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Of this issue of the ELECTRIC RAILWAY JOURNAL 12,000 copies are printed.

Our Twenty-Fifth Anniversary

With this issue of this paper the ELECTRIC RAILWAY JOURNAL commences the twenty-sixth year of its existence. Twenty-five years is a long period in the life of an individual or paper, but still longer when measured by events in the history of the street railway industry. Men who consider themselves young, and certainly have many useful years ahead of them, can recall without difficulty the period when there were absolutely no electric roads. At that time

the text books on electricity vaguely hinted that the force which caused amber when rubbed to attract light objects and was exemplified in the lightning stroke could be utilized in some way to make the wheels of industry revolve, and perhaps be applied to the field of transportation. But the realization of this possibility was considered almost, if not quite, as remote and chimerical as the use of airships now for travel across the Atlantic.

To many a recital of bygone events possesses little interest. They claim, and with considerable reason, that the only really helpful work is that of ameliorating existing conditions and of making provision for the future. We sympathize to a large extent with this point of view, and have recognized its justice by devoting but little space in the columns of this paper during the past five years to the historical side of the street railway industry. Nevertheless, in a country which is so fond of celebrating national anniversaries as the United States, and in a year which has witnessed the Lincoln centenary, the Champlain tercentenary, the Alaska-Yukon exposition and the festivities attendant upon the Hudson-Fulton celebration, the claims of the past cannot be entirely ignored. It may be that "the time that is passed cannot be recalled." But if a knowledge of the trials and achievements of those who have laid the foundations of the present will in any way bring us nearer to a realization of the close connection between their problems and our own, and if it will stimulate us in a material degree to emulate their successes, the final result must be counted as a real gain.

During the quarter of a century which has passed since the establishment of this paper, its duty as well as its high privilege has been faithfully to record the many aspects of the changes which have occurred from the age of horse traction to that of cable; from that of cable to the electric era, and from the period of light, single-truck cars with 7½-hp motors to that of the heavy quadruple equipments of the present day. It has been in touch not only with the inventions which were finally successful, but with those which, heralded and unheralded, were honest attempts to better conditions but were finally discarded. The height of its ambition has always been to act as a faithful ally—as well as guide, counsellor and friend—to the industry which it has represented.

1884 and 1909 Compared

It is customary in historical essays, of which there has been a flood during the past few years, to draw a striking comparison between conditions as they exist at present and those obtaining at the period of which the author is writing. It is not the intention here, however, to review the development in the construction of electric generating

machinery, which finally made the electric arc lamp and then the incandescent lamp a possibility. Nor will an attempt be made to describe the early attempts to utilize the current thus made obtainable, first for stationary power purposes and then as a means of propelling a moving vehicle. All this belongs to the realm of familiar things and is well known to all, even to those who have but lately entered the industry, though only those who have lived through the entire period realize with what keen interest the farseeing railway managers of 1884 watched the developments in the application of electric power which were to have so important an effect upon their properties.

During these 25 years cars, tracks, motive power, in fact, almost all visible features of street railway systems have changed and men have changed with them. It has become almost a truism to say that nothing in the present electric railway system is left of the former horse-car era. We are often accustomed to think of the present manager of a street railway company as being as far removed from the manager of 25 years ago in thoughts and methods and in the equipment with which he has to conduct his business as if the two had lived in different planets. In a sense, but only in a sense, is this true. This view has been accepted so generally that it may not be out of place, indeed it may be most appropriate at this time, for this paper to cite the other aspect and mention some of the characteristics of similarity of the street railway industry as it existed in 1884 and now. Such a comparison will, we believe, reveal a likeness in many more particulars than a divergence, and if this fact will help us to apply lessons taught by the past, the purpose for which these remarks have been prepared will be accomplished.

In many respects the principles of street railway track and car construction employed to-day are similar to those in use 25 years ago, although the track has had to be made stronger to carry the heavier cars permissible with the more powerful motors. But it is not in these particulars that we have in mind to connect the early and later phases of railroad operations. Nor shall we endeavor to show a close resemblance between the general scheme of organization of railway companies as it exists now and as it was 25 years ago, except to say that in its general form it has been modified only so far as expansion has been necessary to direct satisfactorily the affairs of the more extensive systems. After all, these features constitute factors of comparatively minor importance in railway service. The most serious problems have always been those of operation, and here is where the likeness between the two periods which we are comparing is most marked. Indeed it could not well be otherwise, because the purposes of street railway companies at each period were identical and were to transport the public in the safest, quickest, most comfortable and most efficient way. In doing this the railway manager of to-day uses larger cars and a different motive power, but he has to deal with the same class of patrons and with largely the same class of assistants as his predecessor 25 years ago. It is generally accepted by psychologists that human nature does not vary greatly through the ages, so that it is safe to say that the Richardsons, Longstreets and Littels in 1884 had to meet practically the same problems as their successors to-day. They had to encounter

the same kind of arguments and criticisms as the present managers and to a large extent by the same methods, and had to regulate the service to accord with the traffic, maintain discipline on their lines, conduct their purchases and account for and bank their receipts as if they were conducting a line at present.

