	3.094
Expenses at the depots (supervision, lighting, motive power, tolls, shippers, etc.) .....	1.857
Average cost per mile .....	21.660

The annual report of the Fifth Avenue Coach Company, New York, as submitted to the Public Service Commis-

sion for the First District, covering the operations of that company during the year ended June 30, 1912, states that it had eighty-one vehicles in operation during the year and that they were operated 1,440,841 miles. With this mileage and the items of operating expense given therein as a basis, the average cost of operation per mile was computed as follows:

Maintenance, buildings and fixtures .....	Cents 0.035
Tires .....	3.132
Maintenance, equipment .....	7.208
Conducting transportation .....	17.565
Damages and injuries .....	3.042
General expenses .....	2.308
Total operating expenses per mile .....	33.290
Depreciation of vehicle equipment, figured at the monthly rate of one-thirty-sixth of total cost .....	5.311
Taxes .....	2.697
Total operating cost per mile, including depreciation and taxes ..	41.298

#### LICENSES AND SUPERVISION PRACTICE IN LONDON

The entire supervision of buses in London lies with the police department. This supervision relates first to the design of the vehicle and second to bus operation. The rules applying to this subject were issued in August, 1909. Previous to that time many buses weighed 5 tons empty and as much as 8 tons loaded. The rules issued in 1909 and now in use permit only the operation of buses weighing no more than 6600 lb. empty or 13,440 lb. loaded. The weight is distributed about two-thirds on the rear and one-third on the front axle. After the vehicle is approved by the police department it goes to a noise committee of three, also appointed by the commissioner of police. This committee submits the vehicle to three tests as follows: operation of vehicle loaded to full extent, operation on a grade of 6.25 per cent to 5.8 per cent for a distance of about 1800 ft., and operation on level.

Mr. McCollum remarks that if New York permits motor buses in large numbers it will have before it a much larger problem than London because London had experience with horse buses. This is one reason why New York should proceed slowly in permitting motor buses to operate upon its streets.

#### SPEEDS OF BUSES AND CARS

The London police regulations require buses to be so geared that the highest speed shall not exceed 12 m.p.h., or to be fitted with a device which shall give a constant warning as long as the speed of 12 m.h.p. is exceeded. This provision is not enforced by the police. The average bus speed between 9 a. m. and 7 p. m. on seventy-seven routes, including stops, as computed from the average speed of each route furnished by the company, is about 8.1 m.p.h., while the maximum for a route is 10.8 m.p.h. and the minimum is 7.4 m.p.h. The capacity of the motor bus is one-half that of the London double-deck surface car; consequently two motor buses are required to do the work of one car and the number of stops per bus may not exceed one-half that of the surface car. Tests made in August, 1911, showed the average speed of motor buses on four routes to be 10.13 m.h.p. and of electric cars 8.16 m.h.p.

In Paris the motor buses are geared for a somewhat greater speed than in London.

#### FARE COLLECTION

In London bus fares are on a straight zone system and average about 1 cent per mile. The passenger receives a receipt which shows the fare collected and a punch mark opposite the fare limit. The street railway fares of the London County Council Tramways are also on the zone system and average about 1 cent per mile, except that workmen's tickets are sold for as low as 0.4 cent per mile. On the London United Tramways operated by the Speyer interests a modified zone system is used; that is to say, the rider pays less for each of the additional fare zones. The mileage rate on these lines is slightly less than on the buses.

In Paris the plan is to charge a certain sum in one sec-

tion and another sum if the passenger wishes to go beyond the first section. Two classes of fares are charged, the first-class fare being 3 cents per section and the second-class fare 2 cents. The corresponding rates for more than one section are 5 cents and 3 cents. Prior to the franchise of 1910 uniform fixed fares were in vogue, namely, 6 cents for first class (inside and on platform), and 3 cents for second class (on the upper deck). Transfers were also issued to those who paid the higher fare.

The street railways of Paris charge 3 cents for a first-class and 2 cents for a second-class ride in one section. For more than one section the corresponding fares are 4 cents and 3 cents.

LIFE OF VEHICLE, COST OF DEPRECIATION, ETC.

The vehicles of the London General Omnibus Company are off duty 10 per cent of the time. They are overhauled once a year just before the vehicle is submitted to the police for a license renewal. Under this system but few of the parts of the original vehicles, except the frame and axles, are left after a few years' operation. It has been estimated that the normal life under these conditions might be ten or twelve years, but experience up to this time has shown that a vehicle becomes obsolete after five to seven years' use because of improvements in design. The list price of the L. G. O. gasoline buses varies from \$3,500 to \$4,000 each. However, on the assumption that when bought in quantity these vehicles cost \$2,500 each and that the normal life is six years, a replacement fund of about \$400 a year will be necessary for each vehicle.

The National Steam Car Company sets aside one-sixth of the cost of the car each year, although it asserts that some of its cars have been in operation for eleven years. The first cost of this car is somewhat greater than that of the gasoline cars. The National Company also states that 97 per cent of its fleet is in operation throughout the year instead of only 90 per cent.

What has been said about inspection and replacement in London is also true with regard to Paris. The buses used in Paris have been operated less than three years and therefore are of comparatively new design. The cost of the Paris bus is said to be more than \$4,000, and an ample depreciation fund is provided.

FINANCIAL CONDITIONS OF OMNIBUS COMPANIES

Little need be said about the National Steam Car Company of London because it operates only such routes as yield a profit. The General Omnibus Company, however, as it has attained a practical monopoly, must necessarily maintain an efficient service in the entire territory to prevent competition. It is without doubt operating many lines which in themselves show a small profit.

Compared with street railways, the percentage of gross receipts required for operation seems very high, as it exceeds 90 per cent. During the last six months of 1912 the cost of operation on the London General Omnibus system was 92.3 per cent of the gross receipts. This, of course, includes maintenance and depreciation. The capital invested, however, is very much less than the corresponding investment in street surface railways by the London County Council, the proportion being, in comparison with the number of passengers carried in 1912, as follows:

	Passengers Carried	Capital Invested
London County Council Tramways.....	512,652,652	\$53,000,000
London General Omnibus Company.....	492,858,934	15,500,000

From this it is easily seen that the capital required in the omnibus per passenger carried is far less than similar capital for street surface railways as operated in London. With, therefore, this small capital investment, the operations of the London General Omnibus Company are considered to be very profitable, even though the operating expense, as compared with the gross receipts, seems to be abnormally high.

In Paris, no exact data giving capital investment were

obtained, but since the railways and buses are operated by the same company, there is little likelihood that the earnings of the company will fall below the operating expenses and interest on capital invested.

ACCIDENTS

During the past few years the tramways have carried about twice as many passengers as the buses, yet in number of fatal accidents reported within the Metropolitan police area those caused by motor buses were more than double those caused by the tramcars. On the other hand, in number of injuries those caused by the tramway cars exceeded those caused by motor buses. In November, 1912, a parliamentary committee was appointed to inquire into the causes of accidents and to make recommendations for safety measures. The report of the committee, made on Aug. 11, 1913, gives the following statistics with respect to fatal accidents caused by motor omnibuses in both the Metropolitan police area and in the ancient city of London:

Year	Licensed	Fatalities	Per 1000 Buses
1909 .....	1,180	59	50.0
1910 .....	1,200	70	58.3
1911 .....	1,962	114	58.1
1912 .....	2,908	182	62.6

The same report states that the Metropolitan police give as the result of motor bus operation for the first six months of 1913 eighty-seven deaths and 1582 accidents, and that on the assumption of the number of omnibuses being 3000, public carriages 11,000 and estimated private power vehicles 14,000, "a very serious disproportion of fatalities caused by motor omnibuses is shown." The committee recommended a closer control of the motor buses by the authorities.

The bus companies deplore the many accidents which occur and have devoted much energy to obtain means for their prevention. Rewards have been offered by the General Omnibus Company for safety devices. It is expected that the number of deaths will be halved by a fender which has been devised for the rear wheels, but as yet nothing satisfactory has been found for the front wheels. No definite statistics could be obtained on accidents in Paris.

GENERAL DISCUSSION AND COMPARISONS WITH NEW YORK

Although the conditions in London and Paris are in many ways not similar to those of New York, some deductions may be made from the study of the two systems which should be of value in determining the method of operation and control in New York. Disregarding the cost of operation, the omnibus has certain advantages over the surface car in performing the same work which cannot be lightly considered. These follow:

The motor bus is independent of a large complicated system outside of the vehicle itself; it is itself a complete traffic unit.

It can easily adapt its movements to street traffic.

Not being confined to a fixed track, vehicles may run side by side, thus clearing dense traffic intersections much more rapidly than the surface electric railway cars.

Routes may easily be changed, either temporarily or permanently—temporarily when there is obstruction due to fire, parades, etc.; permanently when desirable because of change of traffic conditions, making other routes more desirable to the traveling public, and without loss of investment in permanent street structures.

Passengers entering or leaving buses may do so at the curb without risk of crossing dangerous street traffic.

The breakdown of one vehicle in the street does not derange the service of other vehicles of the same system.

Point to point speed somewhat exceeds that of the street car without exceeding maximum speed of the street car.

On the other hand, it may be said that the motor bus has also its disadvantages, when compared with the street surface car.

It is a constant source of accidents. London statistics

show it to be much more so than other fast-moving vehicles.

The motor bus, because of its limited capacity, is unable to provide rush-hour facilities as effectively as the street car of larger capacity. (This is on the assumption that the weight and capacity of motor vehicles are rigidly limited, as in London.)

The capacity of the motor bus being less than that of the street car, more moving vehicles in the street are necessary to do the same amount of work, thereby increasing the liability to accidents.

When operated in large numbers, the motor bus will require more rigid regulation by the municipal authorities as to type of vehicle and method of operation.

Less comfort to passengers, due to vibration. This vibration increases as the street surface becomes more uneven.

It cannot be said that there is in any borough of New York a densely populated or busy section from which surface railways are entirely excluded. If there is need for the motor bus in New York, the reason therefor must be found elsewhere. Nevertheless, there are routes in New York upon which the motor bus can supply a needed service in local areas, giving the public the benefit of its satisfactory features and at the same time minimizing its disadvantages. A study of bus operation in London and Paris leads to the belief that if permitted in New York the city should exercise its authority as to routes, size, type, weight, capacity and operation of vehicle. The motor bus should not be permitted on any route unless it will thereby fill a place in the transportation field not already supplied; or, if it is to duplicate the service already furnished, it should not be permitted unless it will thereby provide a much more complete, efficient, economical, comfortable or otherwise better facility than that now existing. It would not be for the public good to reduce the traffic on a railway unless the damage done to the surface railway was outweighed by the advantageous features of the motor bus. When the system is operated by private capital continuous efficient street car service can result only with prosperity of the enterprise. The disastrous effect on the London County Council Tramways has already been cited. Of course, to a certain extent, the increase in facilities will also result in increased riding. Motor buses operated by more than one company should not be permitted on the same route. The experience of London shows that if this is allowed the number of accidents will be increased by the racing of rival buses. Further, if more companies than one were to receive a franchise to operate buses in New York, it would only be a short time before one company would control the entire operation. Motor buses should not be operated in the same street with street surface railways, except for short distances where such duplication of route is necessary because there are no other existing highways available for that portion of the omnibus route. This is undesirable, not only on account of competition, but because of such deliberate interference as has occurred in London, where in some cases buses run so close to surface cars that people cannot use the latter in safety.

Motor buses should be excluded from streets having macadam pavement and permitted only on pavement having a heavy foundation. The weight of the vehicle should not exceed that permitted by police regulation of London.

Power should be retained by the franchise whereby the board (city authority) may govern all features of the construction, size, power, etc., of the vehicle, with the right to change any rules when experience shows that such change will be of benefit.

Rate of fare should depend somewhat on distance traveled.

No advertising signs should be permitted on the outside of omnibuses.

Rate of speed should be limited, not by a maximum speed limit only, but in regard to dangerous or reckless driving as well.

Upkeep of vehicles should be insisted upon with a penalty provided for failure to comply with rules in regard thereto, and thorough municipal inspection should be maintained.

#### FRANCHISE GRANT

Whatever is done at first in the operation of motor omnibuses in New York can be at best only an experiment. The term of the grant of a franchise for such experimental operation should be as short as is possible while at the same time giving the company a fair chance to close its operations at the end of the term without financial loss. The life of any one type of vehicle probably does not exceed six years, as has already been explained. In order, therefore, that a profit may result from the operation, sufficient funds must be laid aside each year from earnings to replace the vehicle at the end of the six-year period. Since the motor bus operation does not require any expenditure in permanent way in the streets and the largest investment is in the vehicles themselves, the short life of the vehicle has a large bearing upon the term of grant which the company can accept. It is believed that in no case should the first franchise for omnibuses be granted for a period exceeding ten years in duration, and that it should be for a much shorter time if it can be shown that the company can afford to accept such shorter term. The Paris franchise is for a much longer term than this, but the municipal control as to rates of fare depending upon earnings, etc., reserved therein is one which can be worked out only after the preliminary elementary stage has been passed.

#### CHICAGO MEETING AMERICAN RAILWAY ASSOCIATION

The fall meeting of the American Railway Association was held at the Blackstone Hotel, Chicago, Nov. 19, 1913. About 200 delegates attended the two sessions at which reports were presented by the various standing committees. The report of the joint committee on automatic train stops included a revision of the requisites of installation for automatic train control. After a discussion of this report it was referred back to the joint committee for further consideration.

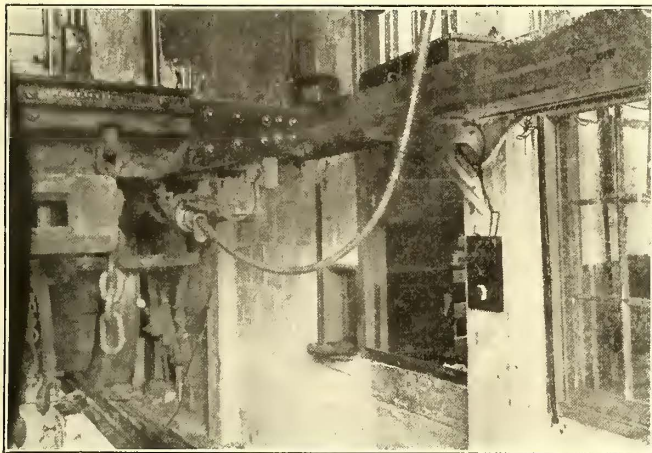
The committee on maintenance reported that the question of modifying the specifications for carbon steel rails, as provisionally approved by the association Nov. 20, 1912, by providing for a variation of  $\frac{3}{8}$  in. from the specified lengths, instead of  $\frac{1}{4}$  in., had been referred to the American Railway Engineering Association for its consideration and recommendations. The question of the contour of chilled-iron car wheels and the throat clearances of frogs, crossovers and guard rails had been referred to the Engineering Association and the Master Car Builders' Association jointly, for full investigation and report.

The committee on electrical working reported that it was giving attention to the questions of overhead working conductor clearances and the clearances for automatic train stops. This committee desired that conclusions as to these questions be reached by the railway technical associations which were also considering them before recommending action for the parent association. At the close of this meeting it was decided to adjourn until Dec. 3, 1913, when another meeting will be held in Chicago. It was also decided to hold a session in New York City May 20, 1914.

The Bureau of Statistics of the American Iron and Steel Institute has recently issued its annual report of the American and foreign iron trades for 1912. A gross tonnage table is given of all kinds of rails, including girder and high T-rails for electric railways, produced annually from 1897 to 1912, inclusive. The year 1906 shows a maximum production of 3,977,887 gross tons.

AN INSPECTION PIT SAFETY DEVICE

The protection of employees has received a large amount of consideration in the Jersey City shops of the Hudson & Manhattan Railroad, which are in charge of P. V. See, superintendent of car equipment. One of the safety devices in use there is an automatic apparatus which replaces the



Trolley and Snap Switches with Pilot Lamp

time-honored practice of calling out in a more or less audible voice "Juice on car No. 732" before the current is put on a car. The new contrivance not only gives a clear warning whistle ten seconds before the current is put on the cars, but it also keeps up this warning as long as the current remains on any of them.

The whistles used are high-pitched and of disagreeable sound quality. Hence they are more effective than an ordinary audible warning because their annoying and persistent character forces the repairmen to keep the current on the car no longer than absolutely necessary. Before the installation of this apparatus the current was often on the contact shoes for an hour or two at a time. Now the cars



View of Contactors

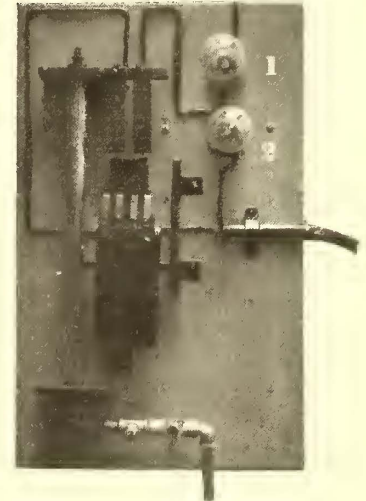
are not alive more than ten or fifteen minutes a day and usually about one minute at a time.

The apparatus consists of four Westinghouse air signal whistles which are equally placed throughout the length of the 400-ft. inspection pit, one electro-pneumatic valve, two contactors and one piston with contacts. The accompany-

ing diagram shows the complete circuit. When a switchman desires to move a car he proceeds as follows:

He first puts the Coburn trolley, which is dead, into the car and turns on one of the snap switches which are mounted on the wall, as illustrated. This switch has a double circuit, one point making a ground for the No. 1 or No. 2 contactor shown, depending on the side of the car-house. The same switch also completes the circuit for the magnets which operate the air whistles, by grounding them. The whistles then start to blow.

On the air line with the whistles is a brass tube with piston which is connected to a heavy weight as illustrated in another view. A small adjustable leakage valve near this piston regulates the building up of the air-pressure in this line. As the pressure increases it raises the piston and weight. Four contact fingers are fastened on this weight. When the piston is raised to the top of its stroke it makes contact with two other fingers, thereby completing the circuit for the No. 1 or No. 2 contactor, picking it up and energizing the



Brass Tube, Piston and Weight

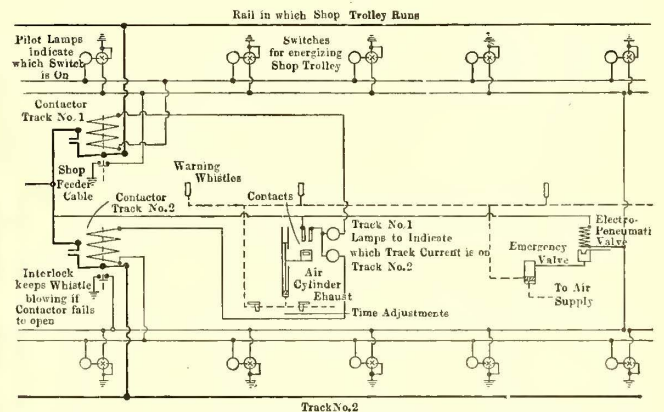


Diagram Showing Complete Circuit of Inspection Pit Safety Device

Coburn trolley. When the switchman turns off the snap switch the trolley removed from the car is no longer alive, and there is no possibility that the operator will receive a shock should the insulation on the cable be defective.

A 2½-mile electric tramway, the first in any Chinese city (as contrasted with foreign settlements), was inaugurated in the native city of Shanghai during the week ended Aug. 16, 1913. The enterprise is essentially a native one. No foreigner has been allowed to subscribe to the capital of about \$130,000. The installation has been done entirely by Chinese contractors, and the management and working staff are all Chinese. Six cars are now running, and twelve cars, with six trailers, are under way. The cars are serviceable without being elaborate. They carry eight first-class and sixteen second-class passengers. Energy is taken from the Shanghai Inland Electric Works, which formerly supplied the city's light and power but stopped working about four years ago.

# Papers and Proceedings of C. E. R. A. Meeting

At the Fall Meeting of the Central Electric Railway Association, Held at Indianapolis Nov. 20-21, Papers Were Read on Bolted Construction, Steel Wheels, Cast Wheels, and Traffic—Abstracts Are Published Together with an Account of the Proceedings

## CHILLED-IRON CAR WHEELS FOR ELECTRIC RAILWAY SERVICE

BY W. A. BENNETT, GRIFFIN WHEEL COMPANY

The white metal, or chilled iron, in the tread and flange of a cast-iron car wheel contains between 3 per cent and 3½ per cent combined carbon; the gray iron in the plates and hub contains about 0.75 per cent. The mild steel from which forged wheels are made in this country contains about 0.70 per cent to 0.75 per cent combined carbon, and in England from 0.40 per cent to 0.50 per cent.

On the scleroscope scale the hardness of chilled iron runs from 70 to 74, and the hardness of steel such as is used for making wheels is 30 to 32. Chilled iron is non-ductile and can be machined by grinding only, while mild steel and cast iron are easily machined.

The wearing parts of the wheel—that, is, the parts which are affected by the action of the wheel on the rail or the brakeshoe on the wheel—should be of material which will offer high resistance to wear. The plates must have sufficient strength to withstand the stresses which come upon them, while the hub must be such as can be easily machined and sufficiently elastic to hold the proper pressure against the axle to prevent loose wheels. The chilled-iron wheel meets all of these requirements.

The most important subject to consider in reference to wheel performance is friction. The relation of the various grades of iron to tractive effort and braking power, as well as wearing qualities, therefore, is important in considering their value as materials from which to manufacture wheels.

### TRACTIVE EFFORT

A large number of experiments were conducted a few years ago by George L. Fowler in the interest of the Schoen Steel Wheel Company, to show, among other things, the relative tractive power of steel and chilled-iron wheels. He found the average coefficient of friction between the wheel and rail, for loads averaging from 3000 lb. to 7000 lb. per wheel, to be 0.256 for chilled iron and 0.249 for steel. For the heavier loads up to 20,000 lb. to 30,000 lb. per wheel the coefficient for the chilled-iron wheel averaged 0.217, the steel wheel 0.235.

Results obtained from a more recent test show that the coefficient of friction for chilled-iron wheels, under loads ranging from 3000 lb. to 7000 lb., averages about 0.273, and for steel wheels under the same load about 0.353. For heavier loads of about 20,000 lb. the coefficient for chilled-iron wheels is about 0.164, and for steel 0.171. The same wheels tested on oiled rails show a coefficient for a chilled-iron wheel, under loads of 3000 lb. to 7000 lb., of about 0.183, and for steel 0.184. For the heavier load of 20,000 lb. the coefficient of friction for both chilled iron and steel was 0.145.

The results shown in Mr. Fowler's test would indicate that the coefficient of friction is slightly higher for chilled wheels under light loads and for steel wheels under heavier loads. The results shown in the other test referred to would indicate that the steel wheels have the higher coefficient of friction on dry rails for both light and heavy loads, but on the oiled rails both wheels have identically the same coefficient of friction.

If we average the results of both tests, we find that there is a slight difference in favor of the steel wheels for a

dry rail, but for slippery rails both are the same. This is because the fibers of the steel in the wheel and rail actually interlock when both are clean, but when the rail is greasy this interlocking does not take place; consequently the coefficient of friction is reduced.

The practical test, of course, is the operation on the same line of cars, some of which are equipped with steel wheels and others with chilled-iron wheels. This has been watched repeatedly on certain lines having difficult schedules to maintain on account of a maximum number of stops and a high average speed. In such cases, after close observation, it has been found that there is no tendency on the part of the cars equipped with either chilled-iron wheels or steel wheels to lag behind, a condition which would be

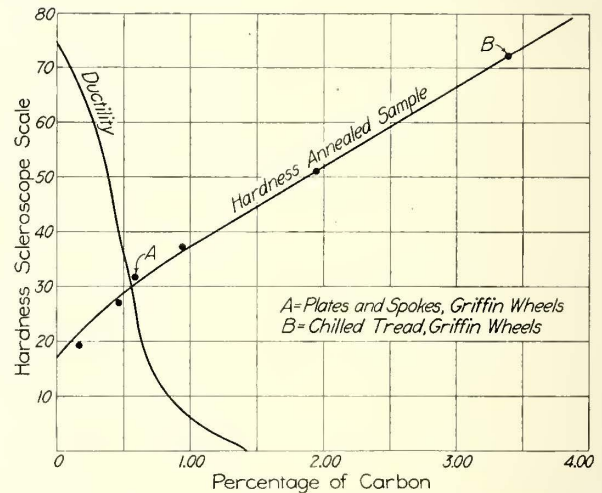


Diagram Showing Relation Between Hardness and Percentage of Combined Carbon

immediately noticed if it existed. This is the best evidence that there is no appreciable difference in tractive effort between chilled-iron and steel wheels.

### BRAKING POWER

Numerous tests have been made at different testing laboratories to determine the coefficient of friction of various brakeshoes on both chilled-iron and steel wheels. In a test recently made at Purdue University the following coefficients of friction between wheel and brakeshoe were recorded:

Shoe Pressure, Lb.	Streeter Shoe		Diamond "S" Shoe	
	Chilled Iron	Steel	Chilled Iron	Steel
2808	0.247	0.216	0.225	0.198
4152	0.208	0.187	0.200	0.165
6840	0.176	0.147	0.184	0.140

The above results closely agree with the result usually found either in laboratory or service tests, namely, that the brakeshoe friction for chilled-iron wheels is about 20 per cent higher than for steel wheels.

The Master Car Builders' specifications for brakeshoes call for a coefficient of friction on chilled-iron wheels of 0.22 for 2808-lb. pressure and 0.16 for 6840 lb., the initial speed being 40 m.p.h. For steel wheels the coefficient should be 0.125 for 6840 lb. and 0.11 for 12,000 lb., the initial speed being 65 m.p.h.



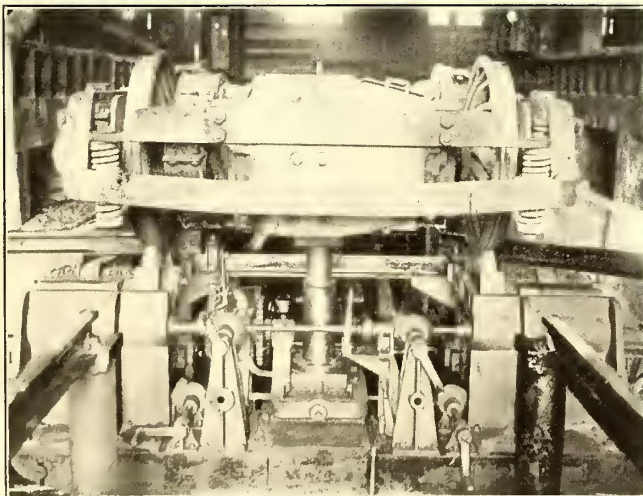
## CARE OF WHEELS

The duty of the flange is to guide the truck, and necessarily in performing this duty the flange, coming in contact with the side of the rail head, will wear to a certain extent. In street railway service, and under light passenger equipment on steam roads, excessively worn flanges should not exist, because the pressure required to guide the truck is comparatively small. Under wheel loads from 8 tons to 12 tons, however, the flange pressure is greatly increased, so that there is a greater possibility of the flange wearing to the condemning limit before the tread is worn hollow.