Although the length of the ride has been tremendously increased and the cars are better lighted and more speedy and comfortable, passengers are carried for practically the same fare, outside of a few benighted cities where less than 5 cents is charged and a few lines in Massachusetts where the railway companies properly get more than a nickel. Again, many of the older city railway systems are operating under the same franchises as their predecessors a quarter of a century ago. The location of many of the car houses, offices and other buildings and of most of the tracks on the streets also had not been changed during this period.

We believe, also, that there is a close resemblance in the character of the officials in 1884 and at present. The knowledge of engineering required has increased, of course, in extent. Electrical graduates from the colleges have swelled the forces of the electric railway companies. Many times the number of men are now engaged in street railway work as were employed 25 years ago. But the lack of knowledge of electrical engineering and of modern systems of accounting detracts not a whit from the ability of the earlier managers. The proceedings of the associations of that time, confirmed by personal recollections, show that the railway managers in 1884 were just as keen to adopt modern improvements, as enterprising in bettering their methods, as familiar with the best practices of the day on other roads and as anxious to help their fellow-managers and ready to co-operate for the general welfare as they are at present. Moreover, many of the means for this co-operative work were in existence then as now, including the American Street Railway Association, the New York and Massachusetts State associations and last, but possibly not least, after November, 1884, the STREET RAILWAY JOURNAL.

Our Convention Issue

Our convention issue, published this week, will reach the regular subscribers just in advance of the annual convention of the American Street & Interurban Railway Association. A limited number of copies will also be available for distribution from our booth in the Denver Auditorium. As in the past, a great deal of time has been spent upon the preparation of its text, and the number has been printed on special paper to secure a handsome typographical appearance. It is thought by the publishers that the high standard previously set by them in convention issues has been equaled, if not surpassed, in the present number of this paper.

The subject matter for the convention section of this issue has been chosen in accord with a policy, well defined for some time, to describe in a very thorough way some particular feature or features of electric railway construction and operation, typified by the electric railway properties in or near the convention city. Such a plan is particularly appropriate this year, because one of the principal reasons for holding the 1909 convention in Denver was to

encourage a closer understanding between the electric railways of the East and West, and in the portrayal of Western electric railway practice thus presented the reader will find much to interest and instruct him.

To those not acquainted with the railway system in Denver the excellence of its service will offer an index of the efficient practices of the several departments of that railway organization. Following the article on Denver is a chapter describing some of the interurban roads of Colorado. Probably the most interesting of these roads from an engineering standpoint is that of the Denver & Interurban Railroad Company, an electrified division of the Colorado & Southern steam railroad. Immediately following these two chapters are articles descriptive of the principal street and interurban systems west of the Rocky Mountains. While these roads do not differ materially from those in the East in their constructional features, novel operating practices have been developed in many cases, due to local conditions. One of these is the greater area served by the roads and the greater amount of track per unit of population. The Western roads, as a rule, carry their passengers farther than in the East, and, as a result, must be prepared to operate at faster schedules. Again, with certain exceptions, the interurban railway systems of the West receive a larger part of their passenger traffic from large centers of population, as contrasted with the interurbans of the Central States, much of whose business comes from agricultural districts and villages. Nevertheless, those Western roads which serve territory susceptible to agriculture have, almost without exception, demonstrated that a substantial growth of scattered population will follow the construction of an interurban line.

To those interested in the handling of freight and express traffic by electric railways the interurban and some of the city systems of the West—notably those of Seattle and Tacoma—present excellent examples of the possibilities of this field. Another characteristic of Far Western electric railway development is the extent to which they have utilized water-powers. West of Denver practically all of the electric lines obtain their power, or a major part of it, from hydroelectric generating stations, distant in some cases more than 100 miles. In many cases of this kind 60,000 volts are used as a transmission voltage, yet no difficulty has been experienced in carrying the high-tension wires through the streets of large cities. Power for the city systems, as in the East, is usually distributed to substations at 13,200 volts, and with the exception of San Francisco, where underground construction is employed, all transmission lines are overhead.

Taken as an entity, the electric railways of the Western States deserve much credit for the original work which they have done. All are so far from the manufacturing centers of the East, and overland transportation lines usually are so congested, that each road has had to be prepared to display considerable resourcefulness in its construction and maintenance departments. For this reason the shops of the Western roads are rather more fully equipped with heavy machinery and do more manufacturing than would be necessary were it possible to obtain manufactured supplies promptly or with the assurance of definite freight delivery.

Variety is not lacking in the methods of power distribution. Among the articles in this issue will be found descriptions of roads operated by cable, by the standard and catenary supported 600-volt trolley, by the 1200-volt third-rail, and by a 11,000-volt catenary trolley carrying alternating current.

Historical Interurban Roads

The concluding chapters of the convention section of this issue are devoted to a history of some of the early interurban electric roads, a subject which was not considered at the time of the publication of our 1904 historical number, and to a summary, with statistics, of the events of street railway interest during the past five years. Recent occurrences indicate the great difficulty of establishing priority in current achievements, and in long past events where many of the records are lost and most of the witnesses have gone, it is still more difficult for the historian to assign proper credit. In publishing the material relating to early railways that may be classified as of this interurban type the *ELECTRIC RAILWAY JOURNAL* does not undertake at the present time to settle all the questions involved about which there is some doubt; that is, it does not now seek to be the final arbiter on the problem of when, where and how the first interurban line had its origin. We prefer to chronicle facts that remain available regarding various properties which were constructed early enough to be of distinct interest to the historian of either the present or a future day.

The earliest of the roads in the Central West which appear to be entitled to be called interurban do not conform in any important respect to the modern lines of this character that now exercise so great an influence on the districts which they traverse. When these roads were first projected the application of electricity for railway purposes was in its experimental stages and apparently no one foresaw the great commercial results that would follow the adaptation of the new power for a railway service that should combine the advantages of good urban street railway service with the functions for short-haul traffic previously discharged by the steam railroads. The situation in the early nineties was such that delay was inevitable; the art had not developed to a point where extended application was practical from a financial point of view. Intervention of the panic postponed hopeful projects, but while the effects of the business depression were still widespread the movement which led to construction of the Akron, Bedford & Cleveland Railroad was started and this line, despite discouragements of every nature, was finally completed by Will Christy and his associates. This road represented permanent advancement in the use of electricity for railway power, and as Mr. Sloat shows in his article, the results attained in construction and operation appear remarkable when considered after the lapse of 14 years. Following the successful initial career of this line was the use of an entire private right-of-way for the Lorain & Cleveland Railway; and subsequent development was very rapid. The earliest interurban construction in Indiana was that for which Charles L. Henry was responsible.

The inventor of the interurban line is worthy of a place among those who have gained distinction by the accomplishment of epochal achievements.

THE ROTTERDAM - HAAG - SCHEVENINGEN RAILWAY

The Rotterdam-Haag-Scheveningen Electric Railway, a 10,000-volt, single-phase line, which was opened on Oct. 1, 1908, is the most extensive electric railway in Holland and the latest and one of the most important single-phase roads in Europe. It joins the great city of Rotterdam with the Hague, the capital, and Scheveningen, the most popular ocean resort of the country. The Hague and Scheveningen are respectively on the western and eastern branches of the main line from Rotterdam, and are located 14.5 miles and 17.67 miles from the last-named city. The history of this project casts an interesting side light on the rapid development of single-phase traction in Europe, for in 1900 a contract had been made by the original promoters for the construction of an 850-volt d.c. railway. It was proposed to generate polyphase current at 10,000 volts and transmit it to two rotary converter stations outside the power plant. Later on, however, the company was taken over by other interests, and several years were lost in settling the difficult problems which came up with regard to the actual roadway construction. In consequence of these delays it was found feasible to change the electrical plans by adopting the multiple catenary suspension and single-phase car equipment.

ROUTE AND ROADWAY

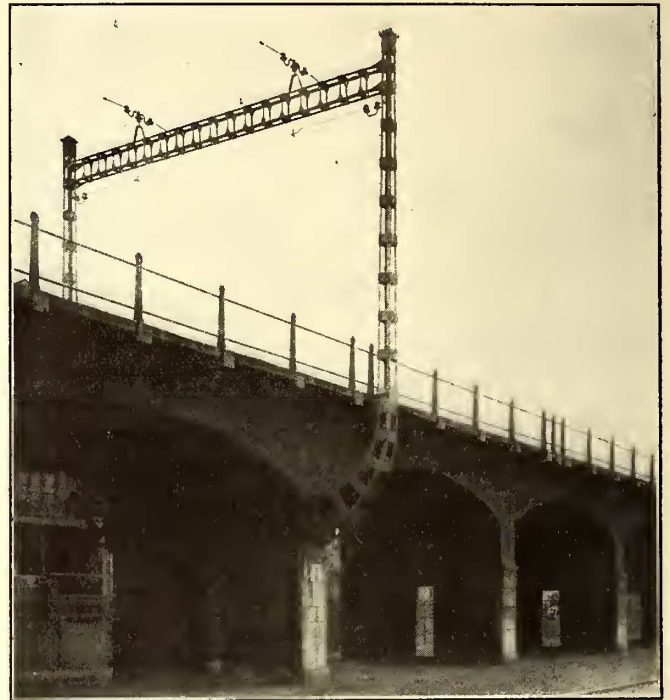
The line begins in the heart of Rotterdam and runs north as a double-track main line for 12.4 miles, where it divides, one double-track line going west to the Hague and the other continuing north to Scheveningen. The junction point is built up as a triangle to permit the direct operation of cars between the Hague and Scheveningen, which are 6.82 miles apart. The route length of this railway is 20.46 miles, and the total trackage in single track, 46.5 miles. Both express and local trains are operated, the former stopping only at one intermediate station, Laan von Nieuwe Ost-Indie, in the suburban territory of the Hague.