To prevent worn flanges the first thing is to see that the wheels mounted on the same axle are the same tape size; that is, have the same circumference. If one wheel of a pair is larger than its mate, it will have a tendency to run ahead and consequently crowd the other wheel to the rail. In order to catch up with its mate, the small wheel must continually slip ahead or the large wheel must spin. If the small wheel slips, this slipping produces greater tread wear, thus making a further increase in the difference between the two circumferences, and consequently more flange wear, until eventually the wheel is removed for worn flange. This not only causes the loss of the small wheel, and probably of the large wheel also, but greatly increases car resistance and produces excessive rail wear and more frequent removal of cars from service.

The following calculation will show what a small difference in mating amounts to. Suppose one wheel to be one tape size larger than its mate, or  $\frac{1}{8}$  in. larger in circumference. A 33-in. wheel makes approximately 611 revolutions per mile. Therefore the large wheel travels 76 in. per mile farther than its mate. In 30,000 miles this difference amounts to 190,000 ft., or 36 miles.

Another item which has a very strong relation to sharp flanges is keeping the trucks properly squared. This receives close attention on some railways, while on others it is entirely neglected. One large street railway, using 2000 chilled-iron wheels per year, pays particular attention to it, as well as to mating wheels, and has practically eliminated sharp flanges. The cars weigh less than 40,000 lb. and the average life for a wheel exceeds 100,000 miles.



Car Wheel Grinder with Truck in Position for Operation

The effect of trucks out of square has been investigated by the American Steel Foundries Company, where it was found, after a large series of tests had been made, that the resistance per ton on the same curve would vary from less than 20 lb. to 50 lb., depending upon the condition of the truck. The increased resistance of cars obviously means increased flange pressure, with a consequently rapid wearing of flange and rail.

If the car is down on the side bearings, or if the center bearing is stiff, the work of turning the truck increases flange wear and also rail wear. Also, mounting one wheel closer to the end of the axle than its mate causes that wheel to run to the rail and produces flange wear.

## GRINDING WHEELS

Even under the best operating conditions, there is likely to be some skidding of wheels, which produces small flat spots in various parts of the tread of all kinds of wheels.



Section of Chilled-Iron Wheel

These flat spots are often very small and gradually increase in size until they are sufficient to cause a removal of the wheel.

Where steel wheels are used facilities are provided for turning the tread of the wheel to a true shape, so that it may be again placed in service and the maximum mileage obtained. It has not been the custom, however, to provide facilities for truing chilled-iron wheels, but on account of their cheapness they are scrapped when removed from service. This is often a wasteful method, as it is entirely practicable to install a grinder in the pit of the carhouse, which in a very few minutes will reinstate the original contour without removing the wheels from the car and without withdrawing the car from regular service.

Aside from grinding the wheel to remove imperfections which are developed in service, the grinder is useful in checking new wheels just before they go into service. The removal of all errors arising from inaccurate machine work will cause the cars to ride smoothly, and the tendency to produce flat spots will be greatly reduced.

The accompanying illustration shows a pit wheel grinder designed by the Griffin Wheel Company for this class of work. The advantage of grinding wheels without removing the trucks from the cars is self-evident. The time required for grinding will vary from ten minutes to half an hour, depending upon the amount of metal which requires removal. All small skidded spots up to 1 in. in length can be removed in ten or fifteen minutes. The cost of a grinder of this type is about one-sixth of that required for a modern lathe to turn the treads of steel wheels.

## COST

The question of the cost of wheels and other materials which are worn out on account of their contact with the wheel is a very important matter, and on account of the different results which are obtained under different conditions the problem is quite complex. As the chilled-iron wheel has been standard for so many years, its cost is well known. The machine shop costs for the chilled-iron wheel for mounting, installing, removing, etc., including overhead, are about \$1.25 per wheel. This amount added to the original cost of the wheel for any class of service gives the total first cost of the wheel. Should it be necessary to grind the wheel during its lifetime, the labor, interest and depreciation of grinder, power, emery wheels and overhead charges are added. When the wheel is sold for scrap the interest on the investment for the time the wheel has been in service is added to the first cost, and after deducting the scrap value from this amount the actual net cost is obtained for the ton mileage made by the wheel. In considering wheel costs, however, there are other items than the wheel alone which must be considered, such as brakeshoe cost,

rail maintenance, general convenience, power consumption, etc.

#### SAFETY

The safety of a wheel is a subject which has not received the attention from electric railway engineers that has been given it by steam road engineers. All wheels are safe if properly designed for the service in which they are to be used and if they are free from structural defects. In designing anything whatever the material of which the thing is to be made is selected to fill best the requirements.

The railroad wheels used prior to the year 1753 were of wood, and when iron wheels were introduced in that year they met with great opposition. It was not until 1767 that wooden wheels went out of use. Chilled-iron wheels came into use in the latter part of the eighteenth century, and thus have been in use for over 100 years.

There are in railroad service to-day about 20,000,000 chilled-iron wheels. If these wheels each run 8000 miles per year and carry an average load of 10,000 lb., we have a ton mileage for one year of 800,000,000,000 ton-miles. When we consider this enormous amount of service and the few wheel failures that result from it, we can truly say that the chilled-iron wheel has reached a high state of perfection.

The reliability of chilled iron for car wheels can be brought to any desired degree by simply considering the design. There is no equipment too heavy, there is no speed too high, for chilled-iron wheels. Within the past year chilled-iron wheels have been introduced in the tenders and pilot trucks of the heaviest engines of the Pacific type operating in the mountains. They have been introduced in the cars carrying loads as high as 150,000 lb. down the steepest grades in railway service. They have been called for under interurban cars where the specified speed was 75 m.p.h. All this is accomplished by simply paying ordinary attention to the design.

#### THE RELATION OF THE TRAFFIC DEPARTMENT WITH ITS COMPANY

BY J. F. STARKEY, GENERAL PASSENGER AGENT LAKE SHORE ELECTRIC RAILWAY

We traffic men are the ones who must face the traveling public most conspicuously, and it is not pleasant to have thrown into our faces remarks derogatory to our lines, these remarks being prompted by something that we are in no wise responsible for and over which we have no control. I do not mean that these instances are the rule, but they sometimes happen, and when they do it is wise policy on the part of the head of any department to which the complaint may be taken by the traffic department to give a listening ear and seek to remedy the evil. We are the servants of the public and cater to their patronage, and it is the wise thing for us all to do, though sometimes it is hard, gracefully to respond to all questions from the public, even though they may seem ridiculous, and courteously to listen to any complaint that may be made. We have formidable foes in many places in the steam road service. There are many who, though they would prefer oftentimes to patronize the steam lines, use our lines on account of the superior facilities we offer in regard to frequency and other conveniences. Even those who patronize us with a lukewarmness should be treated with due courtesy so that eventually they may become our friends.

The head of the traffic department should strive to his utmost to increase the revenues of his company and to be alive to grasping every opportunity afforded. Many of our lines will soon reach, if not already there, the rehabilitation period, and this means the expenditure of much money. The traffic man is the one who is most familiar with conditions pertaining to his department, and

he should have a free rein. The general manager should not curb him, for if he has not full confidence in his traffic head, it is high time that he should replace him with someone else.

Close working relations with connecting steam lines should be gone into as much as is possible. As one instance I might relate that one steam road during the past summer operated excursions to Niagara Falls and turned its passengers over to the line I represent at Toledo, Ohio. We took them to Cleveland, turning them over to a boat line. For this service we furnished special cars in one direction only, getting our full special car rate, and during the season we handled more than 2000 of these passengers. I believe there are many steam lines which as individual lines would be glad to enter into working relations with us, and I hope the time is not far distant when the barrier may be removed so that we may "give and take" with many of them.

Personally, when everything is considered, I much doubt the wisdom of freight handling as a source of revenue when the basis of handling it is on a par with the steam lines as far as rates are concerned. True, there is, in gross, a goodly sum as revenue derived, but when the leakages of every nature, the menace, often, to passenger travel, the cost and maintenance of equipment, the time and expense of the traffic department, etc., are considered, does it yield much additional net revenue? If we can, by reason of better facilities, induce merchants, jobbers and manufacturers to give us their patronage at a rate considerably above that charged by the steam lines—and I will not term them competitors in the line of freight traffic, because they are our superiors in this branch of railroading, except where patrons demand quick service—then and then only can I see a profitable venture in the freight department. If we would utilize fewer cars and make our basis of charges correspond with the service given, I would then emphatically advise the traffic department to give much of its energy to this branch of the industry.

The handling of household goods and commodities of this nature is much like the merchant who sells bananas, the more he sells the more he loses. We have been so keen, so anxious to do business and take away from the steam lines everything we could get our hands on that we sometimes even go so far as to grant special rates that are below those of the steam lines or the official classification. Unless we are permitted by the commissions of our several states to charge the rates we should get, we had better devote our energies to passenger traffic, which to my mind is much more satisfactory from a remunerative standpoint than the freight business. I am always open to conviction, and if any one can show me that the freight department is a profitable branch, I am willing and anxious to go after it if my general manager deems it wise to add this to my duties. At present we do no freight business except in hauling crushed stone, gravel, etc., and switching. We do a pick-up and delivery express business which we term the "Electric Package," and for this service we charge practically the same rates as the old-time express companies.

Another source of revenue that I believe is worthy of due consideration is the special car and special party business. I know there are many member lines that do not believe in party rates, but I am a firm believer in them, and the results of their being in effect on our line have been very satisfactory. As one instance, during the past summer there was a ball team at one of the cities on our line, and almost every Sunday a competing team from Cleveland played there. By reason of a slightly reduced rate for a party of twenty or more we secured the patronage not only of all these teams but of a crowd of "rooters" as well, so that often there were from thirty to thirty-five

in the party instead of the "nine" with a couple of utility men. I could cite many instances where at the time of a convention at some point, instead of delegates only, the special rates induced quite a party to go. If it is profitable to give even lower rates for a party of fifty or more and furnish them special service, then it surely is also profitable to establish a party rate for twenty or more where they use the regular service, and I think that without exception every member line grants the special-car rate.

The Central Electric Traffic Association I believe to be the greatest organization in the field of electric railway operation. There is none as important in any other part of the country, and I would say to the general manager that he makes a mistake if he hampers in any way the attendance of his traffic head at its meetings. It has meant much to the member lines of this association, much more perhaps than is realized by those other than the traffic officials. We believe that there should be a liberal exchange of transportation by all connecting lines to members of the traffic department so that any member may be equipped to go at a moment's notice in any part of the territory, as invariably it means mutual benefit.

### STEEL-TIRED, FORGED AND ROLLED-STEEL WHEELS

BY M. D. HAYES OF THE MIDVALE STEEL COMPANY

The following nine general types of steel-tired wheels about cover American practice, past and present: (1) bolted type; (2) Paige spoke type; (3) Paige plate type; (4) Mansell ring type; (5) Gibson type; (6) Boise type; (7) shrunk type; (8) fused type; (9) Allen paper type. At the present day, however, the first four types practically cover the majority of the wheels of this character now in use in America.

In general, the steel-tired wheel consists of a rolled-steel rim or tire surrounding a center consisting of the web and sub portion, which latter may be made of cast iron, cast steel, plate steel or forged steel and in shape may be either solid web and hub or single plate; solid web with cored hub or double plate hub; cored web or double plate; spoke center or built-up center.

Car wheel and locomotive tires, which latter are really a large car-wheel tire, are manufactured from either open-hearth or crucible steel. Fair average chemical and physical properties of a steel tire are as follows:

Chemical properties:	
Carbon, per cent.....	0.65 to 0.85
Phosphorus, per cent.....	0.06
Manganese, per cent.....	0.55 to 0.80
Silicon, per cent.....	0.15 to 0.35
Sulphur, per cent.....	0.05
Physical properties:	
Tensile strength, pounds.....	125,000
Extension, per cent.....	8
Contraction, per cent.....	12

#### MANUFACTURE

In describing the process of tire manufacture it will be impossible to cover the various shades of difference used by the different makers, but that used by the Midvale Steel Company will sufficiently illustrate the art. In this process a long cylindrical steel ingot is cast by the pouring of molten metal into a cast-iron mold. These molds average about 16 in. in diameter and are about 7 ft. high. When the metal is cold the molds are stripped from the ingot and the latter are cut into sections called billets, each of which is to form a tire. Each portion resembles a large cheese.

The top portion of the ingot, in which the segregation of impurities mostly occurs, is discarded, and only those portions of the ingot are used which are free from the impurities above mentioned. Furthermore, it is a well-known fact that the tendency in all castings while cooling is for slaggy materials and impurities to segregate and form toward the center, where the shrinkage sometimes

forms a pipe or axial opening, and the whole aim, therefore, in the fabricating of a good tire is to retain only those portions of the ingot which are on or near the outer circumference and which, having cooled the most rapidly, have therefore the most uniform fiber texture and are the freest from impurities. In this way the longitudinal axis of the original ingot and the hub or center of the finished wheel or tire are parallel and in the same plane.

The billets are forged under a steam hammer, the first process being the punching out of the center portion, forming an opening through which a mandrel can be run. The forging process is continued, so as to enlarge the piece into a ring of sufficient dimensions to be taken up later by the tire rolls. These rough rings, after forging, are again introduced into the heating furnace and the temperature is raised to the proper degree for rolling. The last process is the introducing of these rings into the rolls, where they are revolved in a horizontal plane between pressure rollers which engage the interior and outer faces and the two sides of the tire at the same time, thus elongating the tire by lengthening its circumference and increasing its diameter as the rolling process proceeds. The roll which engages the outer face of the tire has the desired contour cut into it, and therefore, when the tire has reached the required diameter and is removed from the rolls, the outer face of the tire has taken on a flange and tread of the exact shape required.

The rolling of tires has now reached a very great state of proficiency, and in numerous cases tires are being placed in service just as they come from the rolls, the circumferential dimensions, together with the tolerances for the contour, being so close as to require no further machining except the boring of the interior face of the tire for the particular type of fastening to which it is to be applied.

#### TYPES OF CENTERS AND FASTENINGS

A glance through the catalog of any standard wheel maker will show many and various designs for steel-tire fastenings, but, as is the case in almost every service, certain types have distinguished themselves as being particularly fitted for certain conditions and therefore have withstood the wear and tear better than their less fortunate companions.

For most types of fastenings now used the shrinkage of the tire plays the initial part, and whatever else is used to augment the original strength due to shrinkage is added only as an accessory or a precautionary measure for insuring against the eventuality of a tire losing this initial shrinkage.

Among the different types of fastenings used the M. C. B. Association has within the past two years recommended for special approval the bolted type of tire. In this particular type an interior flange or shoulder is rolled on the inside of the tire, which fits in a recess in the wheel center, and through this shoulder of the tire and the center are passed bolts at regular intervals around the circumference of the rim, the number of these bolts being in proportion to the size of the wheel. Many features are claimed for this fastening which cannot very well be disputed. In the first place, it is a well-known fact that when tires have become considerably worn and the remaining section gets thin there is very great danger of the rolling loads elongating the tire and increasing the diameter of the same on the center, and thereby the original shrinkage is lost, so that unless some means is provided for maintaining the tire in its position the failure of the wheel is inevitable. To provide against this possibility the bolted section would be as near a perfect solution of the problem as could be designed; for even if the tire itself gets loose, through the causes above mentioned, the ring of bolts is sufficient to maintain the solidity of the wheel. This has been proved in a number of cases where the tire has actually broken in two and has been retained in its position by the bolts which serve the double purpose of keeping the tire from turning

on the center as well as preventing pieces of the tire from flying off. It is very probable also that the additional stock of metal left in this inner shoulder of the tire has prevented many a break when the outer part has been worn thin.

The Paige spoke type, a three-piece wheel, is in very common use on engine trucks and is a modified form of the regular type of bolted wheel described above. The addition of a plain ring on the outer face makes it possible to use two rows of bolts on different bolt circles, the outer engaging all three members, tire, ring and center, while the inner roll only engages the ring and center. Owing to the wider tongue on the inside of the tire, there is even more stock left in the tire to resist breakage when it is worn thin than in the first type, and this construction is especially adapted for resisting the effect of side thrusts given to an engine truck. With this construction the tire can neither turn upon nor fly off the centers. The centers are generally of cast iron.

The Paige plate type, a four-piece wheel, is not strictly a bolted type, except in the sense that the tire has an interior shoulder and is bolted to the center; for, unlike the regular bolted type, as adopted by the M. C. B. Association, there is no provision made in a Paige wheel for shrinkage. The only bearing which the tire has upon the center occurs on the faces of the two thin steel plates which form the web of the wheel and which are bolted to both rim and hub with a hollow space between. Like the standard bolted wheel, this tire cannot turn, neither can it fly off in case of breakage, but it has not the same area of support on the center to back up the tire when worn thin as is the case in the M. C. B. bolted type. There are various reasons why this wheel has preserved its identity among the numerous other types, among which might be mentioned its almost universal use under Pullman and passenger cars, where its elasticity and freedom from singing and noise have given it great favor. When properly built it makes a very solid construction for the service in which it is now being used. Of course, it is confined entirely to steam road service, as the weight and complicated structure of the wheel prohibits its use on trolley lines or those where lighter equipment is in vogue. Almost no railway on this continent which is equipped with Pullman, dining, mail and baggage and parlor cars is without its complement of Paige wheels.

The Mansell type with single or double lip is also a four-piece wheel. In the Mansell ring fastening a groove is cut on each side of the tire, into which the lipped ring is inserted, and although this tire might lose its shrinkage and become loose enough to turn on the center, yet the ring is so designed that in case of breakage of the tire it cannot fly off, owing to the shouldered lip. These rings are bolted or riveted to the center and in some cases have an additional lip on the inside of the ring which clasps the center. Among the disadvantages said to characterize the Mansell ring is the additional number of parts which go to make up the wheel and the additional machine work necessary to produce these rings and maintain a neat fit in the grooves; also it is rightly claimed that when the tires are worn thin and there is a possibility of losing their shrinkage, there is nothing in the construction of these rings that will prevent the tire from turning on the center. This also is a more expensive type of wheel than the first mentioned, in which the bolted fastening is used, and is more difficult to repair. Although the Mansell rings as fasteners are still in service on some of our largest railroad systems, their continued use is usually explained by the fact that the cost of the original installation has prevented them from changing their design, owing to the large amount of material in wheel centers which would have to be scrapped or put aside were a new design to take its place.

The Gibson type, a three-piece wheel, has an interior shoulder on the outer face of the tire, together with a

groove into which a separate retaining ring called the arbel is inserted on the inside face of the tire. This ring is of special shape, being concave on one side and convex on the other, as shown in cross-section, and after being in service in the groove of the tire, the outer shoulder of the tire is peened in against the ring, thereby securing it solidly in position and forming a locked joint. The wheel center is thus dovetailed into the space between the ring and the opposite shoulder. Here again the shrinkage of the tire on the center is the main dependence of the wheel for solidity, the ring being inserted to accomplish about the same results as in the case of the Mansell ring described above. However, in case of the tire becoming loose on the center, there is poor provision against turning, although the dovetail is an attempt to prevent the tire flying off in case of breakage. This type of fastening is not very extensively used.

The Boies type is composed of two parts only, like the shrunk or fused wheel, having no bolts or separate fastenings, as in the previously described types. Its dependence for solidity rests entirely on an interlocking device at the grooves, which are machined in both tire and center. Unlike most other wheels, the center is usually made of wrought iron, which, with its additional ductility, prevents breakage through the small shoulder where the grooves occur. The method of mounting the tire is to slip it in a heated state on the center from right to left until the groove on the left-hand side of the tire engages closely the groove of the center on the same side. The tire is then cooled and shrunk. After this is done a roller or peening device is run around on the inner face of the right-hand groove, forcing the small shoulder of the tire up into the groove of the center, thereby forming a lock joint. This wheel is not as complicated to construct as is indicated by the description, but it is not very universally used. A few roads, however, make a specialty of it. The wheel can be used for either engine trucks, tenders or coaches and is mostly constructed with the single plate web. It must be stated, however, that if once loose there is nothing to prevent this tire from turning on the center.

The shrunk type is the simplest of all tire fastenings and is probably the oldest in point of history. Nothing can be conceived more simple in wheel construction where two parts are used than simply to shrink a tire on the center, depending entirely on the shrink value of the tire for holding the wheel intact. While this type of fastening is used in a great many cases for locomotive tires, yet for car-wheel tires for steam roads it is almost obsolete, as under the extreme loads which the railways are now carrying it would be entirely too dangerous a fastening to be depended upon. There is no provision whatever for keeping the tire from turning on the center in case of loss of shrinkage. In some cases a small shoulder is placed on the outside edge of the bore or a few studs are inserted tending to counteract the effect of slide slippage. There are a number of wheels of this type, both with spoke and solid web centers, still in service under the lighter class of steam road equipment and also under trolley cars. The wheel is very simple in construction, is very easy to repair, and the initial cost, as well as the cost of upkeep, is very low. For trolley service this wheel is holding its own fairly well, as in a number of cases where roads do not have their own shops it is very easy to renew the tires on this type of wheel without complicated or heavy machinery.

The fused type, another two-piece wheel, is a very simple type of wheel, but it is rather hard to fabricate successfully, owing to the special manner in which the center and tire are fastened. The tires are first heated and then placed in such a position as to form the outer ring of a mold for casting the centers. In this manner the molten cast iron of the center is brought into contact with the heated surface of the tire and a fusion of the two metals is supposed to take place. When cooled, therefore, it will be seen that

the tire and center are practically one piece, if a successful union of the metals has been accomplished. Provision is also made for a partial resistance to side slippage by curving the inner bore of the tire, which fits into a hollow in the rim of the center. Obviously, unless a good character of joint is made between the center and the tire, there is every chance for this tire to become loosened and turn in service. Therefore, the maker is not absolutely so sure of getting a first-class job as in some of the other types in which the fastenings are positive in character. There are very few fused wheels now being used.

The Allen paper type is a five-piece wheel which is now practically obsolete, although as a matter of history it may be well to include a description of this in the list of wheels which have been in their day very popular. The whole interior portion of the center is composed of layers of paper pressed into position and housed on the outside with steel plates for the protection and stiffening of the paper center. These cover plates also afford a more secure bearing surface for the bolts which hold the laminated paper centers tightly in position. The hub is a separate iron casting, flanged and bolted to the center, in pretty much the same manner as the tire, which also has an interior flange, with a ring of bolts securing the same to the center. There is no provision in this wheel for shrinkage value in the tire and its safety rests entirely upon the rigidity and compactness of the paper center reinforced with its complement of bolts to hold it together. This wheel was once used almost exclusively under Pullman, dining and passenger cars. One of the primary features claimed for it was its silence in rolling, and this was very much to be desired, especially under sleeping cars. It was also very popular for use under private cars, where its elasticity and freedom from noise were its principal recommendations. It cannot be claimed for this wheel that it compares with the solid metal center wheel in strength and, owing to its complicated construction, it has long since fallen into disuse.

It will be seen that in comparison with the type of fastening the type of center is more directly a function of the character of service in which the wheel is to be placed; for example, heavy equipment naturally would take a heavy solid design of wheel center, where extreme rigidity is aimed for. Also the material of the center is directly contingent on the character of service. In the main it might be said that the solid or plate centers are mostly used under steam-road equipment for heavy passenger and Pullman service, also for engine tenders. This service would also include the Paige double-plate wheel.

The spoke type of wheel on steam roads seems to have attained its greatest field under engine trucks, but here one of the particular reasons for choice is the ease with which the lubrication of the bearings inside of the wheels can be accomplished by the use of the openings in the web. In engine trucks the journals come on the inside and, as they are hard to reach, the spoke type of center affords very easy access. For this reason alone it would appear to be fairly well established in this service.

Spoke-center wheels are more universally used in electric service for either motor or trail wheels than any of the other steel-tired types, as they are lighter in weight and present a more artistic and neater appearance than the solid-web type; so that in those wheels where strength is not absolutely the principal factor the spoke type of wheel has attained its greatest hold.

There are several other types of steel-tired wheels in use, but mostly in foreign countries. In fact, a good many of the types described in this paper had their origin abroad, where much lighter equipment in railway service obtains, so that the American practice really represents an evolution of, or an improvement upon, that of foreign countries. It may be safely said that, as the American railway equipment is constantly increasing in size and weight, the weaker forms of steel-tired wheels will gradually drop out and

cease to exist, their place being taken by those forms which have demonstrated their ability to withstand best the most severe attacks of service.

#### SOLID STEEL WHEELS

The genesis of the rolled-steel wheel which is used today in American steam and electric service may be said to belong to the year 1898. At that time Charles T. Schoen, who was engaged in the manufacture of steel freight cars, conceived the idea that the wheel as well as the other parts of the truck and car could be made from pressed steel. Having the courage of his convictions, he immediately began experiments to this end, with such good results that by the year 1903 the business of manufacturing solid forged-steel wheels was established for the first time on a commercial basis.

Closely following the success of this first venture, others took up the project, and to-day four companies are manufacturing forged, or forged and rolled-steel, wheels, as follows: the Schoen Steel Wheel Company (now the Carnegie Steel Company), the Standard Steel Works Company, the Milvale Steel Company and the Forged Steel Wheel Company. It cannot be said, however, that the idea of the forged-steel wheel is wholly an American one, for previous to the dates mentioned certain European firms, principally in Germany, had already developed certain classes of machinery for forging or rolling circular steel disks, and it was really a development of, or an improvement upon, these methods which resulted in the American rolled-steel wheels.

About ten years, therefore, represents the life history of the rolled-steel wheel as we know it in America, and considering the short time which elapsed between its experimental and its present stage, the universality of its use for all classes of service, both steam and electric, is almost phenomenal.

That such a type of wheel would sooner or later come into being was obvious for more than one reason, but chief among the reasons was the crying need for a wheel that would keep pace with the advance in freight-car building, where a constant demand for heavier and larger equipment was caused by the increased tonnage which the railroads were called upon to handle.

Under conditions, therefore, that called for cars of 100,000-lb. capacity it was found wholly unsafe to rely on cast-iron wheels. Steel-tired wheels had given satisfactory service under passenger cars running over these same roads, but they were out of the question for freight equipment, because of their high cost, and in consequence the fabrication of the solid-steel wheel has been reduced to such a state of perfection that it is even disputing the place of a cast-iron wheel under the lightest trolley service in our city streets.

The rolled-steel wheel resembles very closely the cast-iron wheel in section, the difference being in the web, which is a single plate integral with the hub and rim but having no brackets, as in a standard cast-iron wheel. The design of the wheel is susceptible of as many changes in details as are necessary to meet the requirements of the railroads using them, and while there is a wide difference of opinion as to the best proportions for the thickness of the rim, yet such details as the dish, length of hub, contour of tread, etc., are determined to a great extent by the details of truck construction, as well as of equipment, especially on electric roads.

For steam service all treads and flanges are uniform, corresponding to the M. C. B. standard. Some variations, however, occur in the webs and hubs and thickness of rims, and occasionally a variation in the height of flange, if intended for engine trucks.