That the roadway is of massive construction may be judged from the fact that the first 1.24 miles out of Rotterdam consist of a reinforced concrete viaduct. Owing to the difficulty of setting large masses of steel in the concrete, the steel columns which carry the catenary bridges

the swampy character of the soil. Near one station, Schiebroek, the roadway is built on piling.

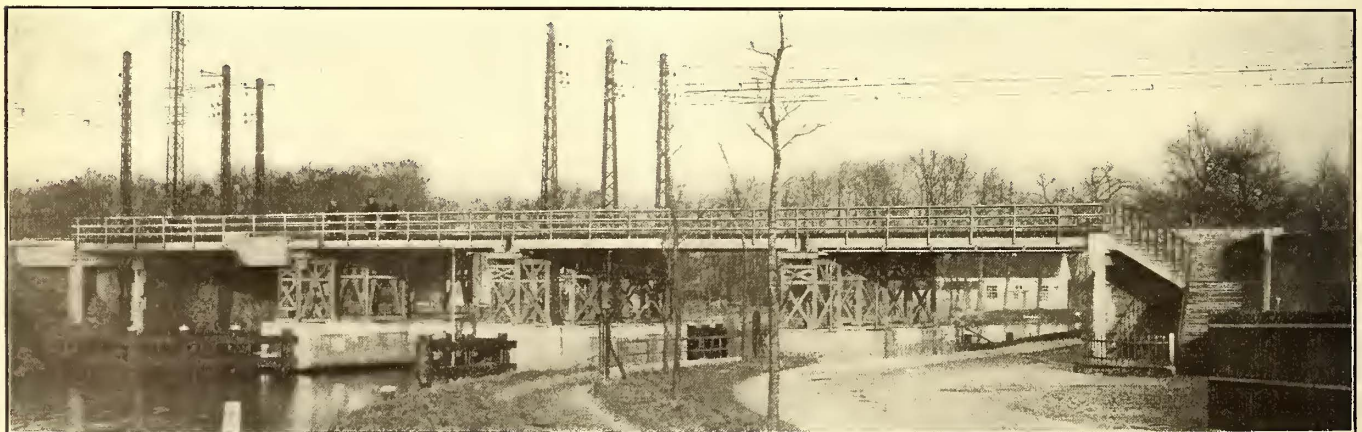
THE POWER STATION

The power house is located at Leidschendam, about 11.46 miles from Rotterdam. Fuel and other material are brought directly to this plant by the Vaart Canal. Owing to the



Scheveningen Single-Phase Railway—Novel Steel Columns on the Bridge at Rotterdam

treacherous soil, this building was erected on a foundation of armored concrete. The walls are of brick with sandstone trimmings. The foundation walls, roof, boiler tops and chimney are all of concrete. The chimney is over 194 ft. high and 8 ft. 2 in. wide at the top. The steam generating equipment consists of five boilers, each furnishing 6612 lb. of steam per hour normally and 9257 lb. of steam per



Scheveningen Single-Phase Railway—Interruption in the Railway Circuit Over Drawbridge at Leidschendam

were placed outside the deck of the viaduct and curved inward to the piers, and the bottom plates of opposite pairs of columns joined by through rods. The rails weigh about 77 lb. to 78 lb. per yard throughout the system, and are laid on wooden ties in rock ballast. The uniform distance between the track centers is 14 ft. 2 in. Neither the grades nor the curves are considerable, the principal roadway trouble being

hour on maximum loads at an absolute pressure of 10 atmospheres and 300 deg. C. superheat.

The original power equipment consisted of two Gorlitz horizontal jet condensing engines, each rated at 770 hp normal and 1040 hp maximum, direct-connected to Siemens-Schuckert 850-kva, 5000-volt, 25-cycle, polyphase generators. The later power apparatus consists of two Zo-

elly turbo-generators. Each turbine has a maximum output of 2600 hp at 1500 r.p.m. and is provided with a surface condenser. An automatic auxiliary valve permits the turbine output to be raised to 3000 hp. The generators are of the Siemens-Schuckert type, and are rated at 2000 kva at 5000 volts, 25 cycles. Both classes of generating units have their speed controlled from the switchboard.

By means of the Scott system of connections, the 5000-volt, 25-cycle, three-phase current from the generators is converted to 10,000-volt, two-phase current by four 600-kva and four 1200-kva transformers. This special arrangement

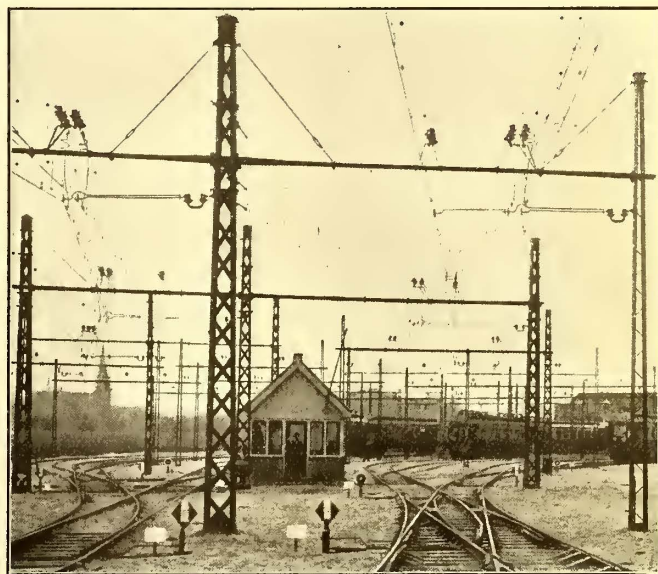


Scheveningen Single-Phase Railway—Viaduct in the Outlying Portion of Rotterdam

was necessitated by the condition that the first two generating sets had been nearly completed as 10,000-volt, three-phase units, when the decision was made to operate the line on two phases. The stators of the two generators, therefore, were connected in parallel to lower the potential to 5000 volts, and, furthermore, the efficiency was raised by decreasing the air gaps. The two exciter sets consist each of a 500-volt, three-phase motor and a 75-kw d.c. generator. The exciters also furnish current for lighting and for the shop motors, and are connected to a storage battery of 120 cells and 1050-amp hours capacity.

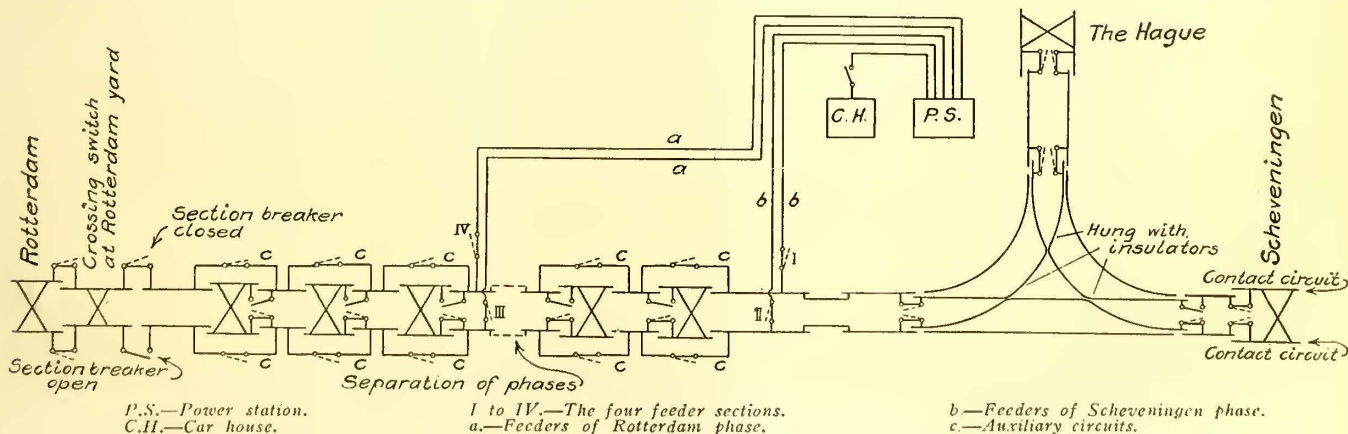
The high-tension equipment is kept entirely separate from

part of which contains the switch and the upper part the 220-volt d.c. operating motor and relay for automatically opening the switch on overloads. The oil-switch motor, which is hidden in the view mentioned, is operated from the main switchboard, where green and red lamps indicate the "in" and "out" positions. An alarm sounds when a high-tension switch opens under overload.



Scheveningen Single-Phase Railway—Overhead Construction in the Leidschendam Station

The main busbars are three in number, of which the outside ones lead to the separate phases on the trolley circuit, while the center bar is connected to the return circuit of the running rails. Each outgoing circuit is provided with two oil switches connected in parallel. Only one switch is used at a time, so that the other is available immediately if the first should fail. A small test line, also furnished with an oil switch, leads from one of the busbars to the car shops. The main switchboard, consisting of 11 marble panels with complete equipment, is mounted on an iron gallery at one end of the engine room, as shown. The panels, which were blank at the time this view was taken,