#### QUALITIES AND METHODS OF FABRICATION

In producing the wrought-steel wheel it may be said that two main points were aimed at—first, to retain the solidity and simplicity of the cast-iron wheel, and, second, to main-

tain the hardness, ductility and toughness of the rim of the steel-tired wheel. Both these ends seem to have been attained, but it is interesting to observe that among the four manufacturers of steel wheels there are radical differences in the methods of fabrication, although the raw materials used are the same and the finished products are practically identical in appearance. The accompanying table will serve to illustrate these differences more clearly.

Following are the average chemical and physical properties of rolled-steel wheels, as fabricated by the American makers:

Chemical properties:	
Carbon, per cent.....	0.65 to 0.85
Manganese, per cent.....	0.60 to 0.85
Silicon, per cent.....	0.15 to 0.30
Phosphorus not to exceed, per cent.....	0.06
Sulphur not to exceed, per cent.....	0.05
Physical properties:	
Tensile strength, lb.....	125,000
Elastic strength, lb.....	72,000
Extension, per cent.....	10
Contraction, per cent.....	15

Comparing these properties with those previously given for a steel tire, it will be seen that all parts of the rolled wheel have about the same high qualities as given for the tire, from the fact that it is a one-piece mass of the same material and practically uniform throughout.

Practically all of the differences in methods of fabrication are confined to that part of the process which covers the treatment or preparation of the ingot after it has been cast and before the bloom is made into a finished wheel, although there are some differences in the final process of finishing which have to do with the actual pressing and rolling of the finished wheel blank. It is not intended in this paper, however, to enter into a detailed discussion of all these differences.

Every forging, whether it be a wheel, an axle or a crank shaft, has its inception of origin in a casting, so that in the case of a solid-steel wheel the production of a cast-steel ingot is the first step. In this process a group of molds is set ready for pouring of the molten steel. At the center is the riser, into which the steel is poured from the ladle and through which it is introduced into the various molds surrounding the same by openings which enter the bottom of the mold and allow the metal to flood the mold from the bottom up. This method tends toward solidity and uniformity in the texture of the ingot and more readily facilitates the escape of the impure gases from the molten mass as the mold is filling up. Each mold holds an ingot of cylindrical shape about 16 in. in diameter and about 7 ft. long. When the ingot is cold the mold is stripped from it and the ingot is removed to a machine shop, where it is cut or sliced into sections.

Up to this point of procedure the practice is identical with that of the manufacture of steel tires, as previously described. From this point on, however, the treatment of a billet for a wheel differs very radically from that described for the tire, and as the next step in the making of the wheel is the forging or pressing of these billets, they are introduced into a heating furnace and the temperature is raised sufficiently for this purpose.

The next step is a hydraulic forging process, the billet being pressed down into a rough blank with a suggestion of the flange on the outer edge and also a depression in the web between the hub and tire. A second pressing immediately follows the first without additional heating, the blank being carried from one press to another. The billet now has assumed fairly well the characteristics of the finished wheel, at least as far as the outline is concerned.

The bore of the hub is next punched out, and this is a very significant feature of this particular process for the following reasons: The impurities, if any, are segregated or collected either in the form of a pipe, which is an opening, or in slaggy, spongy material, in the center and near the top of each ingot; therefore the important thing in producing a good wheel is to retain in the rim or tire of

the wheel those portions of the billet which were first cooled and which were furthest removed from the segregations of the center, being in consequence the purest and most uniform in fibrous texture. To this end the defective portion of the wheel is punched out of the bore of the wheel, which has retained the same center line as in the original ingot, and therefore the rim of the wheel is the same steel that was in the original outer circumference of the billet before pressing.

At this stage a second heating of the ingot is necessary in order to prepare it for the last stage of its manufacture, which is the rolling. It is, therefore, introduced into another heating furnace, and after the temperature has been raised to the desired point the wheel blank is introduced into a set of special rolls designed for the purpose. Of these the side rolls, which engage the disk of the wheel on each side of the web, are the main driving rolls of the machine, and it is their rotation which gives the direction of rotation to the wheel disk. At the back, between these side rolls, is a back roll, which engages the face of the tread and which is constantly pushed against it as the wheel spins or revolves between the side rolls, so that in this spinning process the web is consolidated or squeezed and the diameter of the disk is greatly enlarged until the wheel approaches its finished state. This rolling of the wheel disk gives to the rim of the wheel a fiber texture almost identical with that of the wheel tire, as the rotation of the wheel between the rolls tends to consolidate and elongate the rim in the same manner as a tire and the working of the metal is as nearly parallel to it as the state of the art will permit. So perfect has this rolling process become that a large number of wheels are suitable for immediate service without machining on the treads, the rotundity being within the tolerances called for just as they come out of the rolls.

After the rolling is finished, the wheel is transferred to a smaller press, in which the proper dish or hub projection is given to it. This is not pressing like the former operations, but is simply a bending or pushing of the hub and web out of a straight plane into that required for the particular service into which the wheel is to be placed. The dishing of the wheel is the last operation, and the wheels are then sent to the annealing room, where they are stacked together in such a manner as to retain a sufficient amount of their own heat for twenty-four hours' annealing, thereby insuring against any injurious strains that might tend to develop from too quick cooling. When annealed, the wheels are sent to the machine shop, where the treads and faces of the hubs and rims are machined off when necessary and the hubs bored, after which they go to the loading platform for shipment.

#### PERMANENT SECURITY OF BOLTED-UP CONSTRUCTION

BY JOHN B. SEYMOUR, NATIONAL LOCK WASHER COMPANY

Bolted-up construction is a species of bond which may be readily disassembled but temporarily gives the security of a single piece of material. This is necessary in order to accommodate expansion and contraction of metals due to changes in temperature and to facilitate removal or repair of particular portions without affecting the general structure.

Good practice requires going over such structures some thirty days after original installation, retightening nuts and bringing all parts to a firm contact. This practice continued at stated intervals is sufficient for structures of great weight and strength receiving constant and even strains, such as Corliss engines, turbines and similar machinery. Railroad work, however, is subject to the diametrically opposite condition of tremendous blows, thrusts and strains at irregular intervals, as well as extremes in

temperature, and it is found that, despite tightening from time to time, the structure itself changes, material loses its original cross-section, bolts stretch and the original fit of the parts is so lost that eventually it is impossible to draw them to their original position of rigidity.

From the fact that loosely bolted parts can be tightened if the nuts are turned looseness has naturally been attributed to nut movement, and to prevent this many lock nuts and nut-locking devices have been patented and a few have become articles of common use. There are now in force more than 1000 patents of this nature, but not one of them will compensate for periodic tightening of nuts, nor will they maintain bolted construction in its original rigidity for any considerable duration of service. Tests have been made on practically every variety of bolted construction, which conclusively demonstrates that looseness may occur without nut movement.

On track joints and on special work the nuts have been secured to the bolts by drilling and cottering only to find there was appreciable looseness after a very short period of time. Conditions in ear work naturally differ from conditions in track, but the following account is illuminating: The possibility of looseness without nut movement was raised some years ago by the superintendent of a private ear line, and as a test he arranged that a car which had come back from its initial trip should have all nuts thoroughly retightened and a certain number so cottered that nut movement was an absolute impossibility. Eight column bolts and four hanger iron bolts were removed and carefully micrometered, replaced and tightened firmly to position, after which the nuts and bolts were drilled and cottered. In ninety days the car was back in the yards, and an examination showed that each of the cottered bolts was loose, and inspection showed frictional wear under both heads and nuts.

Stretch of bolt has been assigned as the cause of looseness, but where all parts are in firm contact and the combined elastic limit of the bolts is far greater than any possible strain stretch of bolt is a physical impossibility. If, however, a very slight degree of looseness has taken place in a bolted structure, sudden strains and blows are not resisted by the structure as a unit but by each bolt separately, in which case the bolts may be strained beyond the elastic limit. Corrosion also has been regarded as the cause of looseness, but interior corrosion obviously cannot take place if all parts are in firm contact, although it may readily occur if there is any looseness in the bolted construction.

Hence we may eliminate as the original causes of looseness in bolted-up structures movement of nut, stretch of bolt and corrosion, and we may consider all of these as occurring after the looseness has originated. However, all materials expand and contract in proportion to their volume with changes in temperature. We allow  $1/16$  in. to 33 ft. of rail length for a change in temperature of 10 deg. Movement of bolted parts on each other occurs from end thrust since it is commercially impossible to make all bolt holes to a theoretical driving fit. Where movement of objects in surface contact occurs frictional loss must take place, and after the loss has taken place conditions are prepared for nut movement, stretch of bolt and corrosion; also, where such loss has occurred, the bolted construction fails to resist the blow or strain as a unit, and this entails either that each individual portion of the bolted structure must have a strength greater than the total strain imposed or else that the units composing the bolted structure must be malformed.

If this analysis is correct the problem is to compensate for looseness caused by frictional loss, and as we cannot spend an amount of labor in nut tightening which will provide suitable compensation, the only remedy seems to be the placing of a spring within the bolted structure, whose power of resistance is proportioned to the greatest

possible strains which may come on the structure in service.

The spring lock washer, or spiral nut lock, is the only device which has even been offered to meet these conditions, but as a compensating device it has proved woefully lacking. As originally designed it was intended to prevent nut movement only, but it has also been offered as a remedy for other causes of looseness. Its imperfection is apparent when we consider that the heaviest spring nut lock affords little more than 3000 lb. pressure when coiled for a 1-in. bolt, while the elastic limit of a commercial 1-in. steel bolt is 18,000 lb.

To give proper efficiency the power of such a device should be from one-half to three-quarters the elastic limit of the bolt on which it is applied. Such a device has never been manufactured and cannot be produced in a plain spiral nut lock. I do not wish to decry in any way the value of our present high-tension nut locks. While not actually compensating for internal looseness they do, to a considerable degree, prevent stretch of bolts, and while not resisting the maximum service strains they resist the average strain to such an extent that their use has provided a greater economy than have other devices of a similar nature.

As manufacturers we fully appreciate the limitations of our product, and for several years we have experimented with various methods of meeting actual mechanical requirements. These efforts have been successful to the extent of demonstrating that spring lock washers can be produced whose permanent pressure efficiencies will equal the elastic limits of all sizes of commercial bolts, but the present problem is to produce from the experimental device a practical commercial article.

#### PROCEEDINGS AT INDIANAPOLIS

##### *By Telegraph*

The fall meeting of the Central Electric Railway Association was held at the Hotel Severin, Indianapolis, Nov. 20-21. The first session was called to order with President A. W. Brady presiding and sixty members in attendance. Following the reading of the minutes of the previous meeting, reports of various standing committees were requested. The report of the standardization committee, which was presented at the meeting of the association on June 26, 1913, was again submitted for final action. This report included standard controlling dimensions for 6-in. trolley wheels, proposed arrangement of electro-pneumatic signals, standard trailer light connections and standard end connections for interurban cars. Owing to the fact that these standards had not been considered and approved by the American Electric Railway Engineering Association, it was decided upon motion to delay their adoption until the national association had taken action. President Brady then stated that the executive committee had decided that the question of appointing a joint weight and inspection bureau and maintaining an index bureau in connection with claim department records was pertinent and would be brought up for discussion at the February meeting.

There being no further business, J. B. Seymour read a paper entitled "The Permanent Security of Bolted Construction." This is published in abstract elsewhere in this issue. Following a brief discussion E. F. Berger read a paper entitled "Forged and Rolled-Steel Wheels and Steel-Tired Wheels." This paper was illustrated by lantern slides. In order to permit a general discussion of the wheel problem, W. A. Bennett was then requested to present his paper on chilled-iron wheels for electric railway service. This was also illustrated with lantern slides which showed the methods and processes of chilled-iron wheel manufacture.

R. N. Hemming, Union Traction Company of Indiana, opened the discussion with the statement that it was difficult to remove flat spots from chilled wheels except

by grinding either in a special machine or with a wheel-truing brakeshoe. On the other hand, this was not true of steel wheels because the flat spots which developed would roll themselves out.

F. D. Carpenter, Western Ohio Railway, said he would like to use chilled wheels because they eliminated a large percentage of the metal loss which was necessary in turning steel wheels. He found, however, that the dangerous conditions brought about by chipped flanges in chilled wheels necessitated the use of steel wheels. If this defect could be overcome, he would return to the use of cast wheels because of their low cost and economy.

F. J. Foote, master mechanic Ohio Electric Railway, expressed the belief that special work on electric roads, together with sharp curves and turnouts, was responsible for chipped flanges on chilled wheels. J. B. Seymour, National Lock Washer Company, urged that electric railway companies spend more money in track maintenance and said that less money would then be required in the upkeep of rolling stock.

Mr. Bennett, the author of the paper on chilled-iron wheels, in reply to this criticism, stated that poor track maintenance was largely responsible for chipped flanges. In other cases it was due to improper design as found on roads where the flange, which was intended only to guide the truck, served instead as the tread. In many instances flange-bearing special work was responsible for chipped flanges, more especially special work of the kind where the groove was not self-cleaning. If special work was kept clean and the curves greased, chipped flanges would be eliminated. In reply to the question of safety of chilled wheels as compared with steel wheels, Mr. Bennett said that the Pennsylvania Railroad reported that, out of a total of 325,000 steel wheels, 328 had failed. On another steam road, out of a total of 331,500 chilled-iron wheels, 120 had failed. This emphasized the fact that although the steel wheel did have a greater tensile strength it was not especially advantageous.

Mr. Hemming closed the discussion by stating that he did not believe that data on wheels gathered from steam roads could serve as a criterion for electric roads. Certain service conditions existed on electric roads which must be met if safe operation was to be obtained.

At the session of Friday, Nov. 21, J. F. Starkey, general passenger agent Lake Shore Electric Railway, read a paper entitled "The Relation of the Traffic Department to the Company." This appears in abstract upon another page. Charles Murphy, of the Indiana Railroad Commission, then spoke upon the subject of industrial arbitration. After a general discussion the meeting adjourned.

#### MEETING OF "AERA" ADVISORY COMMITTEE

On Nov. 17 there was held at the office of the American Electric Railway Association, New York, a meeting of the *Aera* advisory committee, which was attended by C. Loomis Allen (chairman), Syracuse; H. C. Donecker, Newark; H. H. Adams, Chicago; C. G. Rice, Pittsburgh; H. A. Bullock, Brooklyn; Cornell S. Hawley, Boston, and J. C. Collins, Rochester. J. D. Mortimer, Milwaukee, and Harlow C. Clark, of the ways and means committee, of which Mr. Donecker is chairman, were also present.

After a full discussion, it was decided to accept advertising for *Aera* beginning with the January, 1914, issue. Solicitation is to be carried on from the office of the association, but if the results do not prove satisfactory a solicitor will be employed. It was also provided that upon each member of the advisory committee would rest the responsibility for securing articles from representatives of his particular department for publication during the year, Mr. Clark, the editor, to keep in touch with this matter. The editor was made responsible for the character of the material appearing in the Question Box.

For the January issue there will be articles from Mr. Adams on engineering matters, from Mr. Rice on the attitude of the claim department toward the public, from Mr. Collins on the relation of the accounting department to public service commissions, from H. E. Reynolds, Boston, on the transportation department and the public, from Mr. Hawley on the manufacturers' share in improving electric railway conditions, while from Mr. Allen there will be a general article covering these matters in a broad way.

#### SHORT-CIRCUIT SUBSTATION ACCIDENT IN CHICAGO

A severe and rather remarkable accident occurred at the Harding Avenue substation of the Commonwealth Edison Company about noon on Nov. 4. This substation is owned and operated by the electric service company, but its output is sold exclusively to three railway companies—the Metropolitan West Side Elevated Railway, the Chicago Railways and the Chicago City Railway. The substation is equipped at present with one 4000-kw Westinghouse rotary converter of the commutating-pole compound type. Twenty-five-cycle, 9000-volt alternating current is delivered to this large machine, the output of which is 600-volt direct current.

The substation switchboard is equipped with three bus-bars—one main bus, an auxiliary and one used for testing. The last-named affords a convenient means for testing the main recording wattmeters of the various railway companies and is often used for that purpose. At the time of the accident construction work was in progress to unite the two sections of this testing busbar by placing in position a new section to connect two existing sections. Two or three men were employed, partly on the first floor and partly in the basement. Canvas was wrapped around the live parts of the busbar, and all the usual precautions were taken. While work was in progress and two men were back of the switchboard on the main floor a loud explosion was heard, and flames burst out with quantities of smoke. The men ran out with their clothing on fire and, although they received immediate first aid, one was fatally burned.

It appears that in some way a contact was made between the metallic work in the building structure and the main lead of the rotary between the machine and its switch and circuit-breaker. The trouble so reduced the voltage that the no-voltage release of the main circuit-breaker was tripped and thereby disconnected the rotary from the bus-bars. However, the draft of current was not sufficient to open the oil switch which controls the energy supply to the rotary converter, and therefore the machine ran on, still pumping energy into the short-circuit. The operator diagnosed the trouble correctly and operated the control switch, thereby opening the oil switch of the rotary converter and cutting off the source of supply within a few seconds.

The strain on the insulators which insulate the cable rack from the frame of the building was great, owing to the short-circuit, and some of them broke down, developing arcs between some of the section feeders and the framework supporting the cable rack. These were not heavy arcs and possibly they were due to molten metal. These arcs received the next attention of the operator and were extinguished. In the meantime a considerable fire, started by the burning canvas, was in progress. The operator next turned his attention to this and put out the flames with the local fire-fighting equipment. His next task was to examine the apparatus to see if it would be safe to put it back into service. At nearly the first moment of the accident he had notified the load dispatcher downtown by telephone, so that in turn the railway companies were notified to make temporary provision through the feeding network, should it be necessary. Things were in pretty bad shape, but nevertheless the operator was satisfied that the machine would stand up to its work, and he put it back into service, carrying its load, within twenty minutes from the time of the explosion. There was no interruption to service.



## REPORT OF FRANCHISE COMMITTEE OF NATIONAL MUNICIPAL LEAGUE \*

BY DELOS F. WILCOX, CHAIRMAN; ROBERT TREAT PAINE,  
JAMES W. S. PETERS, ABRAHAM E. PINANSKI, CHARLES  
RICHARDSON AND CLINTON ROGERS WOODRUFF

It is our view that just at present there is a tendency toward too great centralization in the control of public utilities. The idea of state regulation has gained great headway, and under some of the forms of public utility laws the powers of the municipalities to control local utilities, either through franchise contract or through regulation by means of ordinances or local commissions, are being seriously curtailed or taken away entirely. The league has always been friendly to the idea of municipal home rule, and the home rule movement has been gaining very considerable headway in recent years. It is especially important, therefore, that the league should inquire carefully into the significance of this counter movement for exclusive state control in the matter of public utilities, hitherto regarded as one of the most important fields for municipal activity.

The public utility laws providing for exclusive state regulation do not necessarily and directly strike at the principle of municipal ownership, although in some cases they bring municipally owned utilities under supervision to the same extent as utilities owned and operated by private corporations. Nevertheless, there are certain features of exclusive state regulation which tend to make the municipalization of utilities more difficult, and to that extent interfere with one of the most fundamental provisions of the home rule program.

As a practical matter, the more powerful the corporations become and the more widespread their services, the more important it is that they should be directly answerable to the local communities which they serve. It may easily be possible that any appointive state commission will fall more or less completely under the domination of the powerful interests which control the public utilities of the state, and thus the very machinery provided for the regulation of utilities be captured by the interests presumed to be regulated by it.

We are of the opinion that in most cases regulation cannot be either logical or effective without the active co-operation of both state and local authorities. A city must have control of its streets. This necessity becomes more acute as cities increase in population and the congestion of street traffic and of the surface, underground and overhead street uses develops. Then, too, when the problems of congestion of population become serious, a city finds it necessary actively to initiate and control the development of its public utilities, particularly its local transportation system.

At the same time it is clear that in the country and in small towns the public authorities are wholly lacking in equipment for the regulation and control of public utility corporations. This is especially true where utilities of an interurban or state-wide character merely pass through the local communities. For a country town to attempt to regulate an interurban railroad, except as to the most rudimentary questions relating to the occupation of the streets, would be illogical and practically impossible. It appears to be desirable, therefore, that the state public service commission should have general jurisdiction over public utilities throughout the state, so that there shall be no "twilight zone" within which the companies may escape adequate regulation. We are of the opinion, however, that at least every city of sufficient importance to enjoy powers of home rule in the framing of its charter should

have the right to establish a separate department, bureau or commission for the purpose of supervising the utilities operating within its limits to such extent as may be necessary for the protection of the distinctively local interests of the community. Even in the largest city, with the best equipped utility department, the state commission should still have jurisdiction over certain important matters.

### DIVISION BETWEEN STATE AND CITY

Speaking generally, all those elements of regulation which have to do with the activities of corporations as such and which invite uniform treatment without reference to widely varying local conditions will naturally fall to the lot of the state commission. These matters include the regulation of stock and bond issues, the fixing of a uniform system of accounts, the requirement of public reports and the determination of certain fundamental questions which relate to the stability of the investment. The city, if it chooses to exercise it, should have broad power of control in all matters relating to the occupation of the streets and the character of the services rendered and should be in a position to municipalize the utilities whenever it desires to do so, and for that purpose it should have a continuing right to enter into franchise contracts by the terms of which municipalization can be made practicable.

A state-wide public utility law which provides that every franchise granted by local authorities shall be an indeterminate permit, terminable only upon purchase of the property of the utility at a price fixed by the state commission, is, in our judgment, inadequate to protect the interests of the city, and in fact tends strongly to hamper the city in future efforts to municipalize the utilities.

There are certain elements of regulation which lie on the border line between state and local functions. One of these is the regulation of rates. We are inclined to the opinion that the fixing of rates, which has to do fundamentally with the protection of the investment as well as with the rights of the patrons of the utility, should be recognized as a function in which local and state authorities may properly co-operate.

The problem of extensions is a delicate and difficult one. Obviously some power of initiative as well as of veto on the part of the public authorities is necessary. At the same time it is clear that any company could be driven into bankruptcy by the arbitrary exercise on the part of the local authorities of unlimited control over extensions.

### AMORTIZATION OF THE INVESTMENT OUT OF EARNINGS.

We desire to state emphatically that in our opinion the experience of the utilities of the country, and perhaps especially the transportation utilities, has been such as to give a distinct warning against the policy of permanently capitalizing superseded property, accumulated deficits and intangible elements of value. Whatever may be necessary in an adjustment of the capital account fair alike to the investor and to the public, we are of the opinion that all these elements—sometimes included in appraisals in excess of the permanent value of the physical property—should be written out of capital within a comparatively short period of years.

There may be a legitimate difference of opinion as to the advisability of requiring the amortization of the entire capital account of a public utility while it is being held under private ownership. The amortization we refer to is not the amortization of the company's bonds for the benefit of its stockholders, but the amortization of the investment itself, represented by both stocks and bonds, as a process for the gradual transfer of the ownership of the property from private to public hands. We believe that the time is ripe for urging the recognition of the amortization principle in all franchise contracts, and would further state that in our opinion the tendency will be to amortize too slowly and too little rather than the reverse.

It is essential to the proper development of the utilities

\*Abstract of a report presented at the annual meeting in Toronto, Ont., on Nov. 15, 1913.

of any city and to the full realization of the principles of public control that, in all cases where the outstanding franchises run in perpetuity or for unreasonably long periods, the city should definitely set about devising means for recapturing them. While it is our opinion that every legitimate investment in a necessary public utility should be carefully protected, we do not believe that franchises as such should be irrevocable or that they should have special value apart from their function of giving life to the property of the utility.

VIEWES OF PROFESSOR BEMIS

Prof. Edward W. Bemis did not sign the report but wrote that while he agreed in the main with the views presented he doubted the wisdom, at the present time, of lodging in any state commission any control of the capitalization or rates of public utilities in the larger cities, especially west of New York State.

OPINIONS OF PURCHASING AGENTS REGARDING THE  
FORMATION OF AN ASSOCIATION

In a communication published in the *ELECTRIC RAILWAY JOURNAL* for Nov. 8, 1913, it was suggested that the benefits of an interchange of ideas were sufficient to warrant the purchasing agents who attended the American Electric Railway Association convention in holding at least informal sessions by themselves under the direction of the parent body. To bring out the prevailing opinions of purchasing agents with regard to this matter letters were sent to several electric railways in different parts of the country, and some of the replies are presented herewith.

R. R. Smith, Indianapolis Traction & Terminal Company, says: "It has several times occurred to me that it would be a very good plan to hold such meetings. As I look at the matter, the purchasing departments of the various companies have been left to struggle along in the old rut, while all other operating departments were making advancements. Let us have these meetings by all means."

W. H. Staub, United Railways of Baltimore, says: "I think that the suggestion is a very good one and that there are sufficient topics of general interest to the purchasing agents to warrant provision for them to have sessions to themselves at the annual conventions of the American Electric Railway Association. If such meetings have proved helpful in the other branches of electric railway service, why shouldn't they be beneficial to the purchasing branch, enabling the purchasing agents to compare methods, etc., for mutual improvement? If anything definite should develop toward the adoption of such an idea, I should be very glad to co-operate in launching it in any way that I can."

W. J. Mulholland, American Railways Company, says: "This is a matter that has been in my mind for many years past, but I have never seemed to be able to 'get together' with anyone who was interested in the subject. There are doubtless many things that could be discussed in such an organization for the benefit of the purchasing agents themselves and the companies with which they are connected, without in any way being detrimental to the various people with whom it is necessary for them to do business. I should be very much in favor of getting together such an organization."

E. F. Schneider, general manager the Cleveland Southwestern & Columbus Railway, writes: "In my estimation there is so little in common in the methods of purchasing supplies used by different electric railways that there would hardly be sufficient reason for establishing a purchasing agents' department. There are so many things which enter into the matter of purchasing, such as time, freights, quantities, standards, etc., that I can hardly see any justification for an association of this kind."

S. R. Dunbar, Union Traction Company of Indiana,

says in part: "I feel that meetings of this character for purchasing agents would not be very likely to attract much attendance, largely perhaps because of the varied responsibilities which the office of purchasing agent carries with it in different companies. It might be, however, that a sufficient number of topics of general interest would crop up to make the meetings very desirable."

COMMUNICATION

INCLOSING SPECIAL WORK AT CARHOUSES

SCRANTON RAILWAY COMPANY

SCRANTON, PA., NOV. 13, 1913.

To the Editors:

I notice in your issue of Nov. 1 an editorial on "Carhouse Special Work" in which you take exception to the advisability and desirability of inclosing the lateral entrance track. An excellent reason for this practice, however, is that the carhouse to which you evidently refer can be maintained at a temperature of 70 deg. Fahr. in any kind of weather with very little difficulty. Of course, local conditions must govern the installation of carhouse tracks, but I believe that where it is possible to cover the ladder tracks at minimum cost such protection is worth the price. One door opening at the corner of the building is a much better protection to the building than if the whole side is opened up. I can readily see that it would be out of the question to cover the tracks if the ladder was at right angles to the carhouse tracks.

I have had some experience with the tracks inclosed and know the desirability of having them that way if possible. Most of the cars on the average road are in the carhouse only between 1 a.m. and 5.30 a.m., and a fairly warm building is required to melt off from the trucks the accumulated snow and ice. If the carhouse can be kept at a temperature of 70 deg., the ice drops from the trucks in a very short time and therefore gives the inspection force more time for work than it would have otherwise.