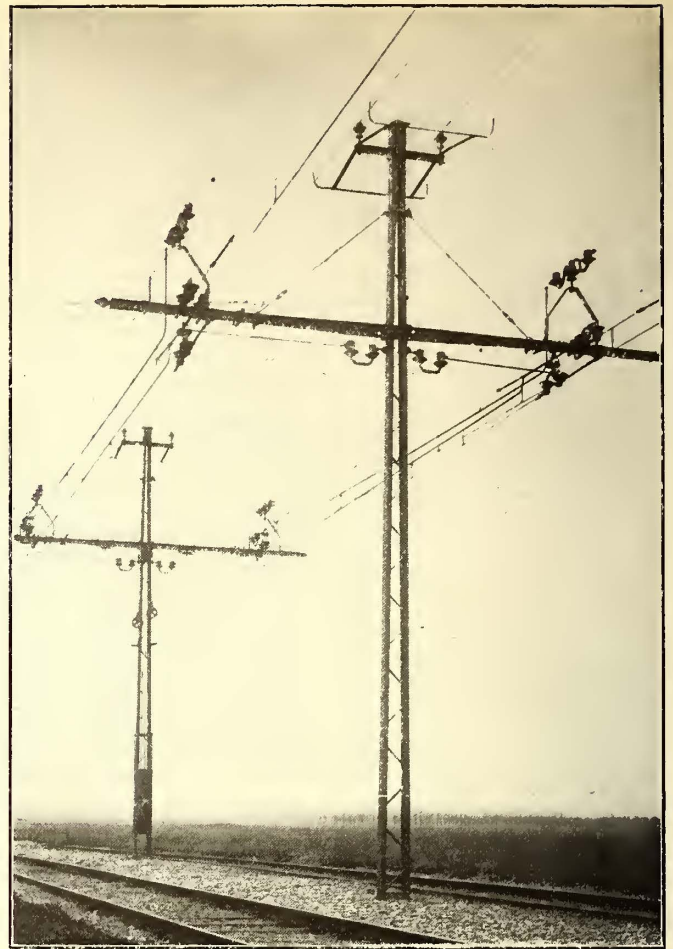
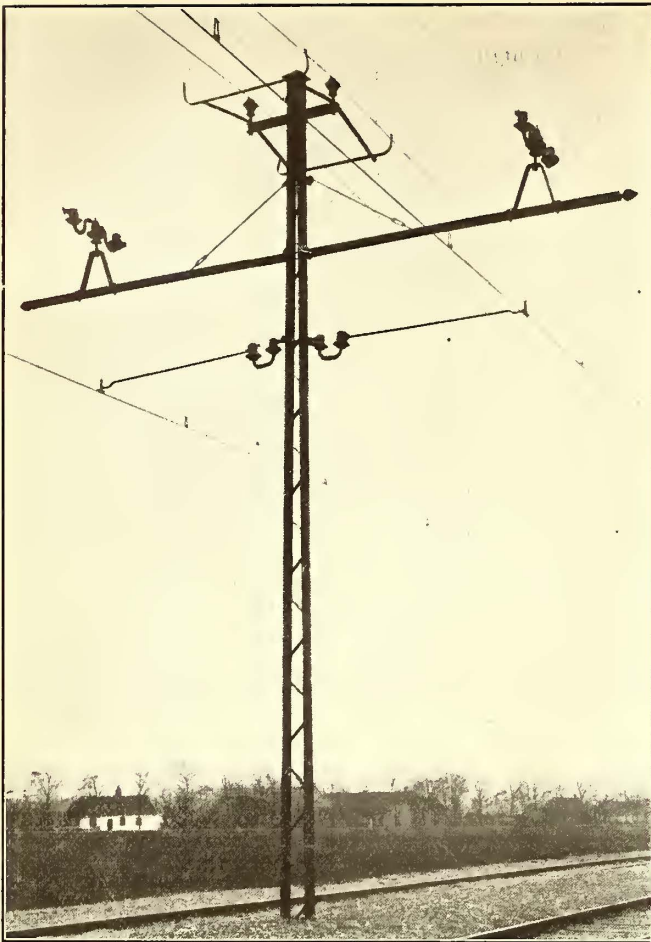
Scheveningen Single-Phase Railway—Diagram of Overhead Line System

the low-tension apparatus. The high-tension chamber is divided into concrete compartments for the oil switches of the generators, motor generator sets and the two outgoing lines, and for the measuring instrument transformers and lightning protection equipment. As shown in one of the accompanying cuts, an oil-switch cell for a main generator or outgoing line consists of a steel framework, the lower

are for the fourth generating set and the third motor-generator.