We had one of these "inclosed" carhouses in a New England city, but we went to the extreme in this particular case because we had a covered ladder track at each end of the building. We had other carhouses all heated by the same system, but much more night work could be accomplished in the "inclosed" carhouse. I might add that the installation of overhead work over an inclosed ladder track is much more simple and durable than an outdoor installation.

I do not think that it would be at all necessary to equip each bay with doors, as has been done, and the saving in cost in this respect would materially reduce the cost of covering the ladder track.

FRANK CAUM, General Manager.

NEW SOUTH WALES TRAMWAYS

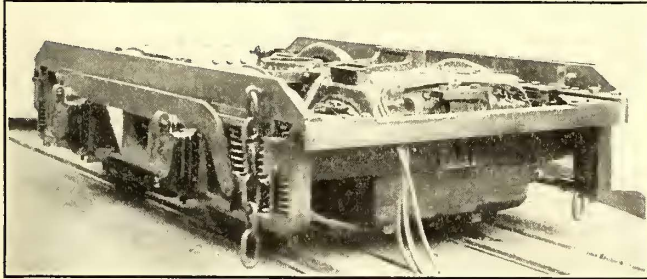
T. R. Johnson, chief commissioner, has presented to the New South Wales government his report on the working of the tramways for the year ended June 30, 1913, as follows:

		Increase Over Last Year
Revenue .....	£1,754,566	£173,173
Expenditure .....	£1,572,190	£240,777
Passengers carried .....	294,445,452	27,665,906
Car mileage .....	26,954,767	2,592,548

The net result, after providing for operating expenses and interest on the capital invested, is a deficit of £32,456. During the year tramway extensions totaling 12 miles were opened for traffic, making the line mileage 208, while a number of new lines are under construction and further extensions are contemplated. Good progress has been made with the erection of the new tramway power house at White Bay, Balmain, and a portion of the plant has been erected on permanent foundations and is now under steam.

**ELECTRIC LOCOMOTIVES REPLACE EXPENSIVE TRUCKING SERVICE**

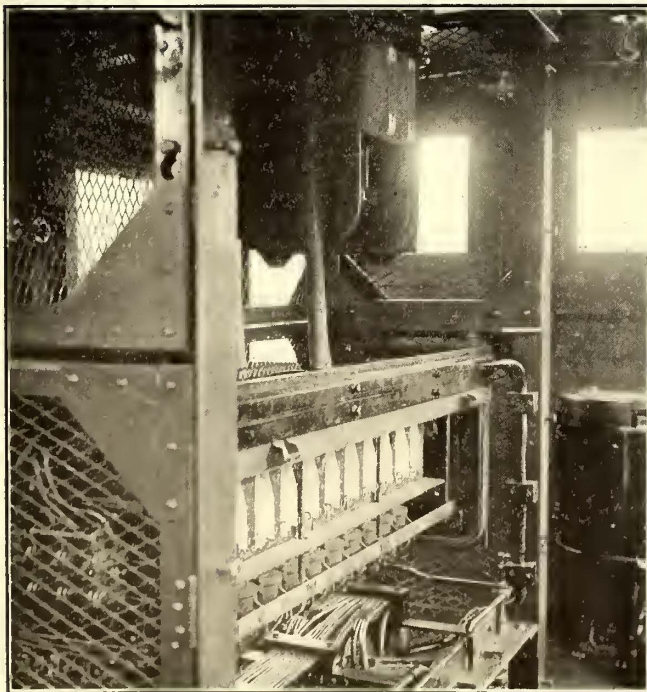
The plant of the Chase Rolling Mill Company, Waterbury, Conn., is located about 1½ miles from the nearest railroad track and at an elevation considerably above the railroad. Heretofore all the hauling raw material and finished product to and from the station has been handled by eight-horse teams. This proved to be expensive, costing at least 50 cents a ton. Some construction data on this extension were published in the *ELECTRIC RAILWAY*



Truck Showing Outside-Hung Motors

*JOURNAL* for Aug. 30 in an article entitled "Way Construction of the Connecticut Company." To replace these teams an electric line 2.3 miles long, with a maximum grade of 5 per cent, was built from the railroad to the mill. Two Baldwin-Westinghouse 45-ton electric locomotives were then employed to handle the work formerly done with twenty eight-horse teams. Each locomotive is equipped with four Westinghouse No. 301-D-2, 100-hp, 600-volt motors geared 17:60, type HL control, and No. 14-EL air brakes.

The control equipment of these locomotives is mounted in the center of the locomotive and surrounded by an



Control Equipment of Locomotive

expanded metal screen cage as shown in one of the accompanying views.

It will be seen from another view that one departure from the usual construction followed in locomotives is that the motors are outside instead of inside hung. This arrangement was necessary to give the trucks a short

wheelbase so as to enable them easily to negotiate the sharp curves on the line.

Each locomotive makes from eight to ten trips per day and with a load of approximately from 100 to 125 tons. This load is governed by the 5 per cent grade, which



General View of Locomotive

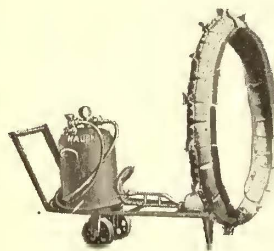
is 3000 ft. long. These machines have been in operation since the first of the year.

Some of the characteristics of these locomotives are given below:

CAPACITY		
Continuous capacity tractive effort with natural ventilation....	4,560 lb.	
Tractive effort at one-hour rating, at 7.8 m.p.h. at 600 volts....	17,270 lb.	
Maximum tractive effort.....	22,500 lb.	
RATED HAULING CAPACITY		
	Number of Cars Each Weighing 45 Tons with Load	Maximum Speed, M.P.H.
Track Profile		
Straight level track.....	38	9.2
½ per cent grade.....	21	7.8
1 per cent grade.....	13	7.8
2 per cent grade.....	7	7.8
MECHANICAL DATA		
Truck wheelbase.....	4 ft. 6 in.	
Total wheelbase.....	20 ft. 0 in.	
Length over bumpers.....	28 ft. 9 in.	
Length of cab inside.....	12 ft. 0 in.	
Length of hoods.....	6 ft. 6 in.	
Width of hoods.....	4 ft. 6 in.	
Width over all.....	6 ft. 6 in.	
Diameter of driving wheels.....	34 in.	
Total height over cab roof.....	11 ft. 0 in.	
Gage.....	4 ft. 8½ in.	
Trucks.....	2-4 wheel swivelled	

**PORTABLE STEEL TIRE HEATER AND PORTABLE KEROSENE TORCH**

Two new oil-using shop specialties of the Hauck Manufacturing Company, Brooklyn, N. Y., are shown in the accompanying halftones. One of these is a portable tire-heating outfit, which can be used with crude fuel or kerosene oil. The tire casing is adjustable for tires of any



Tire Heater



Kerosene Torch

diameter ordinarily employed in railroad work. The adjustable feature is obtained by the use of a flexible casing, made up of a number of interchangeable steel segments. By manipulating the fastenings at the joints these segments can be made to accommodate the diameter of the tire. The tire is placed in the casing and the heat is ap-

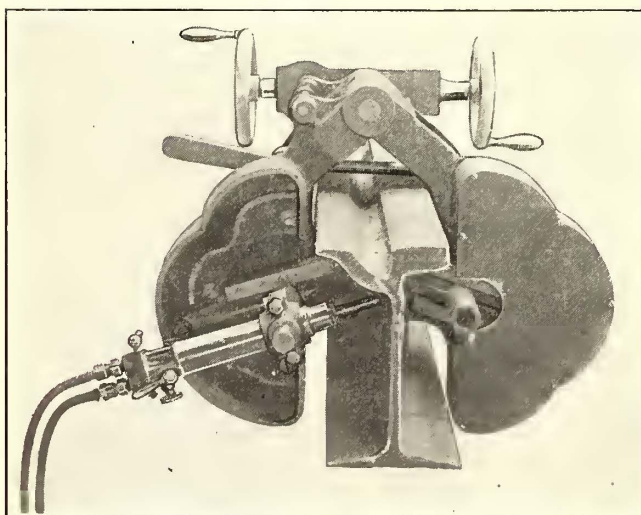
plied through the burner at the bottom. The flame passes around the tire inside the casing, which is left open at the top to allow the escape of heat. The manufacturer asserts that with this outfit any steel tire can be removed in fifteen minutes, using approximately 2 gal. of oil.

The second illustration shows a new kerosene torch which the Pennsylvania Railroad and others have found especially suitable for use in straightening and brazing grab handles and other safety appliances on cars. Many parts like these are broken by trying to straighten them cold, especially when the frost is in the iron, but with this torch they can be readily bent back to shape. The same torch can also be used for burning off paint and for many other heating operations in or about a car shop. It is made in two sizes, namely, 1/2-gal. and 1-gal. capacity. The manufacturer believes that this torch meets the need for a device that can make effective use of kerosene. The latter fuel is cheaper and safer than gasoline; furthermore, one standard grade contains 32,230 b.t.u. more than the gasoline usually employed in shops. The new torch is said to have permitted the bending of a 1/2-in. x 1/4-in. piece of copper in three minutes and of a 1-in. brass rod in two minutes; also to have heated a 2-in. shaft red hot in five minutes.

**AN OXY-ACETYLENE RAIL-CUTTING MACHINE**

The Davis-Bournonville Company, New York, has recently developed the oxy-acetylene rail-cutting machine shown in the accompanying illustration and known as the "railagraph." It can be used on a rail in position in the roadbed. The machine consists of a stand which is clamped on to the rail, and on each side of the rail a bracket is provided in which the cutting torch can be mounted. This bracket is secured to a slide which is moved by a roller held in contact with a cam by a tension spring. Different forms of cams are provided for cutting different styles of rails.

The machine is driven by the small handwheels at the top and as these are rotated the torch is made to travel over the rail, the cam and slide arrangement holding the end of the torch about 1/8 in. from the work. In operation, the torch is first applied at one side of the rail and



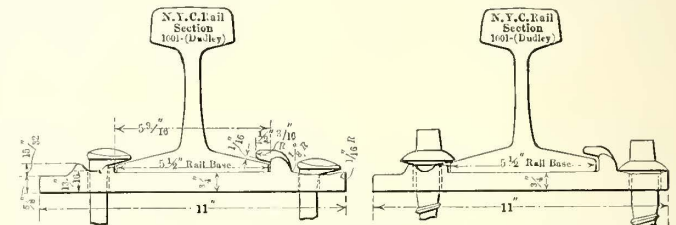
Oxy-Acetylene Rail-Cutting Machine

fed over the line on which it is to be cut, one-half of the base, the entire web and one-half of the rail surface being cut by this operation. The torch is next removed from the holder, and, mounted at the opposite side of the rail, it is passed over the work a second time in order to cut the remaining halves of the base and rail surface. During a

recent exhibition a 9-in. girder rail was cut off in three minutes, with a consumption of 2 cu. ft. of acetylene and 5 1/2 cu. ft. of oxygen. A comparison between this time and the time required to cut off such a rail with a hand hack-saw will readily show the desirability of using the equipment for work of this kind. The standard Davis-Bournonville machine cutting torch is used on this machine, except that for rail cutting the torch is made about 2 in. shorter than the standard dimension. Oxygen is used at a pressure of 50 lb. per square inch.

**REINFORCING PLATE FOR ANGLE-BAR JOINTS AND HOOK SHOULDER TIE PLATE**

Two important specialties for the track department which have already been widely applied on steam railroads are now being actively exploited in the electric railway field by the Lackawanna Steel Company. One of these is

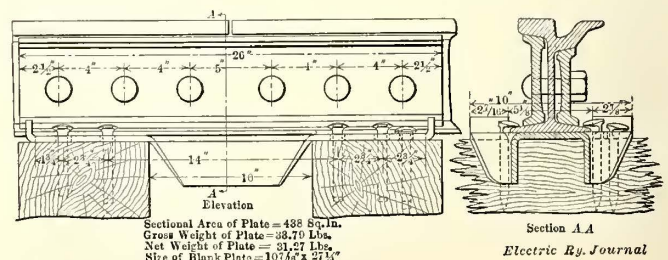


Hook Shoulder Tie Plate with Spike and Screw Fastenings

the Abbott rail joint plate and the other is the Lackawanna hook shoulder tie plate.

The rail joint plate was developed some years ago to help the ordinary angle-bar joint to take heavier loads inasmuch as the vertical section of the bar itself is limited. The plate is a single piece of plain, flat axle steel, forged into a shape that makes a short deck bridge, having greatest strength at the center cross-section, with wide flat end bearings, upturned corner lugs and spike holes arranged to fit any angle-bar rail joint in T-girder and step joint combinations. In the last case, proper support and alignment is furnished by the joint plate in its regular position together with a simple flat plate of thickness equal to the difference in height of the rail sections. An application of the plate to a girder rail is illustrated.

In general, this joint plate is designed to reinforce the angle bar by giving a base support to the rails at the ends; to prevent deflection of the angle bar and battering of rails; to reduce the tendency to stretch the bolts and loosen the nuts; to give wide tie bearings, taking the place of two tie plates and saving ties; to serve as anti-creepers through the engagement of the corner lugs with the ends of the angle bars, and also to make rail guides to prevent lipping



Rail Joint Plate Applied to Girder Construction

of ends if the angle bars should accidentally become broken or displaced. The plate can be easily installed after track laying is completed and therefore is applicable to either old or new track.

The hook shoulder tie plate is of simple pattern with shoulders for both sides of rail, one of which is in the shape

of a hook to extend over one flange, making a holder between the plate and the rail. It is designed to be fastened to the ties without having spikes come in contact with the rail. The spikes hold the plates and the plates hold the rail. The hook shoulders may be installed in reverse position on every other tie, thereby making them a permanent holder of the rail, or all on one side, which makes possible the removal of the rail without disturbing the plates.

**NEW AUTOMATIC TRAIN STOP**

A satisfactory test of a new type of automatic train stop was conducted in Pittsburgh recently to establish its ability for operation under actual working conditions, its application to both electric and steam systems being demonstrated by installations on the Fort Wayne division of the Pennsylvania Lines just west of Pittsburgh and on the Ardmore division of the Pittsburgh Railways. The equipment, both on track and rolling stock, had been in service for some time, that on the Fort Wayne division having been installed nearly two years ago. The inventors are Gardner B. Gray, chief signal inspector of the Pennsylvania Lines West, and Guy P. Thurber, a Pittsburgh consulting engineer. The patents are held by the Automatic Train Control & Signal Company, Pittsburgh, Pa.

The device, which is called the Gray-Thurber automatic train stop, operates on the closed-circuit principle; that is, a train or electric car equipped with it cannot proceed unless the circuit governing it is closed and complete throughout its whole length. Thus any derangement of the apparatus will act to stop the train or car. The accompanying illustration shows its application to electrically propelled trains. An alternating current is used for the train control system, so that the blocks may be insulated from each other and provision still made for returning the propulsion current to the power house through the rails by carrying it around the insulated joints between blocks through impedance bonds, which serve as sufficient insulation against the alternating signal current.

The principal equipment on the car consists of a relay which governs an air valve and a small dynamotor driven by the direct propulsion current which furnishes a low-voltage alternating current to energize the relay. One of the trucks is insulated from the rest of the car. The circuits on the car are illustrated in the upper part of the accompanying cut, which shows the apparatus in the "stop" position. From the dynamotor, *D*, the normal circuit extends to rear truck, to rail, to front truck, to armature of train control valve, *TCV*, to winding of magnet and back to the dynamotor. As long as this circuit is complete the armature to train control valve is held up, the valve is closed and the car may proceed.

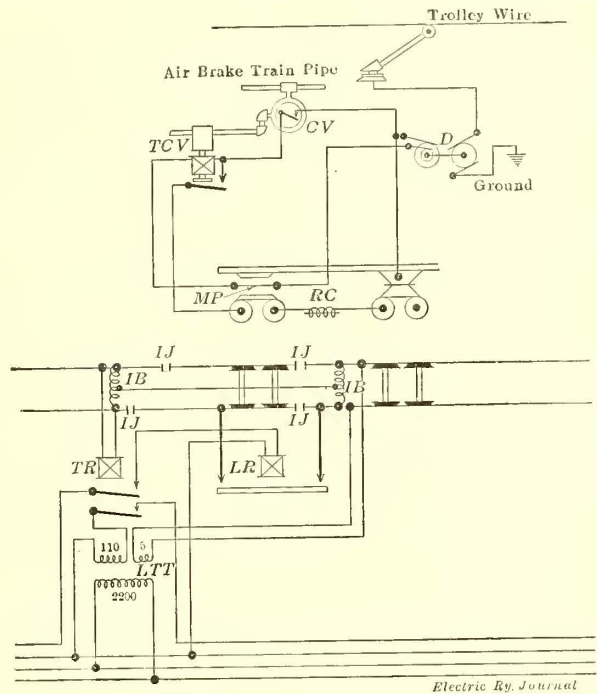
The insulation between the truck and body of the car consists of two sheets of fiber with a metal plate, *MP*, between them. This is made a part of the car circuit, so that if the insulation breaks down, a short-circuit will result between the dynamotor and the relay, the latter will be de-energized and the car will stop.

Whenever the armature falls on account of an interruption of the current normally flowing through the relay, the circuit is broken, thus keeping the brakes applied until the cut-out valve, *CV*, is turned, closing the air valve and the car circuit at the same time. This re-energizes the relay so that the armature is lifted up again, the train control valve is closed and the car may proceed. The cut-out valve is normally held open by a spring. If the train control system breaks down, the cut-out valve may be latched shut so as to permit the car to be run into a switch. An impedance bond, *IB*, between the trucks to return the propulsion current to the rails from both sets of motors completes the car equipment.

Insulated joints in the rails are provided at the ends of each block, as shown in the lower part of the accompanying

diagram. If the rails have been laid with alternating joints it is necessary to insert a short section to bring the insulated joints opposite. The next joints ahead are also insulated, so that as the car enters a block its front truck stands on a short section of track isolated from any signal current. The direct propulsion current is carried around these insulations through impedance bonds *IB*, as above stated. A loop circuit which may be broken by the de-energization of the relay, *LR*, completes the car circuit, while it is crossing the opposite insulated joints, so that the car will ordinarily pass into the block.

The track apparatus is such that the application of the train stop to a road already equipped with an automatic block signal system is a simple matter. It consists of a track relay, *TR*, a transformer, *LTT*, having a high voltage primary supplied with an alternating current from the



**Wiring Diagram for Automatic Train Stop, Showing Connections for the Car and for the Track**

power house, a track secondary of low voltage and a 110-volt secondary which energizes the line relay, *LR*. The line relay, *LR*, is controlled by the track relays of two blocks ahead, or of whatever territory it is desired to protect, and its function is to make and break the loop circuit around the insulated joints, *IJ*, and thus to cause the car to be stopped if the protected territory ahead is occupied. The insulation at the joints is guarded by a detector.

The municipality of Vienna, Austria, has issued an illustrated book of 154 pages in commemoration of the first decade of the municipal operation of the local electric railway system. Among its features are the views of traffic at congested points, the home manufacture of special work, methods of maintaining cars, operation of bus lines as suburban feeders, houses built for employees, manufacture of employees' uniforms and cleansing of the same by the vacuum process. The views of car developments show the latest motor car with separate entrance and exit on the rear platform, train operation and the trial double-deck car. Illustrations are also presented of many handsome waiting rooms for passengers and booths for switchmen. A full-size model of conduit construction is used in the instruction rooms. The general manager of the Municipal Tramways is Ludwig Spängler, whose innovations in cars have been described from time to time in these columns.

# News of Electric Railways

## Substance of Chicago's Surface Railway Unification Ordinance

The ordinance passed by the Chicago City Council at a special meeting on Nov. 13, authorizing the unified operation of all the surface railways in the city of Chicago, contains a number of provisions which are radical departures from the old 1907 settlement ordinances. The new ordinance was read section by section and attempts were made to amend different sections, to require the Board of Supervising Engineers to advertise for bids for all material valued in excess of \$500, to force the railways to furnish a sufficient number of cars to provide seats for all passengers when they reach a point approximately 1 mile from the loop district, to include specific provisions as to what streets the through routing of cars should include, etc. All of these were voted down and the ordinance was passed by a vote of fifty-four to seven practically as it came from the local transportation committee.

The passage of the ordinance was desired in order that the companies might utilize to the fullest extent the trackage in the loop district owned and operated by the two principal surface railways. Under the existing arrangement it has not been possible to carry out the scheme of through routing provided in the 1907 ordinance, owing to the fact that the two companies could not agree on a system of accounts whereby each would receive its proper proportion of the earnings of each through-route car. Under the new ordinance all questions of dividing revenue on through routing are eliminated, and all local service throughout the city will be balanced so far as local schedules permit. This balancing of service will be under the control of the Board of Supervising Engineers.

Another important provision of the merger ordinance is in fixing a 5-cent fare on the surface lines throughout the entire present and future limits of the city of Chicago. At present the Calumet & South Chicago Railway, as well as the Chicago City Railway, collects a 10-cent fare from all passengers from that part of the city north of Seventy-ninth Street who travel into the district south of that line. Under the terms of the 1907 settlement ordinance the Calumet & South Chicago Railway could continue to collect a 10-cent fare until such time as the gross earnings reach a point where the net receipts would pay a 5 per cent annual interest on the capitalization for the entire period of operation from 1907. This company agreed to waive its right to collect the extra 5-cent fare, and the city has agreed to pay it a sum equal to the aggregate amount, including interest adjustment at the rate of 5 per cent per year, of the annual deficits of this company as defined by its old settlement ordinance. The Board of Supervising Engineers computed this aggregate amount of deficits up to July 31, 1913, and found that it totaled \$303,545. The passage of the merger ordinance by the City Council authorized the payment of this amount of money from the city's 55 per cent of the net receipts of the South Side surface lines.

Under the 1907 settlement ordinance it was provided that the companies should deposit in a separate fund 8 per cent of the gross receipts, which amount was to constitute a reserve fund for taking care of renewals and depreciation. At that time, however, it was provided that the Board of Supervising Engineers could increase the percentage until the fund was sufficient to take care of renewals and depreciation. Since the passage of the 1907 ordinance the board has not seen fit to increase this amount, although it has expressed itself several times as being of the opinion that an increase was necessary. In order to be positive that the renewal fund was sufficient the city and the surface railways agreed to increase this amount from 8 per cent to 10 per cent in the merger ordinance.

Another important clause in this ordinance provides that when sewers or water mains are constructed or reconstructed in streets occupied by railway tracks, and it is necessary for the railway company to reconstruct any portion built according to the standards for track in paved streets, as provided by the Board of Supervising Engineers, the expense of reconstruction, except such portion as the

Board of Supervising Engineers may determine as properly chargeable against operating expenses, is to be charged against capital account.

The railways also are authorized to use T-rail in paved streets where its use is approved by the Board of Supervising Engineers. This clause in the ordinance provides that the design of the T-rail shall be satisfactory to the Board of Supervising Engineers and that it shall not extend above the top level of the street pavement. It also provides that where T-rail is used the space between the rails and between the tracks shall be paved with granite block. If after track has been constructed with T-rail the Mayor and City Council are not satisfied with it, they have reserved the right to require the company to replace it with the standard 129-lb. grooved rail construction.

Under the existing ordinances the companies are required to use grooved rail in all new track construction. The merger ordinance provides that it is unnecessary to use grooved rail of the standard section in unpaved streets or streets where the sewer and water supply pipes have not been laid. Track in unpaved streets may be a type of temporary construction approved by the Board of Supervising Engineers.

The provisions for heating the cars as passed by the local transportation committee and published in the ELECTRIC RAILWAY JOURNAL Nov. 1 were adopted by the City Council without change.

At the time negotiations for the merger ordinance were in progress the representatives of the railways hesitated about including the universal transfer privilege. It was agreed, however, that if sufficiently stringent provisions regarding the use of transfers were embodied in the merger ordinance, the companies would grant the universal transfer privilege. As a result of this agreement the following provisions were embodied in the merger ordinance to prevent the fraudulent or improper use of transfers:

"It shall be unlawful for any person: (1) to sell, barter or exchange for any consideration whatever any such transfer, or to give away any such transfer; (2) to receive or to use or attempt to use or offer for passage upon any street railway car of the companies, or any of them, any such transfer not issued for the use of such person by an officer, agent or employee of the companies, or any of them; (3) to throw away or otherwise discard any such transfer without first tearing such transfer in two; (4) to use or attempt to use or offer any such transfer after such person receiving the same shall have interrupted or suspended his or her passage for the transaction of business; (5) to counterfeit any such transfer; (6) to punch or alter or change the punching of any such transfer (authorized agents of the companies, or any of them, excepted). Any person violating any of the provisions of this section shall be liable to a penalty of and shall be fined not less than \$1 nor more than \$25 for each offense."

Under another section it is provided that the basis of accounting between the companies and the city of Chicago shall be the same as under the 1907 settlement ordinance.

It is also provided that the companies may invest in first mortgage bonds secured by their respective properties subject to the approval of the Board of Supervising Engineers and the city comptroller of Chicago. The railways are also authorized to lease any real estate belonging to them, not used for transportation purposes, for periods of such length and on such terms as may be approved by the Board of Supervising Engineers and the city comptroller.

The clause providing for the re-use of rails having a wearing life of not less than five years was changed to seven years. Rails having a wearing life of this length may be used in newly paved or repaved streets, provided they are placed on standard foundations.

There was no change in the street-cleaning clause which provides that during a period of five years after the ordinance becomes effective the companies shall pay the city of Chicago for cleaning the right-of-way, including the removal of snow, the sum of \$51.50 per month for each mile of double track operated. The companies agree to make these monthly payments on 454 miles of double track. All

extensions built or acquired during the five-year period are to be added to this mileage and paid for at the agreed rate.

The electrolysis prevention provisions as passed by the local transportation committee and abstracted on page 966 of the *ELECTRIC RAILWAY JOURNAL* for Nov. 1 were adopted with unimportant amendments. The ordinance was signed by the Mayor on Nov. 18.

#### Interurban and Street Car Service Defined

The finding of the arbitration board in the matter of arbitration between the Southern Pacific Company, Oakland, Cal., and its train employees as to what constitutes interurban and street car service follows:

"From a review of all the evidence submitted it would appear, and the board finds as its determination of what constitutes street car service as distinguished from suburban electric service, as follows:

"1. Street car service differs from suburban electric service in the greater expedition with which passengers in suburban electric service are carried from terminal to terminal, or between stations, by reason of the fact that street car service is designed to do, and does, a more local or transient transportation business than suburban business, in the transportation of passengers locally in a single community, whether that community be a single municipality or a community divided by municipal, county or state boundaries.

"2. Subject to municipal regulations for purposes of public safety, the passenger in street car service may, on signal, enter or leave the car at a street intersection, though sometimes stopping points for street cars are between street intersections by reason of physical or operating conditions. In suburban electric service, on the other hand, the stops are at arbitrary stations fixed by the operating company, or by franchise provisions, though a suburban car may in certain parts of its run stop at street intersections by reason of congestion of traffic, local police regulations, insufficient headway between it and the preceding car, or use of a track operated under a franchise requiring stops at street intersections.

"3. Street cars do not handle baggage, except hand baggage carried by passengers, mail, except for the accommodation or convenience of the government, freight or express, while there are no such restrictions on suburban electric cars.