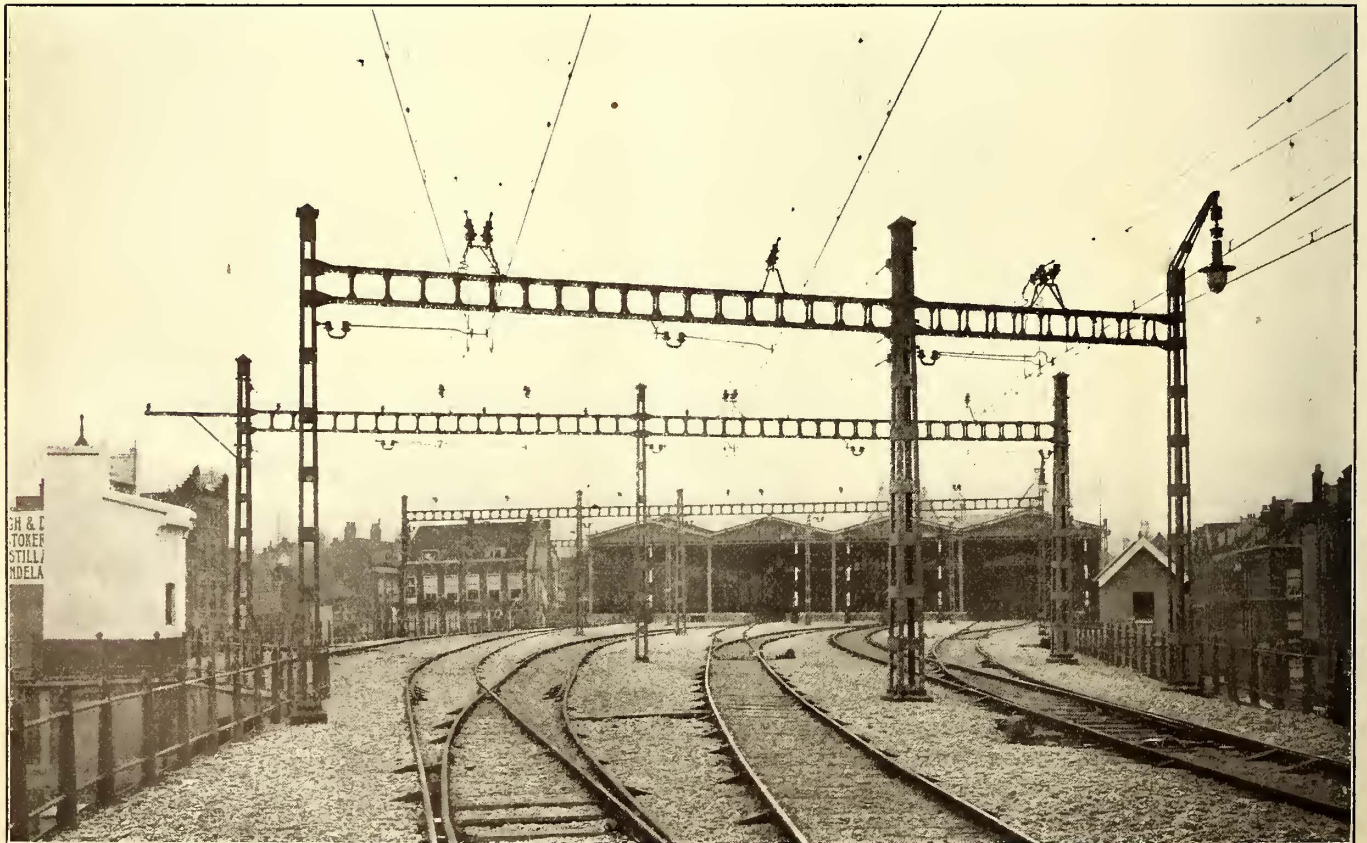
LINE CONSTRUCTION

As has been previously intimated, the trolley circuit is divided in two parts, each of which is fed by a separate phase from the power house. This division is made near Pynacker, about 8.07 miles from Rotterdam, at a point



Scheveningen Single-Phase Railway—Double Bracket Construction in Open Country

Scheveningen Single-Phase Railway—Separation of Phases at Pynacker

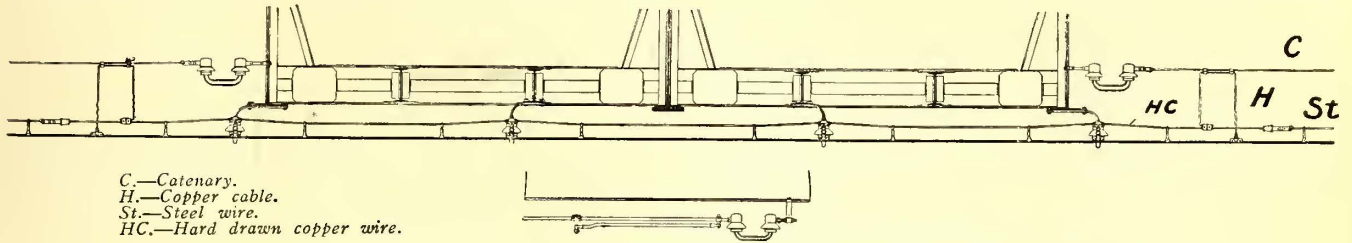


Scheveningen Single-Phase Railway—Bridge Construction at the Rotterdam Station

which allows the load on each phase to be fairly equal. The space between the opposite phases is joined by "dead" bridging pieces about 40 ft. long. The northern, or Scheveningen phase, is fed at a point 11.25 miles from Rotterdam by two bare wires, each of 80 sq. mm cross-section (158,000 circ. mil); the southern, or Rotterdam, phase, is fed by two wires of the same size seven miles from Rotterdam. Both

double insulation permits each insulator to be tested in service at a higher voltage. This testing is carried out during non-operating periods with a motor-generator set and a transformer equipment for 25,000 to 30,000 volts. A storage battery locomotive, which hauls the test car, supplies the direct current from the motor-generator set.