"4. The usual method of operation of street car service consists in the running of single cars, sometimes with a trailer, whereas suburban electric service usually operates with greater power and with cars capable of operation as single cars or in multiple-unit trains, as the necessity for passenger accommodation requires.

"5. In street car service customarily a less commodious type of equipment with much less power than in suburban electric service is used, the street car service demands upon the equipment being usually different on account of the frequency of stops in street car service as compared with suburban electric service and the lack of the necessity for the same maximum rate of speed in street car service as in suburban electric service. This is not a controlling distinction, however, as the type of car used sometimes varies with the maximum of the speed required and the distance to be traveled in the suburban service.

"Although suburban equipment may occasionally be temporarily used in street car service such temporary use of suburban equipment would not change the character of service from street car service to suburban electric service. On the other hand, the fact that an electric suburban equipment is run over the streets of a city does not necessarily make the service rendered by it a street car service.

"6. The fact that transfers may be given to or from a street car to or from a suburban electric car or train, or steam train, operated by the same or a separate management, does not of itself change to suburban service the character of the service rendered by the street car.

"7. The fact that cars furnishing street car service run on the same rails, or that they alternate or are intermingled with suburban, interurban or steam service, or any or all of the three last-named classes of service, does not change the character of the former service from street car service to suburban electric or other service; provided, that in the Ala-

meda and Oakland Pier electric service the service furnished by electric cars of any type, or by electric trains composed of cars of any type, that run into said piers or either of them, and by cars or trains that connect with said last-named cars or trains on schedule, but do not stop at all, or nearly all, street intersections at will of passenger, but only at regular scheduled stations for the particular train, is hereby determined to be suburban electric service as distinguished from street car service; and provided further, that pending the completion of the overhead structure at Sixteenth Street, Oakland, and the running of cars through from Fourteenth and Franklin Streets, Oakland, to said Oakland Pier, the service furnished by cars now operating exclusively between said Fourteenth and Franklin Streets and Sixteenth Street is hereby determined to be suburban electric service.

"The date from which this finding, decision and award shall be deemed to have become effective is Aug. 18, 1913, and the period during which said finding, decision and award shall continue in force shall be at least one year from said last-named date."

The determination of the question was to furnish the parties to the agreement with a definition which they themselves could use in clearing up the meaning of the provisions of Subdivision 2 of the agreement between them, which refers to the portions of the Pacific system of the Southern Pacific Company in Alameda County and in Oregon that have been electrified, and any portion of the Pacific system that may hereafter be electrified, and any new lines constructed for operation in connection therewith, and, under the provisions of the agreement, therefore, the determination of what constitutes street car service as distinguished from suburban electric service was confined to the territory in Alameda County and in Oregon.

#### Howard Elliott on the New Haven's Problems

Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, in an address which he delivered before the members of the Chamber of Commerce of New Haven, Conn., on Nov. 19, 1913, dwelt upon the problems which confront the company and pointed out the possibilities which exist in the territory served, particularly in Connecticut, for properly planned agricultural development. Referring to the past and to the future, he said in part:

"Since the purchase of steamships, electric railways, Boston & Maine and other so-called outside interests there have been elected to the board of directors enough new men so that a majority of the board as now constituted were not members when these acquisitions, which are now so much criticised, were made. Mr. Hustis, the new president of the company, and I came here on Sept. 1.

"With no feeling of criticism of the past or of any men connected with the company then or now, the new directors and officers and the old ones are all working loyally to review the situation and to do what is right to those who own and to those who use the railroad, to conform to the law when it is clear that the law has been transgressed and to practise the most rigid economy consistent with safety and fair service to the public.

"New Haven and Connecticut can help in this difficult work by saying that time must be allowed to solve this problem. If it is necessary or wise to sell electric railways, steamer lines, railroads and other property, such sales cannot be made in a day or a week or a month or even a year, especially at this time of halting business. There will have to be much patient negotiation, and will it help Connecticut and New England to force these sales so that there is an unreasonable loss and crippling of the whole transportation machine? This problem needs the thoughtful consideration of the people generally as well as of the members of governmental bodies and of the directors and officers of the railroad, and reasonable time should be given."

In regard to the electric railways as an aid to the farmers, Mr. Elliott said:

"One of the most effective agencies by which prosperity can be brought to the farms is the electric railway. There are now in operation in this state 384 miles of electric railway express routes, averaging two cars a day and furnishing an express service to the farmer. To-day the farmer

living along these lines can connect with the great highways of commerce from his own front door. But the Connecticut farmer is naturally conservative. He is too apt to think of the \$2 that he can save by hauling his apples himself, though it means a whole day on the road and just so much productive labor lost to the farm. Potentially, the electric railways through the farming communities may mean even more than this to the farmer. It is entirely within the realm of possibilities to utilize the same current now moving his goods in furnishing him power for co-operative refrigerating plants. This is only one of the many possibilities in the agricultural development of this State."

In conclusion Mr. Elliott said that the following three things were absolutely essential if the railroad situation in New England was to be what all desire:

"First—There must be confidence, loyalty and co-operation between officers and men all along the line and a good *esprit de corps*. This is now here in part and by careful organization and work the officers hope and believe they can increase this spirit.

"Second—There must be confidence, frankness and reason between the great shipping and traveling public and the railroad so that differences of opinion may be discussed in a calm, businesslike way with a willingness on the part of each to consider the viewpoint of the other.

"Third—There must be open-minded, fair and frank relations between all the different public bodies with which the railroad has to deal so constantly—commissions, city councils, legislators. The railroad is a servant of the people and so are these governmental agencies—and both must act with prudence and remember that unfair and dishonest treatment of people, communities or property will in the long run hurt the people as a whole. I believe thoroughly in the future of New England and in the ultimate success of her transportation system. The New Haven is a great property; it is in trouble now, but patience, hard work and fair treatment by all should enable it to give the service the people want and at the same time permit a good return to the owners."

#### Revised List of Grievances Submitted at Indianapolis

A revised list of grievances, formulated so as not to conflict with the provisions of the strike settlement agreement of Nov. 7, was submitted on Nov. 14 to the officials of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., by a committee of employees. The new demands omitted all reference to the Amalgamated Association, but asked for recognition of an "employees' association," and included in the demands for higher wages many classes of employees not affected by the strike. The company has ten days in which to consider the demands, before submitting them to the Public Service Commission for its decision, and conferences are now being held between representatives of the company and its employees in an effort to adjust the minor grievances.

Chester P. Wilson, president of the Interstate Public Service Company, announced on Nov. 14 that all of the trainmen of the Indianapolis, Columbus & Southern Traction Company had signed an agreement with the company similar in form to the agreements recently entered into by the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis & Cincinnati Traction Company with their employees for the settlement of differences which arise.

Several brutal attacks have been made recently on non-union employees of the Indianapolis Traction & Terminal Company operating night cars. Some of the men who were attacked had to be taken to hospitals. Substantial rewards have been offered by the company for information leading to the arrest and conviction of the persons who resort to violence to coerce the non-union men into joining the organization.

The Indianapolis Board of Trade passed a resolution on Nov. 18 commending the action of Superintendent of Police Hyland in suspending thirty-three policemen who rebelled and removed their badges rather than protect property of the Indianapolis Traction & Terminal Company during the recent strike. The resolution states that "a most disgraceful and violent riot occurred during the street car strike," and, after describing the conditions,

condemns "the cowardly action of those who, in violation of their oaths of office, at a time when the peace and safety of the city and citizens were in peril, refused to perform their duty." The Indianapolis Chamber of Commerce on the same date passed a similar resolution and protested strongly against any police officer being retained in the service who refused to do his duty during the strike.

The form of agreement between the Terre Haute, Indianapolis & Eastern Traction Company and its interurban trainmen was signed on Nov. 13 by Samuel M. Ralston, Governor of the State of Indiana; Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company, and each of the 185 interurban trainmen of the company. The agreement is somewhat different in form from the other interurban agreements in that it includes the Governor as a party to the agreement and in the fourth clause states particularly that the agreement is to avoid "strikes, lockouts, interruption of operation of cars," etc.

The officers of the Indianapolis & Cincinnati Traction Company failed on Nov. 19 to reach an agreement with the employees in regard to the questions over which they were at odds and the differences which remain to be settled will be submitted to the Indiana Railroad Commission for arbitration.

#### Storm Damage in Cleveland and Vicinity

Street railway service in Cleveland, which was interrupted by the heavy snowstorm of Nov. 10, was almost normal again on Nov. 15. It is estimated that the Cleveland Railway lost about \$40,000 in revenue as the result of the storm, but there was no heavy property damage. Power cables and trolley wires were broken in only a few places. In most instances these breaks were caused by other poles and wires falling against or across lines of the railway. The concrete poles stood the strain remarkably well. Out of a large number in use only a few were damaged. They were not down, but the concrete was cracked and had fallen off where the poles were badly bent. The Cleveland Railway could have operated uninterruptedly on a fair schedule, if the tracks had not been obstructed. When the company was forced to suspend operations on account of fallen wires the snow piled up on the tracks.

Most of the interurban railways succeeded in getting cars into operation by the afternoon of Nov. 12, but of course difficulties were met after that time. Lines to the west of the city had less trouble than any of the others. Between Cleveland and Ashtabula the condition of the country due to the storm was very bad. The Northern Ohio Traction & Light Company's lines in Akron were at a standstill for some time and there was some trouble in Canton. The line between Cleveland and Akron was opened on the afternoon of Nov. 12.

#### Boston Elevated Concludes Presentation of Evidence

The presentation of evidence by the Boston Elevated Railway in the pending arbitration proceedings in connection with wages and service conditions was concluded on Nov. 15. William A. Bancroft, president of the company, was cross-examined by counsel for the employees' organization at the final session. He made the point that large bodies of men must be paid on the basis of average compensation, whereas the individual official of exceptional ability naturally receives a more particularized compensation. Regarding the cost of living and its purported increase in recent years, the witness emphasized the differences between the mere cost of living and standards of living, showing that the phrase "living wage" is subject to many interpretations. Since 1911 no salaries have been paid to members of the executive committee or to members of the finance committee.

The employees have always shared in the management of the company. They are consulted with respect to all matters except the investment of money. Some of the most valuable advice which the witness has ever had came from men in the car service. The proportion of gross receipts paid out in salaries at Boston is about the same as that paid out in New York, Brooklyn, Chicago and other large cities.

Russell A. Sears, general attorney, testified at length



regarding the cost of accidents on the Boston system. The cost of accidents is about 0.8 cent per car mile on the surface lines, 0.27 cent per car mile on the elevated lines and 0.15 cent per car mile in the Cambridge subway. Under the Massachusetts workmen's compensation act, which went into effect July 1, 1912, insurance has cost the company \$82,900 a year. The witness said that last year 1847 accidents to employees were reported, or about 18 per cent. Mr. Sears said that the company goes beyond the act in paying the employee half his wages during the second week of disability, upon application, and in some special cases pays also half the first week's wages. Accident prevention is constantly studied by a safety committee of 210 employees, with local subdivisions. This general committee began work July 1 last, and accidents have been reduced 25 per cent thus far as compared with last year. The company pays for the time of men working on such duties. During the six years preceding the establishment of the compensation act the company averaged only six suits a year from employees. The total cost to the company in the last fiscal year of accidents and damages to persons and property was \$1,182,000. On quick settlements the company paid about \$328,000, on suits settled before or during trial \$400,000, and on judgments about \$303,000. The cost of litigation is about 25 per cent of this total.

#### B. J. Arnold Reports on Chicago Railway Terminals

The report of B. J. Arnold on Chicago railway terminals recommends a system of through-routed electrical suburban rapid transit on tracks depressed through the business district and zone from which all steam traffic is excluded. The plans do not interfere with the main outlines of the proposed new union station on the West Side, which is to be used by the Pennsylvania, Chicago & Alton, St. Paul and Burlington railroads.

Mr. Arnold's report requires extensive alterations in the Pennsylvania freight terminal plan on account of excessive congestion, and recommends ultimate elimination of La Salle Street station as well as Dearborn Street station and re-routing of roads using them to either the new union station or the projected station of the Illinois Central line. It also requires interchange of suburban trains between the Chicago & Northwestern Railway and the St. Paul Railroad, providing transportation to the north shore and to western suburbs and to roads tapping the territory west and south.

The recommendations of John F. Wallace to the terminal committee of the City Council of Chicago were summarized in the *ELECTRIC RAILWAY JOURNAL* of Nov. 1, 1913, page 992. Action on the recommendations of Mr. Wallace was postponed by the committee pending the presentation of the report by Mr. Arnold, who was retained by the citizens' terminal plan commission.

#### Suit Brought for Damages During Buffalo Strike

The International Railway, Buffalo, N. Y., has brought suit against Erie County to recover damages for the wrecking of cars and other depredations by crowds of men during the street car strike. County Attorney Sullivan has outlined the defense he contemplates for the county against the action of the railway. He is quoted in part as follows:

"The International Railway has sued the county for property damage which it alleges was incurred during the strike. The county sets up as a defense that the company was attempting to operate its cars with men not qualified under the railroad law. We expect to prove that the company attempted to operate cars with such characters as 'Ed' Hutchinson, 'Thirty' Murray, 'Stiff-neck' Davis and about 1500 others of similar character brought here and put in charge of its cars on which it expected the citizens of this city to ride."

Mr. Sullivan is said to have expressed the opinion that the county will have no difficulty in proving that the men named, with others of their kind, were from New York and were unfit to operate the cars under the provisions of the railroad law.

In May, 1913, the company through its president, E. G. Connett, filed a claim for \$108,400 against the city of Buffalo for damage to the company's property during the strike.

#### Inspection of the United Railroads, San Francisco

James H. Reed, Pittsburgh, president of the Philadelphia Company; Moritz Rosenthal, of Ladenburg, Thalmann & Company, New York, and Mason B. Starring, president of the United Railways Investment Company, were members of a party which arrived in San Francisco on Nov. 12 to inspect the property of the United Railroads, San Francisco, and to confer with Jesse W. Lilienthal, president of the company. Mr. Starring issued the following statement:

"Our visit to San Francisco on this occasion is the repetition of the inspection trips which a committee from the board of directors of the Investment company has made yearly, commencing with my election to its presidency in 1911.

"It is our desire to see as much as practicable not only of the United Railroads property but also of the various electric power, gas and water properties in which we are interested. Since the committee's last visit the management of the United Railroads has been turned over to a board of directors headed by Jesse W. Lilienthal and composed of residents of San Francisco. We have not met these gentlemen since their election. To learn their views and to ascertain in what way we should co-operate with them, not alone for the profit of the company but also for the best interests of San Francisco, are the principal objects of this trip."

#### Delos F. Wilcox Talks on Cleveland Situation

In an interview with a local Cleveland paper recently Delos F. Wilcox, for some years chief of the bureau of franchises of the Public Service Commission of the First District of New York, stated that the Taylor grant in that city is being put to the political test. The franchise is faulty in two ways, according to Mr. Wilcox. In the first place the company has no stimulus toward economy in expenditures, because the stockholders are permitted to receive not more than 6 per cent return and are not allowed to benefit through restricted expenditures. The company should be allowed to pay its stockholders whatever it could make for them on a service dictated by the city, he said. In the second place, if the administration is really in favor of municipal ownership, a sinking fund should have been established in order that funds for the purchase might be available when wanted. He said that 4 per cent of the gross receipts set aside yearly would just about purchase the property at the expiration of forty years. Setting aside this amount might tend to reduce the interest fund or might make necessary an advance in the fare, but this is better than endeavoring to raise the entire amount when the city wishes to purchase the property. He said that as long as no steps were taken toward the establishment of a sinking fund the street railway question would be in politics.

#### Wheel-Guard and Fender Order Reaffirmed

After a rehearing the Public Service Commission of the First District of New York has served an order on the Brooklyn Heights Railroad and other surface railways of the Brooklyn Rapid Transit system reaffirming previous orders, with certain modifications, requiring the companies to equip their cars with wheel guards and fenders. This action was taken upon an opinion rendered by Commissioner Milo R. Maltbie, who held the hearings in the case. The order as modified requires that on or before May 1, 1914, the companies shall equip certain cars hereinbefore required to be equipped with wheel guards in the borough of Queens or in the borough of Brooklyn with projecting fenders at the forward end of each car, such fenders to be of a type or types to be approved by the commission and to be carried in an operating position and so that the front part of the apron shall be not less than 10 in. nor more than 12 in. above the rails and no fixed or rigid part of such fenders shall be less than 10 in. above the rails. On or before Dec. 1, 1913, the companies are required by the order to submit to the commission for its approval complete drawings and specifications showing, among other things, all measurements and the method of attachment to the car of the type or types of fenders and wheel guards intended or desired to be used in compliance with the order, except

such types of wheel guards as have already been approved by the commission by resolution adopted April 22, 1910.

In a statement which he issued on Nov. 19 in regard to the attitude of the company toward the order of the commission, T. S. Williams, president of the company, said: "This company, in its desire that every safeguard shall be placed around the lives of those who use its lines and those who go about in the public streets, can take no position other than the one it has always occupied, namely, that the projecting fender is a menace in and of itself, and where wheel guards are installed produces more accidents than it prevents."

#### Ticket Ordinance Passed in Portland, Ore.

The City Commission of Portland, Ore., has passed the ordinance requiring the Portland Railway, Light & Power Company, Portland, Ore., to sell tickets good over its lines at the rate of six for 25 cents. The measure is to go into effect within thirty days from Nov. 7. The company is required to issue books containing fifty tickets to be sold at the rate of six for 25 cents. Books are now issued by the company granting fifty rides for \$2.25.

Commenting on the passage of the ordinance, Franklin T. Griffith, president of the company, said in part:

"For fourteen months W. J. Hagenah has been working on the appraisal of our properties. His only instructions were 'Get it right.' The summary of his report shows: Present value of physical property and working capital, \$12,284,487; reproduction cost of new physical property and working capital, \$14,126,096, and the present value of physical properties, working capital and intangible value or going cost of the business, \$18,404,383.

"Based on the present value of the physical property and the working capital our return on the investment is 4.06 per cent; based on the reproduction cost it is 3.53 per cent, and based on the present value of physical property, working capital and intangible value or going cost of the business, it is 2.74 per cent.

"These figures, which we called to the Council's attention, make it readily apparent that this company is not making a mint of money. In fact, we are getting only a nominal return on our investment. During the year ended June 30, 1913, it was only 4.06 per cent.

"The commissioners do not doubt our figures, in my opinion, but the majority of them are convinced that a reduction in fares will result in an increase in traffic sufficient to make good our losses.

"It is true that some Eastern cities in the same class as Portland in point of population do have lower fares. However, comparison of fares is most unjust for the reason that all other conditions are not compared likewise. Such basic facts as relative mileage covered, cost of construction, wages, numbers of cars operated and the density of population must in justice be considered.

"There are many other reasons why I do not see where the action of the Council in ordering a reduction of fares is justified by the facts. While I am sure that its members voted as their convictions demanded, still I believe they should have postponed action until they had had an opportunity to make a fair inquiry and fully ascertain the facts, something they have not had the time to do."

#### Rectitude in Railway Affairs

In an editorial on this subject, in its issue of Nov. 14, the *Railway Age Gazette* says:

"The season for the beginning of Christmas shopping is now open. It is, therefore, once more an opportune time to remind our readers in the railway and railway supply businesses that nowadays they live, work and have their being in the spotlight of publicity. This being true, it behooves them to avoid both evil and the appearance of evil. Sometimes there is real evil in the giving of Christmas presents when the donor is a man who is seeking to get contracts and the recipient is the man from whom he is trying to get them. Sometimes there is no evil in it. Seldom, however, do presents of substantial value pass between a representative of a supply concern and an officer, whether high or low, of a railway without the incident presenting at least the appearance of evil. Such gift-giving and gift-receiving,

if not open to just censure, is clearly open to a construction which is adapted to do both the railways and the supply concerns harm. Last year and the year before at about this time the *Railway Age Gazette* warned against the dangers incidental to the extensive practice of present-giving which has grown up in the railway and railway supply businesses. It is believed that our comments on the subject and those which others have made have done some good. They have not, however, had the effect of abolishing the practice. What is still worse, all the discussions of and the scandals connected with various forms of grafting have not been sufficient to eliminate it from the railway business. There are numerous forms of stupidity. The most bone-headed form of it, however, is the stupidity of dishonesty. No man is so hard to convince that he should desist from doing things that he is doing as the man who is making a dishonest profit from doing those things. His stupidity almost always leads him to believe that he, at least, is shrewd enough to prevent his conduct from being detected and exposed. The experience of others who have been detected, exposed and disgraced for doing just as he is doing usually is lost upon him. It would seem, however, that the many, many developments which have occurred in the railway business within the last decade—and especially within the last half decade—should have taught every man who is connected with that business, or who has business relations with it, that the time has come when it behooves him to put his house in order so that when the muckrakers for the magazines, or the inspectors of the Interstate Commerce Commission, or the lawyers for the Interstate Commerce Commission, swoop down on him they will not find anything which he would not like to have them find."

#### Issue Between Public Service Commission and Company at Nevada, Mo.

Differences which have arisen between the Public Service Commission of Missouri and the Nevada Water, Light & Traction Company, Nevada, Mo., will be taken to the courts. The commission holds that it has power to remove the manager of the company. W. H. Hallett, attorney for the company, contends that the holding of the commission is in direct conflict with the decision of the Supreme Court of Missouri, to which the case will go on appeal by the company. The commission approved a rule requiring cash deposits to secure payment for meter service and also held that the consumer should be given the privilege of furnishing personal security in lieu of a cash deposit. The commission also held that it has power to change the rates fixed by franchise. The commission holds that it has power to order a defendant corporation to remove a manager when in its judgment such removal is for the benefit of the public, and to direct the company to secure the services of competent persons.

**Proposals Invited for Line in Azores.**—The American consulate at St. Michaels, Azores, has forwarded to the Bureau of Foreign and Domestic Commerce, Washington, D. C., copies of a prospectus for building and operating an electric railway on that island, for which proposals are invited by the Junta Geral (local parliament).

**Decision in Regard to Franchise Taxes in New York.**—The Appellate Division of the Supreme Court of New York, Third Department, has rendered a decision sustaining the contention of Attorney-General Carmody that the receiver of a dissolved corporation must pay franchise taxes accruing before dissolution and that such taxes are preferred in payment over all other claims.

**Electrification of Ocean Shore Railroad Planned.**—The directors of the Ocean Shore Railroad have decided to call a meeting of the stockholders of the company in January to vote on the question of increasing the authorized capital stock of the company by \$5,000,000, the plan being to issue \$200,000 of the new stock at once to provide funds to electrify the line and complete improvements now under way.

**Toronto Purchase Agreement to Be Prepared.**—On Nov. 11 the City Council of Toronto, Ont., decided to have an agreement prepared covering the plan to take over the property of the Toronto Railway. If this agreement cannot

be completed in time for approval by the Hydro-Electric Power Commission of Ontario and for submission to the people as a by-law on Jan. 1 a synopsis covering the situation will be submitted on that day in the form of a plebiscite.

**Safety Measures in New York Electric Zone.**—The Public Service Commission of the Second District of New York has ordered the New York, New Haven & Hartford Railroad to allow no one, except those engaged in the maintenance of overhead construction, to get upon or ride on the top of any car within the electric zone. The commission has also instructed the company to install illuminated warning signs for the safety of employees and others. The order becomes effective on Dec. 15.

**Question Regarding Type of Rail in New Albany.**—The city of New Albany, Ind., has brought suit against the New Albany Street Railway and the Louisville & Southern Indiana Traction Company in which it alleges that the use of the T-rails constitutes a menace to travel and asks that the company be directed to lay girder rails on all improved streets. The case was heard in the Floyd Circuit Court before a special judge recently, and the demurrer of the electric railways was overruled. It will now go to trial on its merits.

**Hearing on Omnibus Application in New York.**—The Board of Estimate of New York gave a hearing on Nov. 13, 1913, on the petition of the People's Five-Cent Bus Corporation for a franchise to operate buses run by electricity over twenty-one routes within the central and western parts of Manhattan Borough. After the hearing the matter was referred to the franchise committee, which may grant another hearing. Opposition to the granting of the franchise came from the Fifth Avenue Coach Company, the New York Railways and the Park Avenue Association.

**Reduction in Tax Value Asked by Ohio Electric Railway.**—W. Kesley Schoepf, president of the Ohio Electric Railway, Cincinnati, Ohio, filed a brief with the State Tax Commission recently in which he asked that the tax value placed on the property be reduced from \$15,000,000 to \$11,000,000. In support of this request, he said that the loss of the company from the flood last March was more than \$400,000 and the consequent loss of business about \$300,000 more. He said that many of the lines built by the company are not yet earning a sufficient amount to make them profitable.

**Technical Talks to Trainmen Resumed.**—H. H. Buckman, master mechanic of the Louisville & Northern Railway & Lighting Company and of the Louisville & Southern Indiana Traction Company, with offices at New Albany, Ind., is preparing to resume his talks before the Boosters' Club of the traction companies on the subject of the wiring of electric cars and the methods to be used in making emergency repairs. The trainmen attend the meetings, and with the aid of blueprints and other diagrams the exact mode of constructing the wiring of a car is explained.

**Separate Operation of Port Arthur & Fort William Electric Railway.**—That Fort William and Port Arthur, Ont., will operate their respective parts of the hitherto mutual Port Arthur & Fort William (Municipal) Electric Railway as separate units was decided on Nov. 2, when the Fort William Council voted to manage its own end of the line, leaving Port Arthur to direct the section of the railway in its own limits. Port Arthur delivers the power for the operation of the whole line. The charter for the road was secured twenty years ago by Port Arthur and terminates on Dec. 1. One fare for the two cities is compulsory by legislation.

**Expert Passenger-Rate Clerk.**—The United States Civil Service Commission announces an open competitive examination for expert passenger-rate clerk, for men only, on Dec. 10, 1913. From the register of eligibles resulting from this examination certification will be made to fill a vacancy in this position in the Quartermaster Corps at St. Louis, Mo., at a salary of \$1,200 per annum, and vacancies as they may occur in positions requiring similar qualifications in any branch of the service. Persons who desire to take the examination should apply at once to the United States Civil Service Commission, Washington, D. C., or to the secretary of the United States Civil Service Board, for application Form 1312.

**Report on Employers' Liability and Workmen's Compensation Laws.**—Senator Sutherland, of Utah, chairman of the commission authorized by Congress to investigate and report on employers' liability and workmen's compensation laws, outlined on Nov. 8 the salient differences between an employers' liability bill and the proposed workmen's compensation act, pointed out the exact effect of the proposed legislation and met, seriatim, various objections which have been made to the measure by those who now oppose it. The last Congress passed the measure by a vote of three to one in both branches, but the Senate was unable to get an agreement on the few House amendments in the closing hours of the session, the legislation thereby failing.

**Report of Committee on Height of Buildings in New York.**—It is expected that the committee appointed by George McAneny, president of Manhattan Borough and president-elect of the new Board of Aldermen of New York City, which has made an exhaustive study of the question of the height of buildings, will recommend a general limitation of building heights. The committee will complete its labors in a few days and will very likely have its report ready for presentation when Mr. McAneny returns from his vacation, when definite action will be taken. The report will be submitted in two sections. The recommendation of the committee needs only the sanction of the Board of Estimate and the Board of Aldermen to make it operative.

**Mr. Mitten to Confer with Transit Director Taylor.**—Thomas E. Mitten, chairman of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, announced on Nov. 17, after a meeting of the board of directors, that nothing could be said as to what the company's position would be on the city's plan for a Broad Street subway until after he had conferred with Transit Director Taylor. Mr. Mitten said: "I am awaiting Director Taylor's return, and I will have nothing to say as to whether this company favors or disapproves of the director's plan to have the company lease the subway and equip it until after that meeting. He will arrange the meeting upon his return at our mutual convenience. No doubt Director Taylor will make such a statement after our conference."

**Report on Plan to Take Over Toronto Radial Lines.**—Corporation Counsel Geary, of Toronto, Ont., has reported to the Board of Control in reference to taking over the radial lines in the city limits and operating them in conjunction with civic car lines and the new lines to be projected. Mr. Geary said: "We are taking over the parts of the Toronto & York Radial Railway, Mimico division and Scarboro division, lying within the city limits. I hope to be able at a later date to submit an arrangement for the use of the tracks on Yonge Street within the city limits in common with the Toronto & York Radial Railway, Metropolitan division. The radial lines belonging to the Toronto Suburban Railway are part of the system which has a franchise from the old city of West Toronto."

**Public Hearings on Kansas City Franchise.**—The joint committee of the Kansas City Council appointed to consider the proposed franchise of the Metropolitan Street Railway has held daily meetings for some time past to hear the suggestions of all interested in the measure. Matters which have already been considered include the demands of organized labor, those of the Kansas City Terminal Railway that the Metropolitan Street Railway be made to bear half the cost of erecting viaducts which the electric line will use, and the suggestions of residents interested in the routing of cars to and from the new union station, which will be put into commission early in the new year. W. D. Miles, who has taken a prominent part in the franchise negotiations, proposed that a provision be inserted in the grant to allow a competing company to use six consecutive blocks on any street in Kansas City.

**Proposals for Improvements in Montreal.**—The Montreal (Que.) Tramways has submitted proposals for the improvement of the tramways service to the Board of Control of the city. Briefly, the proposals include a new artery for traffic between Place Viger or some nearby point and Windsor Street; a boulevard between Craig Street and Mount Royal or Van Horne Avenue, or preferably the Back River; a subway from some point on Craig Street between Bleury and St. Denis Streets running north to Mount Royal

or Van Horne Avenue; a subway under St. Catherine Street followed by a tube under Notre Dame or St. James Street or from Hochelaga west as far as Victoria Square, with a fork to Westmount and Notre Dame de Grace, and a bus line on Sherbrooke Street. It is asked that the city take steps immediately to widen Vitre Street from near St. Denis Street to Bleury Street or Victoria Square. The subways would be operated individually by the company at a straight 5-cent fare. The franchise would be for forty years, the company paying to the city 4 per cent of its gross earnings from the surface lines.

**Examination for Junior Accountant and Examiner and Assistant Examiner.**—The New York State Civil Service Commission announces that an open competitive examination will be held in various cities throughout the State on Nov. 29, 1913, for the positions of junior accountant with the Public Service Commission of the Second District of New York, examiner with the commission and assistant examiner. The position of junior accountant pays from \$1,080 to \$1,500 a year and is open to men only, between twenty and thirty years of age, who have been trained in the theory and principles of economics, including accounting, finance and statistics. The positions of examiner and of assistant examiner pay from \$1,800 to \$2,400 and from \$1,500 to \$1,800, respectively, with expenses when engaged in field work, and it is desired to secure for these positions eligibles between the ages of twenty-five and thirty-five years with practical experience in corporation accounting in one or more of the following fields: steam railroads, street and electric railways, electric corporations, gas corporations, telephone and telegraph corporations. Those who desire to take the examination should address the State Civil Service, Albany, N. Y., for the necessary application blank.

**Power Plant Accident in Utah.**—The Utah Light & Railway Company, Salt Lake City, Utah, is installing two 2500-kva hydroelectric units at its Pioneer plant in Ogden Canyon. The hydraulic turbines, which operate under a 450-ft. head, have 24-in. gate valves back of them, controlled from the switchboard. On Oct. 26 an irresponsible person opened one of these valves from the switchboard. At the time the workmen had the quarter turn of the turbine off and the scroll case open, so that when the gate valve opened the water flooded the power house floor to a depth of 2 ft. Four 1000-kva generators were put out of commission, as was the transformer equipment handling the Ogden lighting circuit. As the gate valve which had been opened accidentally was closed its disks broke and water shot out again, requiring the large valves on the 6-ft. receiver to be shut down. It was nearly midnight when the water was shut off, but the Ogden City service was shut down only an hour or so before temporary connections were made from the high-tension transformers so that Ogden City could be supplied from the Salt Lake plant. The damage to the Ogden power plant amounts to not more than \$5,000.

**Officers' Club Entertains.**—The members of the Officers' Club of the Lehigh Valley Transit Company, Allentown, Pa., escorted the officers of the Easton Transit Company, a subsidiary concern, on a pleasure and inspection trip over the Philadelphia division recently and dined at the Hotel Allen. Charles N. Wagner, secretary-treasurer of the Lehigh Valley Transit Company, called upon President H. A. Fehr to tell his former associates how welcome they must feel themselves when guests of the Officers' Club. H. H. Paterson, superintendent of the Easton company, responded. The guests were F. H. Hazzard, secretary and treasurer; H. H. Paterson, superintendent; F. E. Crick, superintendent of overhead lines; R. C. Green, master mechanic; C. E. Jenkins, engineer of maintenance of way; Charles B. Brunner, claim agent of the Easton Transit Company. The hosts were H. A. Fehr, president; C. N. Wagner, secretary and treasurer; C. M. Walter, auditor; C. C. Collins, traffic manager; George E. Miller, superintendent; H. W. Bromley, superintendent of the power station; W. W. Wysor, engineer of maintenance of way; H. L. Coker, superintendent of lines; A. H. S. Cantlin, manager electric light companies; R. J. Pike, purchasing agent; William Trythall, claim agent; Thomas Gibson, real estate agent; Harry Branson, master mechanic;

C. L. Murray, freight agent; Col. E. C. Spring, business manager Philadelphia division; F. A. Burgess, superintendent Philadelphia division.

## PROGRAMS OF ASSOCIATION MEETINGS

### Midyear Meeting American Electric Railway Association

The midyear meeting of the American Electric Railway Association will be held in New York on Friday, Jan. 30. The committees will meet on Jan. 28 and 29. It is probable that the banquet will be held on the evening of Thursday, Jan. 29. At the meeting of the association on Jan. 30 the report of the committee on joint use of poles will be considered. This report, which was presented at Atlantic City, was referred back to the committee with instructions to secure expressions from member companies and to report at the midyear meeting. There will also be two or three addresses on topics connected with electric railway work.

The banquet this year will not be a complimentary dinner extended by the Manufacturers' Association. It will be in charge of a joint committee of the American and the Manufacturers' associations, which will select the speakers and have the other details of the dinner in charge. Tickets will be sold at a price to be fixed by the committee to cover the cost.

### New York Electric Railway Association

A meeting of the executive committee of the New York Electric Railway Association was held at the Engineers' Club, New York, on the afternoon of Nov. 14. Those present were Frank Hedley, New York, president of the association; James F. Hamilton, first vice-president, Albany; Stuart Wilder, second vice-president, Mount Vernon; James P. Barnes, Syracuse; John J. Dempsey, Brooklyn; S. Walter Mower, Cooperstown, and Charles C. Dietz, Albany, secretary and treasurer. Charles V. Smith, secretary to Mr. Hedley, was also present. It was decided to hold the eighteenth quarterly meeting of the association in New York City on Tuesday, Dec. 9, at the Engineering Societies Building, 29 West Thirty-ninth Street.

The committee on arrangements, of which Mr. Hamilton is chairman, met after the session of the executive committee. It decided that the papers and discussions at the December meeting should be devoted to the subject of public relations. The details of the program will be published later. The members of the committee on arrangements, in addition to Mr. Hamilton, are the following: W. H. Collins, Gloversville; James P. Barnes, Syracuse; J. S. Doyle, New York; Charles R. Ellicott, New York, and H. N. Ransom.

### National Civic Federation

The fourteenth annual meeting of the National Civic Federation will be held at the Hotel Astor, New York, on Dec. 11 and 12. These departments of the federation are to report at the meeting: the department on compensation for industrial accidents and their prevention, the food and drug department, the welfare department, the woman's department, the department on industrial mediation laws, the department on regulation of municipal utilities, the department on regulation of industrial corporations, the department on industrial economics. The department on compensation for industrial accidents and their prevention has a commission of six men who are making a study of the actual results of the working of the various forms of compensation acts. The commission has confined its work to the states where the compensation law has been in effect for at least a year, which include Massachusetts, New Jersey, Michigan, Ohio, Illinois, Wisconsin, California, Oregon and Washington. In the light of the information secured by this commission the model workmen's compensation bill of the National Civic Federation will be redrafted. The department on industrial mediation laws will report on a model state mediation bill. The department on regulation of municipal utilities will report on its proposed model bill for the regulation by the state of street railways, gas, electric light and other municipal utilities.

# Financial and Corporate

## Stock and Money Markets

Nov. 19, 1913.

The volume of transactions on the New York Stock Exchange to-day was not as large as on either of the previous days of the week, but there was no evidence of weakness, the price changes being mostly in the shape of moderate declines. New Haven prices receded early in the day, but were exceptionally strong at the close. Rates in the money market to-day were: Call, 2½@3 per cent; sixty days to six months, 4¾@5 per cent.

At the opening of trading in Philadelphia to-day attention centered in the traction issues. Union Traction recovered during the day to 43½. Philadelphia Rapid Transit, under pressure, closed at a net decline of 1½ for the day.

In the Chicago market small declines in stocks were established. Bonds were firm.

During the early hours of trading in Boston to-day dealings were small and the tone was heavy. Trading was dull at the close.

The volume of transactions on the Baltimore Exchange to-day was small, but the tone was firm. The demand for bonds continued good.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 12	Nov. 19
American Brake Shoe & Foundry (common).....	88½	87
American Brake Shoe & Foundry (preferred).....	128	127
American Cities Company (common).....	36	36
American Cities Company (preferred).....	63	63½
American Light & Traction Company (common).....	332	339
American Light & Traction Company (preferred).....	105	106
American Railways Company.....	38¾	38¾
Aurora, Elgin & Chicago Railroad (common).....	a42	41
Aurora, Elgin & Chicago Railroad (preferred).....	83	84
Boston Elevated Railway.....	82	85
Boston Suburban Electric Companies (common).....	7	7
Boston Suburban Electric Companies (preferred).....	60	60
Boston & Worcester Electric Companies (common).....	6½	*6½
Boston & Worcester Electric Companies (preferred).....	38	38
Brooklyn Rapid Transit Company.....	86½	86¾
Capital Traction Company, Washington.....	112	112
Chicago City Railway.....	160	160
Chicago Elevated Railways (common).....	25	25
Chicago Elevated Railways (preferred).....	75	75
Chicago Railways, pteptg., ctf. 1.....	a92	90
Chicago Railways, pteptg., ctf. 2.....	26	27
Chicago Railways, pteptg., ctf. 3.....	6	7
Chicago Railways, pteptg., ctf. 4.....	2	2
Cincinnati Street Railway.....	105	105
Cleveland Railway.....	103½	103¾
Cleveland, Southwestern & Columbus Ry. (common).....	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred).....	*30	*30
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	59½	59½
Columbus Railway (preferred).....	88	88
Denver & Northwestern Railway.....	111	111
Detroit & United Railway.....	a80	a80
General Electric Company.....	140½	140½
Georgia Railway & Electric Company (common).....	119	119
Georgia Railway & Electric Company (preferred).....	85	85
Interborough Metropolitan Company (common).....	14½	14
Interborough Metropolitan Company (preferred).....	58	58¾
International Traction Company (common).....	*40	*40
International Traction Company (preferred).....	*95	*95
Kansas City Railway & Light Company (common).....	*22	*22
Kansas City Railway & Light Company (preferred).....	*30	*30
Lake Shore Electric Railway (common).....	*7	*7
Lake Shore Electric Railway (1st preferred).....	*92	*92
Lake Shore Electric Railway (2d preferred).....	*25	*25
Manhattan Railway.....	129¾	130
Massachusetts Electric Companies (common).....	11	11
Massachusetts Electric Companies (preferred).....	66	65
Milwaukee Electric Railway & Light Co. (preferred).....	100	100
Norfolk Railway & Light Company.....	*25¼	*25¼
North American Company.....	70	70
Northern Ohio Light & Traction Company (common).....	66¼	66¼
Northern Ohio Light & Traction Company (preferred).....	97	97
Philadelphia Company, Pittsburgh (common).....	39¾	39½
Philadelphia Company, Pittsburgh (preferred).....	39	39
Philadelphia Rapid Transit Company.....	19¾	19½
Portland Railway, Light & Power Company.....	*56	*56
Public Service Corporation.....	107	106
Third Avenue Railway, New York.....	39¼	39¾
Toledo Traction, Light & Power Company (common).....	30	a30
Toledo Traction, Light & Power Company (preferred).....	80	a80
Twin City Rapid Transit Co., Minneapolis (common).....	104	104¾
Union Traction Company of Indiana (common).....	*13	*13
Union Traction Company of Indiana (1st preferred).....	*83	*83
Union Traction Company of Indiana (2d preferred).....	*25	*25
United Rys. & Electric Company (Baltimore).....	25½	25½
United Rys. Inv. Company (common).....	18	18
United Rys. Inv. Company (preferred).....	35	34
Virginia Railway & Power Company (common).....	a56	56
Virginia Railway & Power Company (preferred).....	93¼	96
Washington Ry. & Electric Company (common).....	92	88
Washington Ry. & Electric Company (preferred).....	80	87
West End Street Railway, Boston (common).....	70	68
West End Street Railway, Boston (preferred).....	89	90
Westinghouse Elec. & Mfg. Company.....	65¼	64
Westinghouse Elec. & Mfg. Company (1st preferred).....	110	112¼

\*Last sale. a Asked.

## ANNUAL REPORT

### Chicago Elevated Railways

According to a financial report of the Chicago Elevated Railways for the twelve months ended June 30, 1913, the gross earnings of the combined companies, the Northwestern Elevated Railroad, the South Side Elevated Railroad and the Metropolitan Elevated Railway, increased during the period \$45,158, but the net earnings decreased \$31,597 and the surplus as of June 30, 1913, was less by \$177,555 than the surplus a year before. There was a falling off in other income of over \$40,000, and interest and taxes increased about \$181,000, so that the net income from all sources was \$921,019, against \$1,124,242 the previous year, making a decrease of over \$208,000. The Chicago & Oak Park Elevated Railroad is in the hands of a receiver, and its figures are not properly a part of the showing of the above three lines, although all four are operated under one management according to the collateral trust agreement. The combined statement of income, profit and loss of the South Side Elevated Railroad, Metropolitan Elevated Railway and Northwestern Elevated Railroad for the fiscal year ended June 30, 1913, is as follows:

	1913	1912
Gross earnings.....	\$8,005,450	\$7,960,292
Operating expenses:		
Maintenance of way and structure.....	\$197,887	\$196,251
Maintenance of equipment.....	354,630	328,687
Conducting transportation.....	2,958,025	2,883,534
General expenses.....	383,156	408,472
Total operating expenses.....	\$3,893,698	\$3,816,944
Net earnings.....	\$4,111,752	\$4,143,348
Other income.....	631,577	672,124
Total income.....	\$4,743,329	\$4,815,472
Charges.....	3,822,309	3,691,230
Balance.....	\$921,020	\$1,124,242
Surplus year ended June 30, 1912.....	233,250	
Balance, June 30, 1913.....	\$1,154,270	
Dividends.....	1,098,575	890,992
Surplus, June 30, 1913.....	\$55,695	\$233,250

The report also contains individual statements for the South Side Elevated Railroad, Metropolitan Elevated Railway and the Northwestern Elevated Railroad.

The statement of income, profit and loss of the Northwestern Elevated Railroad for the year ended June 30, 1913, follows:

	1913	1912
Gross earnings.....	\$2,580,334	\$2,539,705
Operating expenses:		
Maintenance of way and structure.....	\$72,223	\$64,234
Maintenance of equipment.....	113,678	110,072
Conducting transportation.....	1,037,854	1,015,270
General expenses.....	120,963	124,818
Total operating expenses.....	\$1,344,718	\$1,314,394
Net earnings.....	\$1,235,616	\$1,225,311
Other income.....	606,248	637,510
Total income.....	\$1,841,864	\$1,862,821
Charges.....	1,840,991	1,745,066
Balance.....	\$873	\$117,755
Surplus year ended June 30, 1912.....	18,867	
Balance, June 30, 1913.....	\$19,740	
Dividends.....		98,888
Surplus, June 30, 1913.....	\$19,740	\$18,867

A similar statement for the South Side Elevated Railroad for the fiscal twelve months ended June 30, 1913, shows the following financial results:

	1913	1912
Gross earnings.....	\$2,470,664	\$2,443,588
Operating expenses:		
Maintenance of way and structure.....	\$53,231	\$57,783
Maintenance of equipment.....	124,175	112,731
Conducting transportation.....	828,210	805,893
General expenses.....	116,552	129,162
Total operating expenses.....	\$1,122,168	\$1,105,569
Net earnings.....	\$1,348,496	\$1,338,019
Other income.....	11,049	20,431
Total income.....	\$1,359,545	\$1,358,450
Charges.....	858,160	840,340
Balance.....	\$501,385	\$518,110
Surplus year ended June 30, 1912.....	96,090	
Balance June 30, 1913.....	\$597,475	
Dividends.....	575,483	422,020
Surplus, June 30, 1913.....	\$21,992	\$96,090

The earnings of the Metropolitan Elevated Railway for the fiscal year were as follows:

	1913	1912
Gross earnings .....	\$2,954,451	\$2,976,998
Operating expenses:		
Maintenance of way and structure.....	\$72,433	\$74,234
Maintenance of equipment.....	116,777	105,884
Conducting transportation .....	1,091,961	1,062,371
General expenses .....	145,641	154,492
Total operating expenses .....	\$1,426,812	\$1,396,981
Net earnings .....	\$1,527,639	\$1,580,017
Other income .....	14,279	14,182
Total income .....	\$1,541,918	\$1,594,199
Charges .....	1,123,157	1,105,823
Balance .....	\$418,761	\$488,376
Surplus year ended June 30, 1912.....	118,292	
Balance, June 30, 1913.....	\$537,053	
Dividends .....	523,092	370,084
Surplus, June 30, 1913.....	\$13,961	\$118,292

### Columbus Railway & Light Company Reorganization

The committee having in charge the reorganization of the street and railway electric lighting companies of Columbus, Ohio, have sent out a circular to the stockholders of the companies interested extending the time for the deposit of securities until Nov. 25 and asking the consent of the depositors to a possible change in the plan by which the property of the Columbus Light, Heat & Power Company will not be taken into the reorganization but will continue to be controlled under lease to the Columbus Railway & Light Company unless the stockholders of the Light, Heat & Power Company deposit their stock by Nov. 25. There have already been deposited a sufficient number of shares of stock of all the companies, with the exception of the Columbus Light, Heat & Power Company, to make the plan operative. Litigation was commenced by some of the stockholders of the light, heat and power company who were dissatisfied with the representation given them and the deposit of securities of that company has been delayed on this account.

The plan as originally outlined will be carried through with the exception of the necessary changes caused by the omission of the Columbus Light, Heat & Power Company property and the continued control of that property under lease. Stockholders of the Columbus Light, Heat & Power Company who have deposited their stock will receive the same representation in the new company as if the Columbus Light, Heat & Power Company had come in, provided the Public Utilities Commission gives its consent. A large percentage of the stock of the light, heat and power company has agreed to the reorganization and it may be that by Nov. 25 enough more will be deposited to make the plan operative as originally contemplated. If this should not be done the committee will proceed on the lines indicated in the circular to the stockholders.

### Right of Stockholder to Copy Corporate Books

According to a decision handed down recently by Associate Justice Haley, of the Supreme Court of the State of Maine, any stockholder, even though he own but one share of stock, may have access to the books of the corporation and may copy the list of stockholders contained therein. Justice Haley ordered a writ of mandamus to issue, commanding William M. Bradley, Portland, Me., as the clerk of the Commonwealth Railway & Light Company, a Maine corporation doing business in Michigan, to allow Warren N. Whittington, New York, to copy the list of stockholders of the corporation. It appeared from the evidence submitted that Mr. Whittington has had control of his one share of stock only a short time. Mr. Bradley took exception to the decision for the company and the question will now go before the full bench of the court.

**American Railways, Philadelphia, Pa.**—Charles R. Miller, Governor of Delaware, has been elected a director of the American Railways to succeed the late R. D. Apperson.

**Babylon (N. Y.) Railroad.**—The Public Service Commission of the Second District of New York has issued an order granting the application of the Babylon Railroad for consent to increase its capital stock from the present authorized and issued amount of \$25,000 to \$75,000.

**Barcelona Traction, Light & Power Company, Ltd., Toronto, Ont.**—Emilius Jarvis & Company, Toronto, Ont., issued a circular recently relative to the affairs of the Barcelona Traction, Light & Power Company, which operates in Barcelona and its suburbs in Spain. At the present time of an authorized issue of \$12,500,000 of 7 per cent non-cumulative preferred stock, there is outstanding \$10,000,000; of an authorized issue of \$30,000,000 of common stock, there is outstanding \$27,450,000, and of first mortgage 5 per cent bonds of 1911, due in 1961, there is a present issue of \$7,500,000.

**Boston (Mass.) Elevated Railway.**—At the annual meeting of the stockholders of the West End Street Railway to be held on Nov. 25, stockholders will be asked to authorize the issue of "not exceeding 20,000 additional shares of stock" to fund floating debt incurred for additions and improvements to property.

**Boston Suburban Electric Companies, Newtonville, Mass.**—The Boston Suburban Electric Companies has issued the following statement of earnings for the fiscal year ended June 30, 1913: Income from securities held, \$181,246; expenses and interest, \$48,401; net income, \$132,845; dividends paid, \$129,548; surplus for the year, \$3,297; previous surplus, \$600,727; total, \$604,024; charge against profit and loss surplus after closing June 30, \$8,387; surplus at end of period, \$595,637.

**Chicago (Ill.) Railways.**—A meeting of the registered holders of the participation certificates, Series 1, 2, 3 and 4, of the Chicago Railways has been called for Dec. 22 in Chicago to pass upon the resolution for unified operation of the Chicago Railways, the Chicago City Railway, the Southern Street Railway, and the Calumet & South Chicago Railway, as authorized by ordinance of the City Council of Chicago, passed on Nov. 13.

**Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio.**—Frank S. Shutts, receiver of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, has reported to the insolvency court that the road's assets are valued at \$1,034,148. John W. Peck, attorney representing the receiver, is reported to have stated that the assets exceed the liabilities and that the receivership will be lifted soon.

**Electrical Securities Corporation, New York, N. Y.**—At the annual meeting of the stockholders of the Electrical Securities Corporation held recently, G. P. Gardner was elected a director to succeed E. K. Boisot.

**Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.**—The Public Service Commission of Indiana has authorized the Fort Wayne & Northern Indiana Traction Company to issue \$600,000 of notes to be secured by the pledge of \$1,000,000 worth of bonds of the company. The proceeds of the issue of notes are to be used for improvements.

**Gary & Interurban Railroad, Gary, Ind.**—The Gary & Interurban Railroad has applied to the Public Service Commission of Indiana for permission to issue \$100,000 of 6 per cent notes, payable on Nov. 1, 1915, to be secured by a first lien on the line from Laporte to Woodville Junction. The new notes are to be used to refund \$100,000 of notes of the Goshen, South Bend & Chicago Railroad.

**Interborough Rapid Transit Company, New York, N. Y.**—The Public Service Commission of the First District of New York will hold a hearing on Dec. 2 on the application of the Manhattan Railway to create a second mortgage to secure \$5,490,000 of bonds. In compliance with the lease of 1903 of the property of the Manhattan Railway to the Interborough Rapid Transit Company the proceeds of the bonds secured by the new mortgage will be turned over to the Interborough Rapid Transit Company to reimburse it for expenditures for improvements and betterments.

**Kansas City Railway & Light Company, Kansas City, Mo.**—A writ of attachment against the Kansas City Railway & Light Company, granted to Arthur S. H. Jones and served on the New York Trust Company, the National City Bank and Blair & Company, has been placed on \$100,000 of the money which the company has on deposit with the New York Trust Company. The complainant is the owner of \$100,000 of the Kansas City Railway & Light Company's 6 per cent notes which matured on Sept. 1, 1912, and were

not paid. On Aug. 15, 1912, a committee was formed and the owners of the notes were asked to deposit their holdings with the committee. The majority of the noteholders complied with this request, but the \$100,000 of notes which Mr. Jones owns were not deposited and he now demands that they be paid.

**Memphis (Tenn.) Street Railway.**—Hugh McCloskey, who was recently elected president of the American Cities Company, and J. S. Pevear, who was recently elected vice-president of New Orleans Railway & Light Company, have been elected directors of the Memphis Street Railway to succeed A. H. Ford and George Bullock.

**New York, New Haven & Hartford Railroad, New Haven, Conn.**—The executive committee of the New York, New Haven & Hartford Railroad decided on Nov. 18 to defer the proposed issue of \$67,552,000 of convertible debenture bonds until the final decision of the Massachusetts Supreme Court in the litigation started by Morgan G. Bulkeley is rendered and arrangements were made for borrowing \$45,000,000 at once from a syndicate headed by J. P. Morgan & Company. The notes, bearing interest at 6 per cent, will be taken at 99½ by J. P. Morgan & Company, Kidder, Peabody & Company and Lee, Higginson & Company. They will be payable in six months or may be called at any time before that, and in any event will be called upon the receipt of the proceeds of the proposed debenture bonds.

**Ocean Shore Railroad, San Francisco, Cal.**—A meeting of the stockholders of the Ocean Shore Railroad will be called for January to vote on the question of increasing the authorized capital stock of the company \$5,000,000, \$200,000 of which it is proposed to issue at once.

**Ohio Traction Company, Cincinnati, Ohio.**—The Ohio Traction Company has been authorized by the Public Service Commission of Ohio to issue its 5 per cent preferred capital stock of the par value of \$300,000, to be sold for the best price obtainable, but for not less than \$90 a share, to provide funds for extensions and improvements.

**Poland (Ohio) Street Railway.**—On Nov. 19 the Public Utilities Commission of Ohio authorized the Poland Street Railway to lease to the Mahoning Valley Railway all of its property, consisting of a line of street railway extending a distance of approximately 4.6 miles from the intersection of Poland Avenue and Powers Way, in Youngstown, Ohio, to and into the village of Poland, Ohio. The Mahoning Valley Railway was authorized to lease this property for an annual rental in no case to exceed \$8,500.

**Rochester, Corning & Elmira Traction Company, Rochester, N. Y.**—Justice Benton, in the Supreme Court at Rochester has handed down a decision granting William C. Gray, receiver for the Rochester, Corning & Elmira Traction Company, judgment for about \$150,000 against Otto C. Heinze, Max S. Schultze and others, who are alleged to have manipulated the company in their interest. The directors authorized Mr. Heinze to withdraw \$125,000 belonging to the company which was on deposit with the Knickerbocker Trust Company. Shortly afterward Mr. Heinze went into bankruptcy and has not yet been discharged. The withdrawal was settled by delivering to the Rochester, Corning & Elmira Traction Company 120 shares of Western Development Company stock declared to be valueless. The Supreme Court directed the receiver to disregard the transfer and sue the defendants for the money withdrawn.

**Sunbury & Susquehanna Railway, Sunbury, Pa.**—The Pennsylvania Steel Company has filed a bill in equity in the County Court asking for the appointment of a receiver for the Sunbury & Susquehanna Railway, operating an electric railway between Selingsgrove and Northumberland, a distance of 8 miles.

**Third Avenue Railway, New York, N. Y.**—At the annual meeting of the stockholders of the Third Avenue Railway retiring directors were re-elected, and the consolidation of the Kingsbridge Railroad with the Third Avenue System was formally ratified.

**Toledo Railways & Light Company, Toledo, Ohio.**—A decree has been entered by United States District Court in Toledo sustaining the rights of H. L. Doherty & Company, New York, N. Y., in operation of various traction and lighting properties in Toledo. The directors adverse to their

interests have resigned and the entire matter has been adjusted. It has been stipulated that there will be no appeal from the order which has been entered. In this final decree the court states that the Toledo Traction, Light & Power Company is the lawful owner and holder of 117,447 shares and \$11,500,000 of bonds of the Toledo Railways & Light Company.

**Washington Water Power Company, Spokane, Wash.**—A special meeting of the stockholders of the Washington Water Power Company has been called for Dec. 2 to vote on increasing the capital from \$15,000,000 to \$20,000,000.

**Dividends Declared**

American Railways, Philadelphia, Pa., quarterly, 75 cents, common.

Citizens' Traction Company, Pittsburgh, Pa., \$1.50.

Columbus (Ohio) Railway, quarterly, 1¼ per cent, common.

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1¼ per cent, common.

Tennessee Railway, Light & Power Company, Memphis, Tenn., quarterly, 1½ per cent, preferred.

**ELECTRIC RAILWAY MONTHLY EARNINGS**

AMERICAN RAILWAYS, PHILADELPHIA, PA.							
Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Oct.,	'13	\$450,660	.....	.....	.....	.....
1 "	"	'12	417,286	.....	.....	.....	.....
4 "	"	'13	1,940,990	.....	.....	.....	.....
4 "	"	'12	1,780,858	.....	.....	.....	.....

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.							
1m.,	Sept.,	'13	\$182,597	*\$114,813	\$67,784	\$33,510	\$34,274
1 "	"	'12	182,851	*99,093	83,758	32,120	51,638
3 "	"	'13	602,274	*344,502	257,772	101,068	156,704
3 "	"	'12	573,749	*304,323	269,426	96,262	173,164

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, SAGINAW, MICH.							
1m.,	Sept.,	'13	\$194,220	*\$59,576	\$134,644	\$80,000	\$54,644
1 "	"	'12	115,135	*12,701	102,434	30,000	72,434
12 "	"	'13	1,949,180	*344,811	1,604,369	610,000	994,369
12 "	"	'12	1,243,356	*111,500	1,131,856	360,000	771,856

GRAND RAPIDS (MICH.) RAILWAY							
1m.,	Sept.,	'13	\$107,960	*\$73,624	\$34,336	\$8,969	\$25,367
1 "	"	'12	109,592	*58,449	51,143	14,753	36,390
12 "	"	'13	1,276,819	*774,275	502,544	172,549	329,995
12 "	"	'12	1,220,783	*684,519	536,264	175,820	360,444

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO							
1m.,	Sept.,	'13	\$133,404	*\$69,533	\$63,872	\$35,213	\$28,659
1 "	"	'12	125,743	*66,378	59,364	35,168	24,196
8 "	"	'13	1,075,872	*628,297	447,576	316,206	131,370
8 "	"	'12	998,520	*566,593	431,927	314,417	117,510

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE							
1m.,	Sept.,	'13	\$64,139	*\$38,647	\$25,492	\$15,630	\$9,862
1 "	"	'12	62,006	*34,463	27,543	14,304	13,239
12 "	"	'13	668,841	*414,878	253,963	177,643	76,320
12 "	"	'12	612,207	*386,394	225,813	173,181	52,632

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO							
1m.,	Sept.,	'13	\$289,023	*\$169,220	\$119,802	\$47,271	\$72,531
1 "	"	'12	268,074	*146,402	121,672	48,813	77,859
8 "	"	'13	2,444,698	*1,471,036	973,662	413,196	560,460
8 "	"	'12	2,247,866	*1,257,571	990,295	394,363	595,932

PORTLAND (MAINE) RAILROAD							
1m.,	Sept.,	'13	\$90,286	*\$55,687	\$34,599	\$16,503	\$18,096
1 "	"	'12	87,997	*54,197	33,800	10,254	23,546
12 "	"	'13	1,030,896	*708,200	322,696	144,736	177,960
12 "	"	'12	967,893	*684,504	283,389	119,421	163,968

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.							
1m.,	Sept.,	'13	\$547,451	*\$278,501	\$268,950	\$176,918	\$92,032
1 "	"	'12	542,387	*272,822	269,565	148,329	121,245
12 "	"	'13	6,689,055	*3,322,192	3,366,863	1,934,892	1,431,971
12 "	"	'12	6,557,842	*3,249,749	3,308,096	1,699,268	1,608,828

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.							
1m.,	Sept.,	'13	\$106,445	*\$63,303	\$43,142	\$20,198	\$22,944
1 "	"	'12	95,875	*56,871	39,004	19,710	19,294
12 "	"	'13	1,236,783	*698,564	538,219	240,173	298,046
12 "	"	'12	1,151,645	*671,624	480,021	235,141	244,880

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.							
1m.,	Sept.,	'13	\$787,891	*\$387,354	\$400,540	\$144,112	\$256,428
1 "	"	'12	730,845	*351,688	379,156	143,079	236,078
9 "	"	'13	6,568,762	*3,336,218	3,232,544	1,322,846	1,909,698
9 "	"	'12	6,089,072	*3,109,910	2,979,162	1,284,713	1,694,449

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.							
1m.,	Sept.,	'13	\$423,409	\$177,244	\$206,167	\$132,720	\$73,447
1 "	"	'12	402,344	193,634	208,710	124,537	84,173
3 "	"	'13	1,317,808	659,684	658,125	397,926	260,199
3 "	"	'12	1,234,928	612,862	622,067	371,389	250,678

\*Includes taxes.

# Traffic and Transportation

## "Safety First" Campaign Started on Detroit United Lines

The following announcement was made in the Nov. 14 issue of *Electric Railway Service*, the company's publication, in regard to the plans of the Detroit (Mich.) United Railway for carrying out its proposed safety first campaign:

"Safety first!"

"Please get these two words firmly fixed in your mind. You are going to read of them and hear of them a great many times within the next few months.

"Repeat the words: 'Safety first.' Think about them. Remember them. Get the habit of 'Safety first.'

"The Detroit United Railway is about to start upon a 'Safety first' campaign extending over its entire 800 miles of track within and without the city of Detroit.

"The company desires to impress upon every one of its patrons that safety is the first consideration, that it comes before time, speed and everything else.

"As an initial step in this campaign of safety, the company proposes to have the words 'Safety first' in plain letters at every point where they will attract attention. Along the right-of-way, on tool houses, depots, telephone booths, freight houses, milk stands, carhouses, highway crossings, trolley poles and fence posts the words 'Safety first' will urge you to caution. On passenger cars in several conspicuous places the same warning will cause you to remember that safety supersedes everything else. The work of placing these 'Safety first' signs will be conducted as rapidly as is possible.

"The campaign to be undertaken by the Detroit United Railway is in line with the country-wide effort of electric and steam railways to impress upon their patrons the importance of 'Safety first.' Many people with other things to think about forget the dangers which beset them if they do not exercise caution. This movement is designed to prevent them from forgetting it is essential that they shall always be on their guard against possible injury. Eternal vigilance is often the price of life as well as of liberty.

"Before you board a car remember safety.

"Before you leave a car remember safety.

"When you are tempted to run and catch a moving car hesitate and think of 'Safety first.'

"If you are about to cross behind a car without noting the possible approach of others from the opposite direction, stop and recall 'Safety first.'

"Never run in front of a passing car—that isn't 'Safety first.'

"Don't get off a car facing the rear. With the left hand take hold of the grip handle, left foot to the step, right foot to the ground, face forward and remember 'Safety first.'

"To the children we offer two suggestions in connection with the 'Safety first' campaign:

"Never hitch on and steal rides behind street cars or wagons.

"Never play on the car tracks.

"The public can help in this 'Safety first' movement. Its co-operation is essential if the campaign is to have the desired result. The company can make every possible provision for the safety of its patrons, but unless the patrons respond to the company's efforts very little can be accomplished.

"The Detroit United Railway appeals to its patrons to assist in making 'Safety first' the watchword and slogan of the entire system, city and interurban. With this assistance and co-operation the results of the campaign will unquestionably prove gratifying to the public and the company alike.

"But please remember: 'Safety first.'

"Always safety."

The company printed a placard 21 in. wide by 10 in. high in red and black, headed "Safety First," on which it said: "The Detroit United Railway will be delighted with your help in its campaign to protect life and limb. 'Please don't take chances.' Read the next number of *Electric Railway Service*, out Friday, Nov. 14."

## Passenger Traffic in the New York Subway

The Public Service Commission of the First District of New York has made public a statement of passenger traffic on the subway division of the Interborough Rapid Transit Company as indicated by the number of tickets sold at each station in the year ended June 30, 1913. It appears that during the year 327,471,510 passengers rode in the subway as compared with 302,973,856 during the previous year. This represents a daily average travel of 963,152 as compared with 891,099 for the previous year. The net increase for the year was 24,497,654 as compared with 26,269,060 for the previous year. Atlantic Avenue, at the end of the line, with its direct connection with the Brooklyn Rapid Transit System and the Long Island Railroad, continued the busiest station of the system, having a daily average of 62,536 passengers compared with 55,664 for the previous year. Brooklyn Bridge comes second with 53,203 passengers, and Grand Central third with 49,821 a day. The following summary has been prepared from the original report to show the returns of the stations on the Lenox branch, the Broadway branch, the main line from Ninety-sixth Street to the Battery and the Brooklyn branch, with figures for the express stations at Ninety-sixth Street, Seventy-second Street, Grand Central, Fourteenth Street and Brooklyn Bridge, also Times Square and all the stations below the Brooklyn Bridge and in Brooklyn:

Stations	Total	Year's Increase	Daily Average (a)		
			1913	1912	1911
Lenox branch (total) ..	63,508,597	5,343,064	186,790	171,075	153,296
Broadway branch (total) .....	42,117,654	4,001,464	123,875	112,106	100,053
Ninety-sixth Street to South Ferry (total)	178,967,848	11,315,991	526,376	493,094	458,044
Seventy-second Street	4,554,314	236,099	13,395	12,701	12,065
Times Square .....	13,211,957	502,646	38,859	37,380	34,303
Grand Central .....	16,939,238	1,943,715	49,821	44,104	40,586
Fourteenth Street....	14,086,688	1,076,639	41,431	38,265	36,813
Brooklyn Bridge ....	18,088,949	381,360	53,203	52,081	49,734
City Hall .....	530,209	D 8,575	1,559	1,585	1,741
Fulton Street .....	15,899,866	1,220,643	46,764	43,174	39,309
Wall Street .....	7,973,638	440,031	23,452	22,158	21,382
Bowling Green .....	5,575,507	433,449	16,399	15,124	13,460
South Ferry .....	1,756,623	116,050	5,167	4,825	4,855
Brooklyn (total).....	42,664,453	3,809,135	125,484	114,280	101,919
Borough Hall .....	8,942,227	483,595	26,301	24,878	22,810
Hoyt Street .....	7,639,520	655,905	22,469	20,540	17,779
Nevins Street .....	4,820,566	333,253	14,178	13,198	12,157
Atlantic Avenue....	21,262,140	2,336,382	62,536	55,664	49,173
Miscellaneous .....	212,958	28,000	626	544	525
Grand total .....	327,471,510	24,497,654	963,152	891,099	813,837

(a) Treating Sundays as half days (340 days to the year). (D) Decrease.

The commission has also made public a summary of passenger traffic on the Second Avenue, Third Avenue, Sixth Avenue and Ninth Avenue lines of the Manhattan (Elevated) Railway, operated by the Interborough Rapid Transit Company, for the year ended June 30, 1913. The summary of figures for these lines as made public by the commission follows:

Division	Total	Year's Increase	Daily Average (a)		
			1913	1912	1911
Second Avenue line..	44,383,978	405,019	130,541	129,350	129,806
Third Avenue line...	143,308,012	1,672,166	421,494	416,576	410,130
Sixth Avenue line...	87,256,189	252,236	256,636	255,894	253,980
Ninth Avenue line...	31,896,827	244,744	93,814	93,094	92,700
Grand total .....	306,845,006	2,574,165	902,485	894,914	886,616

(a) Treating Sundays as half days (340 days to the year).

## Texas Traction Company's Courtesy Pamphlet

The completion of the Southern Traction Company's lines between Dallas and Waco, Tex., and between Dallas and Corsicana, Tex., made this system, when combined with the Texas Traction Company's line, which is under the same management, the largest interurban system in the Southwest. The total length of these two lines is approximately 237 miles. As the new extension between Dallas and Waco was made possible through investments made by citizens of the various counties and towns along the line, the management, particularly its president, J. F. Strickland, is anxious that the popularity evident on the day of its opening, Sept. 30, shall continue throughout its operation. In order to accomplish this, the president issued a pamphlet to trainmen on "Courtesy." This pamphlet contains numerous epigrammatic clauses presented in abstract as follows:

"There are many things that you, with your training



and experience, understand but which the public does not. We should, therefore, not assume that passengers should comprehend them without asking questions, but when they make inquiry of you give them the courtesy of a reply, just as full and clear as you can make it and stay within your knowledge of the facts.

"If anyone asks you what time the 4 o'clock train leaves, do not treat the matter as a joke, but consider that the passenger is probably nervous owing to his intended journey and does not realize fully what he is asking. Be courteous in your reply. Special attention should be given to the young and inexperienced in travel, to the aged and to ladies when traveling alone.

"Words are only one means of expression; manner is quite as important. We should, therefore, remember that a kindly and gracious manner is not only the sign and mark of a self-respecting man, but is to our words what oil is to machinery—making them move effectively to their purpose. True courtesy is no respecter of persons. It remembers that 'A man's a man for all that' and gives a civil word and helping hand quite as readily to the ill-clad stranger as to 'the lords of high degree.'

"Courtesy is something that the public has a right to expect of us, and it pays in many ways. It pays in the friends it makes us personally and as representatives of the company; it pays in minimizing the friction of our lives and that between the company and its patrons; it pays in raising our standing with the company, and it pays in the personal satisfaction which results from having done the right and kindly thing by our fellow-man.

"The man who comes in contact with the public has opportunities for advancement over the man in a private office. He has a natural opportunity to advertise his ability to the public that the man in the private office does not have. The very man whose impatience he returns with patience may be the one figuratively to take him by the hand and lift him to a better position.

"Returning good for evil is not just a religious law, it is a natural law—it is returning efficiency for deficiency. As there is no end to the harm that discourtesy may do, likewise there is no end to the good that courtesy may do—it is like the brook, it flows on forever. Courtesy always pays dividends; the man to whom we are courteous tells other people about us. The story is repeated and our good reputation is made. If we are discourteous, the story is repeated and our reputation is made, but in a very different manner.

"Interurbans have two things to offer in exchange for business—service and personality. Personality in this connection means courteous treatment of the public and affability. It is our desire that the true value of courtesy may be fully appreciated by all the representatives and employees of these companies, and that rivalry may exist in a friendly effort to see who can make the best record along this line."

#### The Open-Door Policy in Brooklyn.

The New York *Evening Post* published in its issue of Nov. 15 an article dealing with Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, and his experiments in applying civility, courtesy and publicity to the transit problems in Brooklyn. After sketching briefly the career of Mr. Williams in journalism and business the writer continued in part as follows:

"The Brooklyn Rapid Transit Company used to be one of the best-hated corporations in the country. Nobody in Brooklyn had a good word for it, and visitors to the foreign borough across the East River shuddered at mention of its name. The traffic conditions at the Brooklyn Bridge were a scandal and a by-word. Blocks and delays were frequent, guards and employees were not over-polite, and the misguided citizen who ventured to complain at the offices was soon put in his place. In fact, the Brooklyn Rapid Transit was in practically the same state of mind as most other corporations before what might be styled the period of corporation enlightenment dawned upon a weary people.

"Mr. Williams came to the presidency at about the time it was getting to be the thing for public service corporations to consider some of the people's feelings. He knew

the merits of publicity and cordiality of public sentiment. The transit conditions of the city were in the utmost confusion. Great schemes were on foot to assist the unwieldy city to grow. This meant new subway lines and extensions to elevated lines.

"Mr. Williams set to work. First, he began to make himself solid with his public. He sought to spread abroad the impression that the Brooklyn Rapid Transit considered itself a servant of the public. There had been a general and sustained increase in mechanical efficiency for several years back, and, of course, the opening of the East River tube had taken some strain off the Brooklyn Bridge. What Mr. Williams tried particularly to do was to better the personal relations of the company with its patrons. He tried to establish a feeling that the company depended upon the support of the people and that it was anxious to have their support. Many looked with suspicion upon this campaign; they do still look with suspicion upon it. But it has made headway.

"He is the head of one of the greatest transit systems in the country, with thousands of employees, hundreds of miles of surface and elevated track—not to speak of the subways which he has gained for his company since he became its head—and a volume of business fully equal to that of a big transcontinental line. Nevertheless, anybody who has a legitimate reason for seeing him can walk into his office without having to wait longer than you would expect to wait outside of any busy man's sanctum."

**Increase in Wages in Omaha.**—Announcement is made by the Omaha & Council Bluffs Street Railway that it will voluntarily raise wages of motormen and conductors 1 cent an hour, bringing the new wage schedule to from 24 cents to 29 cents an hour according to length of service.

**Opinion by Commission Asked in Regard to One-Man Cars.**—C. Taylor Leland, secretary and treasurer of the Pottstown & Phoenixville Railway, Pottstown, Pa., has asked the Public Service Commission for a ruling on the question whether it is legal to operate an electric car with one man.

**Increase in Wages on Atlantic City Lines.**—The Atlantic City & Shore Railway, Atlantic City, N. J., will advance the wages of motormen and conductors 2 cents an hour, effective Jan. 1. The increase in the cost of living is given by the management as the reason for the advance in wages.

**Schenectady Fare Hearings Postponed.**—The time for oral argument in the complaint of the city of Schenectady against the Schenectady (N. Y.) Railway for its refusal to sell six tickets for 25 cents has been postponed from Nov. 25 to Dec. 16, by reason of the illness of Corporation Counsel Cooper of Schenectady.

**Steam Passenger Service Abandoned.**—On the ground that it cannot compete with the service of the Kansas City, Clay County & St. Joseph Railway from Kansas City to St. Joseph, Mo., the Rock Island Railroad has abandoned passenger service between those points. The change has also cut off steam service to Atchison and Leavenworth, Kan.

**Municipal Road and Private Corporation Ratify New Transfer Agreement.**—The Geary Street Municipal Railroad, San Francisco, and the United Railroads began to interchange transfers on Nov. 14 at the intersection of Geary and Kearney Streets and Geary and Larkin Streets. The Municipal road will pay 3 cents for each passenger who presents one of its transfers on a United Railroads car and will receive only 2 cents for each passenger transferred to its line by the United Railroads.

**Free "Movies" in Texas to Decrease Street Car Accidents.**—Stone & Webster have closed a contract with a number of motion-picture playhouses in Texas by which it is agreed to show moving pictures emphasizing the necessity of being careful in getting on or off street cars. For a number of years Stone & Webster have conducted a systematic campaign along these lines by street car, newspaper and other kinds of advertising. School children in Dallas, Fort Worth and other Texas cities have been supplied with complimentary tickets which will admit them to the performances at which the pictures are shown.

**Brockton & Plymouth Fares and Service to Be Investigated.**—The Massachusetts Public Service Commission will hold a hearing at Boston on Nov. 25 upon a petition by Harry B. Davis and others for an investigation of fares and service on the Brockton & Plymouth Street Railway. The board will consider the establishment of service on a two-hour interval in parts of Plymouth, will investigate the condition of cars and equipment with respect to cleanliness and general upkeep, and will examine the financial condition of the road with regard to the necessity of maintaining the present 6-cent unit of fare.

**Pacific Electric Railway Resorts to Moving Pictures.**—The Pacific Electric Railway, Los Angeles, Cal., has resorted to the use of motion pictures in the instruction of conductors and motormen as to the application of its rules for the prevention of accidents. The pictures were shown on Nov. 7 for the first time to 600 employees at the new Garden Theater, Los Angeles. By this method the officials of the company believe that the trainmen can be taught their duty under a given state of trying circumstances in such a way as only sad experience could otherwise impress upon them. Byron Dixon, head of the company's school, superintended the making of the pictures, and Lester Scott acted as director of the actors, who were recruited among the employees.

**Safety Committee on Kansas City Road.**—An improvement or safety club has been formed by the Kansas City, Clay County & St. Joseph Railway, of which J. R. Harrigan is president. The claim agent of the road has been elected chairman of the club. The latter appointed the head of each other department as a sub-chairman. Each sub-chairman selected a number of men in his own department as members of his committee. At present the improvement or safety club consists of about fifty men, ranging in rank from head of a department to a section hand. If an employee in one department sees room for improvement in that branch of the service he reports to the head of his department, who makes the change. In other cases the report is forwarded to Mr. Harrigan, who sees that it passes through the necessary channels. New committees will be appointed every six months.

**Steam Suburban Service Unprofitable.**—The Pennsylvania Railroad, which has operated a suburban service between Louisville, Ky., and New Albany, Ind., for many years, will suspend this service on Jan. 1, it is reported, though no official bulletin has been issued on the subject. The reconstruction of the company's Fourteenth Street bridge across the Ohio River at Louisville has made this step necessary, it is explained. Owing to the competition of the lines of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, the Pennsylvania's suburban business out of Louisville has fallen off greatly in recent years, and instead of operating trains half-hourly they are run only hourly at present. It is also reported that in case the Pennsylvania Railroad should decide to resume the service after the bridge has been reconstructed it will equip the line for electric operation.

**Connection Between Steam and Electric Railway.**—On Nov. 11 the Oakland, Antioch & Eastern Railroad, Oakland, Cal., applied to the City Commissioners of Sacramento for a franchise to connect its tracks with those of the Western Pacific Railway. This has given rise to the unofficial statement that the Western Pacific Railway and the Oakland, Antioch & Eastern Railroad have entered into a traffic agreement whereby the former will run its trains over the Oakland, Antioch & Eastern Railroad's tracks from Sacramento to Oakland. The franchise provides for a double-track broad-gage line from a point in M Street, the Sacramento entry of the Oakland, Antioch & Eastern Railroad, south in Second Street to the intersection of Third and R Streets. The franchise is for a term of thirty-five years and was signed by Samuel Naphtaly, vice-president of the Oakland, Antioch & Eastern Railroad. The estimated cost of construction is \$20,000. By using the tracks of the Oakland, Antioch & Eastern Railroad the Western Pacific Railway can reduce materially its running time between Sacramento and Oakland. The electric road will be benefited inasmuch as the arrangement will provide through freight connections with the East.

## Personal Mention

**Mr. F. H. Chamberlain** has been appointed general manager of the Alabama Power Company, the operating corporation of the Alabama Traction, Light & Power Company, Birmingham, Ala.

**Mr. Howard Elliott**, chairman of the board of directors of the New York, New Haven & Hartford Railroad, New Haven, Conn., has been elected president of the Connecticut Company, New Haven, and the Rhode Island Company, Providence, R. I.

**Mr. Frederick A. Persons**, who has been superintendent of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., has been appointed to the position of superintendent of motive power and equipment of the Massachusetts Consolidated Railways with headquarters at Greenfield.

**Mr. Thomas W. Ryley**, whose resignation as superintendent of the Norwich & Westerly Traction Company, Norwich, Conn., was noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 8, 1913, was waited upon recently by a committee of the employees of the company and presented with a purse of \$50 in gold.

**Mr. C. A. Jefts**, who has been superintendent of the Gardiner division of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., has been appointed superintendent of the company to succeed Mr. Frederick A. Persons, who has become connected with the Massachusetts Consolidated Railways.

**Mr. Joseph T. Hearn**, who has been connected with the traffic department of the Boston & Worcester Street Railway, Boston, Mass., has been appointed superintendent of the Providence & Fall River Street Railway, Swansea Center, Mass., to succeed Mr. Alvah C. Dole, who, as noted elsewhere in this column, has been appointed superintendent of the Pawtuxet Valley division of the Rhode Island Company, Providence, R. I.

**Mr. A. L. Bodwell**, for years connected with the office of the city engineer of Providence, R. I., has been selected by Commissioner of Public Works Slade and Public Service Engineer Robert L. Brunet for the position of railway inspector. Mr. Bodwell was appointed in accordance with the provisions of the ordinance passed last spring by the City Council creating the office of public service engineer and providing for the appointment of an assistant whose duties would be confined to the supervision of railway traffic on the city's streets.

**Mr. Alvah C. Dole**, superintendent of the Providence & Fall River Street Railway, Swansea Center, Mass., has been appointed superintendent of the Pawtuxet Valley division of the Rhode Island Company, Providence, R. I. Mr. Dole has been superintendent of the Fall River line for seven years, succeeding his brother, Mr. George P. Dole. At one time, he was conductor on the Haverhill, Merrimac and Amesbury line. He had charge of the electrical work when the carhouse was being equipped. He was the conductor on the first car over the road on June 4, 1901.

**Mr. William C. Brown** resigned on Nov. 18 as president of the New York Central & Hudson River Railroad, effective on Jan. 1, 1914. Mr. Brown has been in railroad service continuously for more than forty-four years. He said in offering his resignation: "I feel that I have earned that freedom from care, hard work and responsibility which can be secured only by retiring from active service." Mr. Brown has been connected with the New York Central & Hudson River Railroad for twelve years, five years in charge of the operation and maintenance of the property, two years as senior vice-president and five years as president. During the period covered by Mr. Brown's connection with the company the work of electrifying the lines of the company in and about New York City was begun and carried to completion and the Grand Central Terminal was reconstructed and enlarged.

**Mr. Allan G. Armstrong** has resigned as general auditor for W. S. Barstow & Company, Inc., New York, N. Y., managers for the General Gas & Electric Company and the Eastern Power & Light Corporation. Mr. Armstrong has

been connected with the electric railways, gas and electric light corporations for the last fifteen years. He was formerly with the Norfolk & Portsmouth Traction Company, Norfolk, Va. Later he was connected with the Southern Pacific Steamship Company, and subsequently to that he was with the receivers of the Metropolitan Street Railway, New York. He then became auditor for the receivers of the Ithaca (N. Y.) Street Railway and for the receivers of the New York, Auburn & Lansing Railroad. He next entered the employ of Barstow & Company. Mr. Armstrong's resignation from Barstow & Company becomes effective on Jan. 1, 1914. He proposes with others to organize the Armstrong Auditing Company, to specialize in accounting for public utility corporations.

**Mr. C. Nesbitt Duffy**, who has been elected vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I., was the guest of honor at a banquet at the Hotel Pfister, Milwaukee, on the evening of Nov. 15. To wish him success in his new work and to express regret at his leaving Milwaukee, thirty-three associates of Mr. Duffy connected with The Milwaukee Electric Railway & Light Company attended the dinner. As an evidence of the esteem in which he was held, a handsome silver service was presented to Mr. and Mrs. Duffy by the company. It bore the following inscription: "To Mr. and Mrs. C. Nesbitt Duffy on the occasion of their departure for Manila, P. I., with the sincere best wishes from the officers, staff and employees of The Milwaukee Electric Railway & Light Company, Nov. 15, 1913." A set of pearl shirt studs and cuff links was presented to Mr. Duffy at the office, and employees of the departments presented him with an autograph album bound in seal and containing their signatures. In making his address of farewell, Mr. Duffy voiced his appreciation of Milwaukee and the company and explained his reasons for going to Manila. Mr. J. D. Mortimer, president of the company, expressed regret at Mr. Duffy's leaving, and, voicing the sentiment of every one connected with the company, wished him success in his work in Manila. Those present in addition to Mr. Duffy were Messrs. J. D. Mortimer, president; R. B. Stearns, vice-president; S. B. Way, vice-president; F. J. Boehm, George W. Kalweit, W. J. Ramsey, A. J. Bohl, E. T. Mason, A. G. Schwenke, F. V. Benz, A. A. Meisenheimer, H. A. Rogers, R. H. Pinkley, George Keummerlein, Jr., M. S. Rausch, C. H. Lemon, C. M. Rosecrantz, George P. Miller, Edwin S. Mack, E. J. Evans, G. G. Post, R. R. Lukens, John Anderson, R. B. Snyder, C. E. Partee, Edwin H. Gruhl, G. W. Vanderzee, H. A. Flertzheim, James D. Shaw, J. B. Blake, C. W. Lamb, E. A. Gimbel and Bert Hall. The directors of the Citizens' Business League of Milwaukee entertained Mr. Duffy at luncheon at noon on Nov. 15.

**Mr. J. S. Pevear**, who has been vice-president of the International Railway and vice-president of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has been elected vice-president of the New Orleans Railway & Light Company, New Orleans, La. Mr. Pevear became connected with the Buffalo & Lake Erie Traction Company in 1911 as general superintendent. He had previously been connected with the Twin City Rapid Transit Company, Minneapolis, Minn., and the General Electric Company. He was superintendent of the St. Paul lines of the Twin City Rapid Transit Company. The International Railway system, with which Mr. Pevear was connected as vice-president, is a consolidation into one operating company of various street railways in the United States and Canada, including lines in Buffalo, Niagara Falls, Lockport and Tonawanda, and comprising in all 374 miles. The Twin City Rapid Transit Company controls the entire street railway systems of Minneapolis, St. Paul and Stillwater, and has the ex-



J. S. Pevear

clusive right to operate street cars between St. Paul and Minneapolis. The entire system is 402 miles in length. The New Orleans Railway & Light Company comprises 201 miles of line, all the street railways in New Orleans. The company also has a perpetual gas franchise, exclusive until 1925, and a perpetual electric light franchise in New Orleans.

**Mr. Hugh McCloskey** has resigned as president of the New Orleans Railway & Light Company, New Orleans, La., and has been elected chairman of the board of directors



H. McCloskey

of the company and president of the American Cities Company, the common stock of which has been acquired by the United Gas & Electric Corporation, as mentioned previously in the *ELECTRIC RAILWAY JOURNAL*. No successor to Mr. McCloskey as president of the New Orleans Railway & Light Company has yet been selected. Mr. McCloskey will assume his new office on Dec. 1. Mr. McCloskey first became identified with railway work in New Orleans as a member of the board of directors of one of the subsidiary

companies of the New Orleans Railway & Light Company. On Feb. 22, 1908, he was elected chairman of the board of the latter company. In April of the same year he was elected president of the company and the position of chairman of the board was abolished. Mr. McCloskey's aim was to develop the corporation in a way consistent with the growth and development of the city, and results began to appear in all branches of the service soon after he assumed active control. Mr. McCloskey had the tracks in Carrollton Avenue and City Park Driveway placed in the neutral ground, so as not to interfere with the street paving, and authorized the construction of the new line out to St. James Avenue to Milneburg. Under his administration Spanish Fort was purchased and converted into a pleasure resort, the railway was built to that point, and the company stored half the expenses with the New Orleans Land Company in building a driveway to Spanish Fort. The company has also made important improvements in the electric lighting and gas departments under Mr. McCloskey's direction. He considered that his first duty was to his city and State, and the credit for the wharves and present dock system at New Orleans is attributed to him. Mr. McCloskey received recently the New Orleans *Picayune's* loving cup for his public-spirited efforts in giving the city its wharves and sheds. Besides being prominently identified with electric railway development, Mr. McCloskey is first vice-president of the D. H. Holmes department store, New Orleans; vice-president of the Hibernia Bank & Trust Company and the Hibernia National Bank and vice-president of the Hibernia Insurance Company, New Orleans. He was the founder of McCloskey Brothers, one of the largest wholesale grocery and produce firms in the South.

#### OBITUARY.

**David M. Mortland**, former Mayor of Rockland, Maine, and for many years a member of the State Railroad Commission of Maine, is dead. Mr. Mortland was seventy-eight years old.

**Henry M. Richards**, chairman of the board of directors of the Washington Water Power Company and vice-president of the Spokane & Eastern Trust Company, Spokane, Wash., is dead.

**C. M. Corey**, for two years prior to last July auditor of the Kentucky Traction & Terminal Company, Lexington, Ky., died recently at Lake City, Fla., where he had been for the past five months following his resignation from the company on account of ill-health. He was forty-five years old. Prior to his connection with the Kentucky Traction & Terminal Company Mr. Corey was with the Denver (Col.) City Tramway.

# Construction News

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

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

## RECENT INCORPORATIONS

**Miami & South Florida Railway, Miami, Fla.**—Incorporated in Florida to build a steam or electric railway between Detroit, Homestead, Miami and Palm Beach. Capital stock, \$5,000. H. C. Roome, president; Nathan A. Cole, vice-president, and J. M. Cobb, secretary and treasurer. [E. R. J., Sept. 6, '13.]

\***Petersburg & Columbia Springs Railroad, Petersburg, W. Va.**—Chartered in West Virginia to build a 120-mile steam or electric railway between Petersburg and Columbia Springs. Capital stock, \$25,000. Incorporators: Alexander R. Watson, Marcus C. Hite, John Y. Hite, Lloyd Bailey and R. L. Long, all of Fairmont, W. Va.

## FRANCHISES

**Birmingham, Ala.**—The Birmingham Rapid Transit Company has asked the Council for a new franchise to build its line through Birmingham. The old franchise held by the company has expired. [E. R. J., Oct. 11, '13.]

**Sacramento, Cal.**—The Oakland, Antioch & Eastern Railway has asked the Council for a franchise in Sacramento that will connect it with the Western Pacific Railroad and allow the lines jointly to compete for transportation with the Southern Pacific Railway between Sacramento and Oakland.

**Visalia, Cal.**—The Big Four Electric Railway has received a franchise from the Council in Visalia to operate a city line in connection with its interurban line now under construction between Visalia and Tulare. All of the grade on the interurban line except a few miles has been completed. This 45-mile line will connect Tulare, Visalia, Lindsay and Porterville. [E. R. J., Oct. 18, '13.]

**New London, Conn.**—The Shore Line Electric Railway, Norwich, has received a franchise from the Common Council for an extension through State Street and Water Street to the Boss factory in New London. The company will ask the Public Utilities Commission for its approval of this extension.

**Tampa, Fla.**—The Tampa Electric Company has asked the Council for a franchise to extend its lines on Grand Central Avenue from Albany Avenue to Lincoln Street in Tampa, a distance of 1 mile.

**Hutchinson, Kan.**—The Hutchinson Interurban Railway has received a franchise to extend its line in Hutchinson 1½ miles.

**Lincoln, Neb.**—The Lincoln Traction Company has asked the Council for a franchise for extensions in Lincoln.

**Newark, N. J.**—Approval has been given by the State Board of Public Utility Commissioners to one of the ordinances asked for by the Public Service Railway and granted by the Board of Works in connection with the proposed terminal plan. The ordinance approved permits the construction of a curve leading from Springfield Avenue north into High Street and the laying of a second track in High Street between Market Street and Springfield Avenue in Newark.

**Rochester, N. Y.**—The New York State Railways has received a franchise from the Council to double-track Parsells Avenue from a point west of Chamberlain Street in Rochester.

## TRACK AND ROADWAY

**Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.**—Plans are being considered by this company to extend its lines in Gadsden.

**Edmonton (Alta.) Radial Railway.**—During the next year this company plans to award contracts to build 7½ miles of new track.

**Lacombe & Blindman Valley Electric Railway, Lacombe, Alta.**—About 8 miles of grading has been done and contracts for ties and rails are being awarded by this company for

its 30-mile line from Lacombe to Gull Lake and Rimbey. Gasoline-electric cars will be operated. E. R. Strathy, Winnipeg, is interested. [E. R. J., Feb. 15, '13.]

**Northern Electric Railway, Chico, Cal.**—Work has been resumed by this company with the construction of a bridge over the right-of-way at Santa Clara Street, Vallejo.

**Fresno, Cal.**—Surveys have been completed between Fresno and Clovis, and as soon as the survey to the terminal 4 miles from Academy is completed a company will be organized and incorporated to build this proposed electric line between Fresno, Clovis and the foothills of the Sierra Nevada Mountains. F. S. Granger, Clovis, is the promoter. [E. R. J., Nov. 15, '13.]

**Tidewater & Southern Railroad, Stockton, Cal.**—This company has placed in operation its line between Stockton and Modesto.

**Albany (Ga.) Transit Company.**—Material has been received and construction will soon be begun by the company on the extension of the Madison Avenue line in Albany.

**Waycross Street & Suburban Railway, Waycross, Ga.**—Plans are being made for the immediate extension of this company's line on Gilmore Street through Gilchrist Park in Waycross.

**Idaho Falls (Idaho) Electric Railway.**—Surveys have been begun by this company, and a contract has been awarded to W. D. Rogers to grade 26 miles of its line between Idaho Falls and Poplar, via Lincoln and Iona. From Lincoln a branch will extend south about 9 miles to Taylor and Goshen. William C. Ross is interested. [E. R. J., Nov. 1, '13.]

**Pocatello, Idaho.**—J. D. Browning, Pocatello, and L. L. Evans, American Falls, plan to build a street railway in Pocatello. Orders for rails will soon be placed. It is planned to use storage battery cars. [E. R. J., July 19, '13.]

**East St. Louis & Suburban Railway, East St. Louis, Ill.**—Work has been begun on the extension of the Washington Park line in East St. Louis.

**Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.**—Plans are being considered by this company to extend its lines west from Crawfordsville to Veedersburg.

**New Albany & French Lick Valley Traction Company, New Albany, Ind.**—The Louisville Commercial Club has indorsed this company's project to build a 60-mile line from New Albany to French Lick and West Baden Springs, with a branch from Mooresville to Corydon. John H. Martin, Palmyra, president. [E. R. J., Oct. 18, '13.]

**Charles City & Western Railway, Charles City, Ia.**—Plans are being made for the electrification of this line and to extend it so as to meet the Chicago Great Western Railroad.

**Hutchinson (Kan.) Interurban Railway.**—Work has been begun by this company on the extension of its line on Fourth Avenue east in Hutchinson.

**Madisonville, Ky.**—The project began several months ago by James Breathitt, Jr., Hopkinsville, to build an electric line between Madisonville and Nortonville, a distance of 12 miles, has been revived. [E. R. J., Sept. 27, '13.]

**Owingsville & Olympian Springs Railway, Owingsville, Ky.**—This company has laid 9 miles of track on its line between Owingsville and Olympian Springs. W. W. Hubbard, Owingsville, president. [E. R. J., Nov. 8, '13.]

**Missouri & Kansas Interurban, Kansas City, Mo.**—This company plans to build about 45 miles of new track in the spring, according to an announcement by President Strang. The line, which extends from Kansas City to Olathe, Kan., will be extended to Lawrence, Kan., a distance of 25 miles, and later to Topeka, 19 miles additional. The surveys for the extensions have been completed. The route to Lawrence will be via Udora. One bridge will be constructed on the extension.

**Springfield & Western Railroad, Springfield, Mo.**—Impetus was given to the plan of this railway to build an electric line from Carthage, Mo., to Springfield, when the company's franchise was extended one year. The grant provides for the use of Division Street, Springfield. An

entirely new survey for the line is being made, the route from Springfield to Sarcoxie having been completed.

**Red Lodge (Mont.) Electric Railway.**—This company has been organized to build a 10-mile electric railway between Red Lodge, Washoe and Bear Creek. The company is capitalized at \$225,000. Among those interested are William Larkin, Thomas F. Pollard, A. H. Davis, Walter Alderson and J. W. Chapman. [E. R. J., Oct. 11, '13.]

**Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.**—Plans and specifications for the construction of this company's line have been completed and contracts will be awarded by the company late in the winter or early in the spring for the completion of its line from Lincoln to Omaha.

**Republic Railway & Light Company, Trenton, N. J.**—Plans are being considered by this company for an extension beyond New Castle to New Wilmington, Mercer and on to the north.

**United Traction Company, Albany, N. Y.**—This company has been asked to build a new belt line over Second Avenue and Delaware Avenue and into the southern section of Albany by way of South Pearl Street.

**\*Hempstead, N. Y.**—A project is being considered to build an electric line through Franklin Avenue from Hempstead to and through Rockville Centre and Oceanside and across Wreck Lead to Long Beach.

**Hornell (N. Y.) Traction Company.**—This company has completed a 1-mile extension in Hornell.

**Asheville Power & Light Company, Asheville, N. C.**—Grading has been begun by this company on the extension of the Charlotte Street line to Grove Park Inn in Asheville.

**Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.**—Preliminary arrangements are being made by this company to build its line from Norwood to Middletown and Reading. It is planned to begin construction within the next three months. E. H. McKnight, Middletown, general manager. [E. R. J., Sept. 13, '13.]

**Norman Interurban Railway, Oklahoma City, Okla.**—This company has placed in operation its 33-mile line between Norman, Oklahoma City and Edmond. This line is owned by the Oklahoma Railway and will become a part of that system.

**Guelph, Ont.**—The City Council has passed a resolution recommending that the Hydro-Electric Power Commission be asked to make a report on the cost of construction and operation of an electric railway to connect Hespeler, Puslinch Lake, Guelph, Elora, Fergus, Arthur, Mount Forest, Meaford and Thornbury.

**Toronto (Ont.) Civic Car Lines.**—A branch line down Lansdowne Avenue to the Canadian Pacific Railway crossing above Royce Avenue has been advocated by Works Commissioner Harris before the Board of Control. This would link up the present St. Clair line with the terminus of the Carlton line of the Toronto Railway, and Mr. Harris estimates that it could be operated at a profit at the current fare schedule of six tickets for 10 cents or 2 cents each. The cost is estimated at \$104,186, with operating and interest expenses at \$17,078 a year. Passenger traffic is estimated at 4588 persons daily, which, if no transfers were allowed, would produce gross receipts of \$28,674 a year. The length of the line would be about  $\frac{5}{8}$  mile.

**Interstate Railways, Philadelphia, Pa.**—Plans and surveys are being made by this company to build a line between Angora and Medina.

**Bryan & Central Texas Interurban Railroad, Bryan, Tex.**—Work has been begun by this company on its extension through the Brazos section.

**Southern Traction Company, Dallas, Tex.**—This company has placed in operation its line between Dallas, Waco and Corsicana. The line is in two sections, one extending from Dallas to Waco, 101 miles, and the other from Dallas to Corsicana, 56 miles. Among the towns on the Dallas-Waco division are Lancaster, Waxahachie, Forrester, Italy, Milford, Hillsboro, Abbott, West Elm and Point. On the Dallas-Corsicana division are Ferris, Palmer and Temple.

**Parkersburg, Mariette & Interurban Railway, Parkersburg, W. Va.**—Work has been begun by this company to double-track several streets in Parkersburg.

**Wheeling (W. Va.) Traction Company.**—Plans are being considered by this company for an extension from the end of its present Rayland division in Wheeling to Brilliant and eventually to Steubenville, Ohio.

**\*Green Bay, Wis.**—Plans are being considered to build an interurban railway from Sturgeon Bay to Ephraim and ultimately to Green Bay. E. E. Galle & Company, Minneapolis, are now interested in the project and are endeavoring to dispose of \$175,000 worth of stock.

**Wisconsin Electric Railway, Oshkosh, Wis.**—This company has secured options on a private right-of-way from a point opposite Bowen Street in Oshkosh to a point opposite Commercial Street in Neenah. The proposed right-of-way extends along the right-of-way of the Chicago & Northwestern Railway along the lake shore. The plan is to remove the present line between Oshkosh and Neenah from the Jackson Street road to the proposed private right-of-way. This extension will include the city of Winnebago on its line.

## SHOPS AND BUILDINGS

**Little Rock & Hot Springs Electric Railway, Little Rock, Ark.**—This company has purchased the Toska Leymer tract of land at the end of Nineteenth Street in Little Rock, on which it plans to build its new freight terminals.

**Kentucky Traction & Terminal Company, Lexington, Ky.**—Definite decision regarding the recently announced plans of this company to establish larger terminal facilities in Lexington has been made. The company has taken a long-term lease on a three-story brick building in the center of the business section. The lease is effective Dec. 1. The building will be remodeled for use as a general passenger station and general offices for the company. The first floor will be fitted up for waiting rooms, while the upper part of the building will be used for office purposes.

**Lake Erie & Northern Railway, Brantford, Ont.**—The terminal facilities of this railway at Galt, Ont., are being made ready. It is expected that the work will be finished this year.

**Sioux Falls (S. D.) Traction Company.**—This company is moving its general equipment into its new carhouse and office building on North Main Avenue in Sioux Falls.

**Dallas Consolidated Electric Street Railway, Dallas, Tex.**—Work has been begun by this company on its new repair shops on Elm Street and Peak Street in Dallas. The structure will be 180 ft. x 150 ft. It will be used as a repair shop, and the company's present repair shop will be used as a carhouse exclusively. The cost is estimated to be about \$125,000.

## POWER HOUSES AND SUBSTATIONS

**New York, New Haven & Hartford Railroad, Stamford, Conn.**—This company plans a new substation on Pine Street, South Norwalk. The current will be taken from the power plant at Cos Cob. The new plant will cost about \$75,000, of which \$35,000 will be spent on a fireproof building.

**Illinois Traction Company, Peoria, Ill.**—This company plans the expenditure of about \$75,000 in improvements to its power plant at Venice, Ill.

**Louisville & Southern Indiana Traction Company, New Albany, Ind.**—This company has contracted with the Louisville Gas & Electric Company to supply it with power to the extent of 500 kw until March 1, 1914, and 1000 kw thereafter. The company's own power plants are becoming inadequate, and in order to avoid the necessity of enlarging them the arrangement noted has been made.

**Manhattan City & Interurban Railway, Manhattan, Kan.**—This company has begun work to secure more power from the Rocky Ford power plant. New transformers, lightning arresters and other equipment will be installed.

**Rochester Railway & Light Company, Rochester, N. Y.**—This company is installing six new boilers at its boiler house for station No. 3 at Mill Street and Factory Street in Rochester.

**London (Ont.) Street Railway.**—This company will require the necessary equipment to transform 1000 hp, alternating current, as supplied by the city substation, to 550 volts a.c. as used by its lines.

# Manufactures and Supplies

## ROLLING STOCK

**City Railway, Dayton, Ohio**, is receiving propositions for twenty pay-within type cars with maximum traction trucks. It is also investigating the center-entrance cars. The order for these cars will be placed in the near future.

**Chicago (Ill.) Elevated Railways** has sent out specifications asking for bids on approximately 100 motor and trail cars. These specifications call for a fireproof car body with an all-steel frame and outside sheathing and an interior finish of steel and a fire-resisting composite material. The over-all dimensions of both motor and trail cars are 48 ft. over bumpers, 8 ft. 8¼ in. over window rails and 12 ft. 3½ in. from top rail to top roof. In addition to the bodies, trucks, automatic air brakes and couplers will be purchased for all cars and motors and multiple-unit control for the motor cars.

## TRADE NOTES

**Watson-Stillman Company, Aldene, N. J.**, has moved its publicity department to its main office at Aldene, N. J.

**Railway Utility Company, Chicago, Ill.**, has received an order from the Chicago (Ill.) City Railway to equip with utility thermometer control the electric heaters in the 100 new cars which are being built by The J. G. Brill Company.

**A. C. Torbert Equipment Company, Chicago, Ill.**, has been incorporated with a capital stock of \$10,000 to manufacture and deal in railway equipment, construction and industrial material. The incorporators are A. C. Torbert, F. A. Farnham and Nathan S. Smyser.

**Okadee Company, Chicago, Ill.**, has been incorporated with a capital stock of \$25,000 for the purpose of constructing, manufacturing and dealing in railway supplies and equipment. The incorporators are Marshall E. Keig, Arthur G. Hollingshead and Paul Carpenter.

**Easton Car & Construction Company, Easton, Pa.**, has purchased the entire stock and equipment of the Ernst Wiener Company. In addition to continuing the manufacture of industrial railway equipment, cars, tracks and other appurtenances this company will also manufacture plate, tank and structural steel up to ½ in. in thickness.

**Horne & Crane Engineering Company, New York, N. Y.**, has recently been incorporated, with offices in the Engineering Building, 114 Liberty Street, to develop and exploit the Horne & Crane system of automatic train speed control, and to conduct a general engineering business in railway and industrial specialties. Messrs. Horne and Crane were formerly connected with the car equipment department, Interborough Rapid Transit Company, New York.

**Coleman Fare Box Company, Ltd., Toronto, Ont.**, has been incorporated under the laws of Ontario, with a capital of \$75,000, to manufacture fare boxes for electric railways. It has bought the business carried on at Tottenham, Ont., by the late J. H. Coleman and the business of the Coleman Fare Box Company, incorporated under New York State laws. The Canadian works will remain at Tottenham, but the head office and sales department will be in Toronto, Ont. The directors are Acton Burrows, W. H. Knowlton, Noel Marshall, R. B. Nordheimer and A. A. Burrows, of Toronto, the last named being the manager.

**Esterline Company, Indianapolis, Ind.**, has appointed the following sales representatives to cover the distribution of "Golden Glow" headlights for electric cars and locomotives in their respective territories: Grayson Railway Supply Company, St. Louis, Mo., covering the Southwest, including the States of Missouri, Arkansas, Oklahoma, Texas, Louisiana, Mississippi and parts of Tennessee and Kentucky; J. G. Duncan, Jr., Company, Philadelphia, Pa., covering eastern Pennsylvania, New Jersey and New York City; E. R. Mason Company, New York, N. Y., covering New York and Connecticut; Brown & Hall, St. Louis, Mo., covering Kansas and Nebraska; Electric Sales Company, Boston, Mass., covering Massachusetts and Rhode Island.

**Tool Steel Gear & Pinion Company, Cincinnati, Ohio**, has received a contract for the third year for gears and pinions

covering the properties throughout the country controlled by Stone & Webster. The company has also received an order for 344 gears and 344 pinions to be used in the electrification of the London & Southwestern Railway, London, England. The motors for this equipment are of 200 hp and the gear is probably the largest that has thus far been made up for street railway service, having fifty-nine teeth, two-pitch, with a diameter of 30½ in. The gears will weigh about 600 lb. each when made and will be made from forged-steel blanks. Other orders recently received are: United Railways & Electric Company, Baltimore, Md., 240 gears and pinions; Texas Traction Company, 120 gears and pinions.

**Prepayment Car Sales Company, New York, N. Y.**, has issued a circular saying: "The Ross & McDonald pay-as-you-enter basic patent (No. 800,172) has just been sustained at New York City, before Judge Holt in the United States Court for the Southern District of New York, and the royalty of \$100 per car established. This decision, while upholding the company's right to be compensated for the admitted benefits which its inventions have brought in car design, is of prime importance to the entire street railway industry and to the public, as it will insure the proper application of the prepayment principle based upon the widespread experience of the inventor company." The circular is signed by T. W. Casey, president Prepayment Car Sales Company.

**National Electric Specialty Company, Toledo, Ohio**, has appointed H. E. Gifford, Jr., sales manager, with headquarters in Chicago. He resigned as Western representative of the L. S. Brach Supply Company to accept this position. Mr. Gifford has been in the signal business since 1905, when he went to work for the New York Central & Hudson River Railroad at Mott Haven, N. Y., as accountant in the office from which the electric zone work was handled. In May, 1906, he was appointed chief clerk to Azel Ames, then signal engineer of the electric zone. When the organization was disbanded in the latter part of 1907 he went into the accounting department of the Union Switch & Signal Company's Pennsylvania Terminal construction organization. In 1910 he entered the employ of the American Conduit Company and was later connected with the installation of the underground conduit system of the New York, Westchester & Boston Railway. In January, 1912, he was appointed Western representative for the L. S. Brach Supply Company. In his new position Mr. Gifford will handle principally the "Vac-M" lightning arresters. These devices are vacuum arresters which are adaptable for all kinds of electrical, electric light, telephone, signal and power supply installations.

## ADVERTISING LITERATURE

**Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.**, has issued Bulletin No. 3 of its rail reports, containing sulphur prints and microphotographs showing cross-sections of seven standard and seven titanium-treated open-hearth rails. The results of chemical and physical tests show that (1) the treated rails average better ductility, especially in the heads, and strength than the untreated; (2) the treated steel average an increased shock resistance; (3) treated rails are less easily fractured by fatigue or constantly repeated stresses below the elastic limit, and (4) that treated rails show greater uniformity, indicating freedom from segregation and its attendant evils.

**The J. G. Brill Company, Philadelphia, Pa.**, prints in the *Brill Magazine* an illustrated biography of Allen F. Edwards, vice-president in charge of purchases of the Detroit United Railway. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service in Birmingham, Ala.," "Composite-Frame Cars for the Tri-City Railway Company," "Semi-Convertible Car Hit by an Engine," "Twenty-six Passenger Omnibus," "Three Construction Cars for Spain," "City and Interurban Cars for the Wilkes-Barre Railway," "Interurban Combination Cars," and "Closed Cars for South Carolina." The J. G. Brill Company has also issued a catalog containing illustrations of eighty-six different types of city and interurban passenger cars as well as many types of funeral, baggage, freight and service cars. The illustrations are accompanied by floor plans and by dimensions and weights.