The catenary supports on each span or cross-arm are



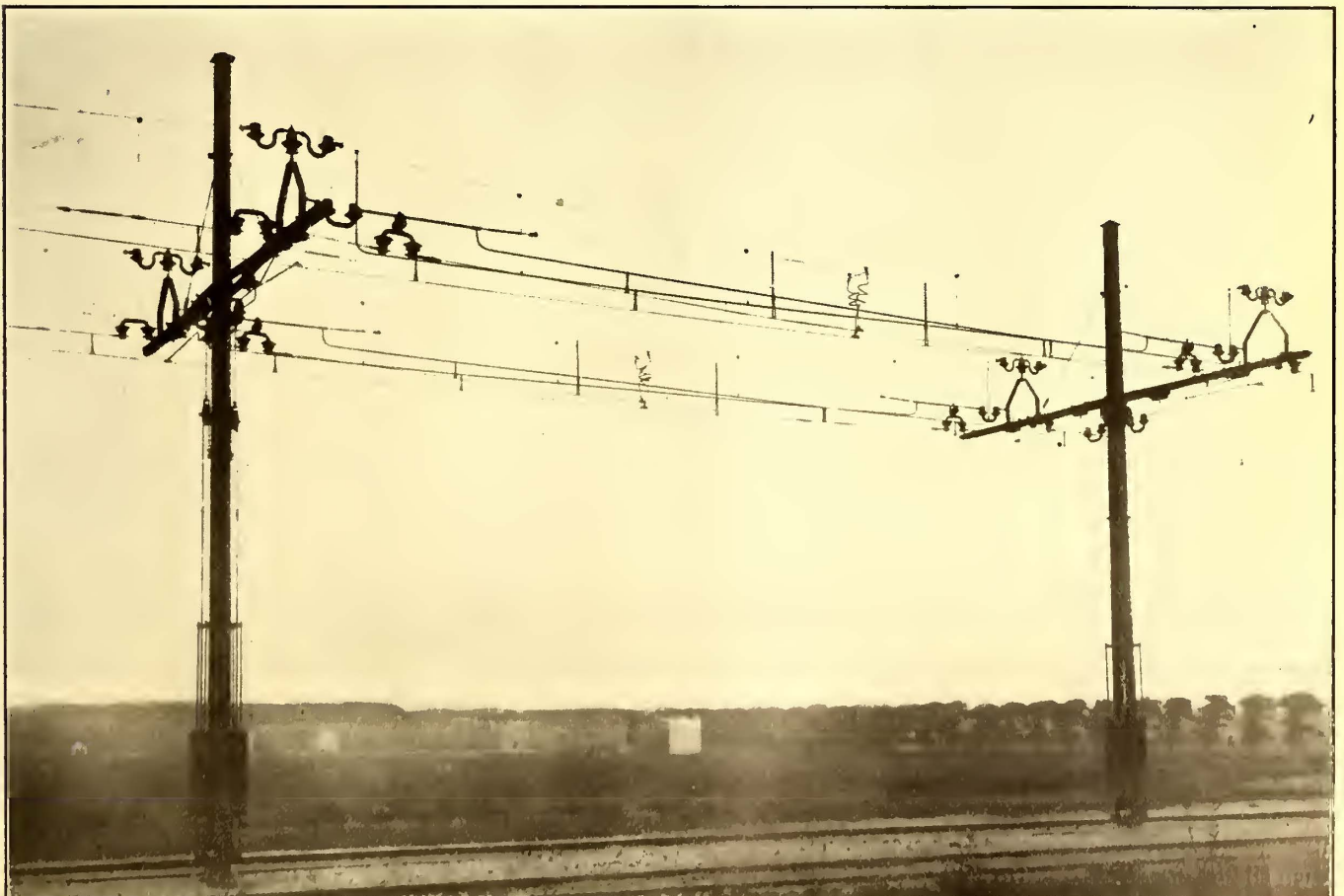
Scheveningen Single-Phase Railway—Overhead Construction Under Iron Bridge

sets of feeders are carried on the regular pole line. The return circuit from the rails to the power house is carried through two buried bare wires, each of 100 sq. mm section (197,400 circ. mil). The general arrangement of the overhead line, with section-breakers, etc., is shown in an accompanying diagram.

The overhead construction is of the Siemens-Schuckert type, which comprises a catenary, a contact wire and a third, or auxiliary, wire between the two. The spans average about 148 ft., and the height of the trolley wire over the rails is 18 ft. The contact line, which is of Fig. 8 profile and 100 sq. mm cross-section (197,400 circ. mil), is fastened to the auxiliary wire at intervals of 9 ft. 10 in. The hangers between the catenary and auxiliary wires are 19 ft. 8 in. apart. Double insulation is provided for the entire suspension. Aside from its greater safety, the use of

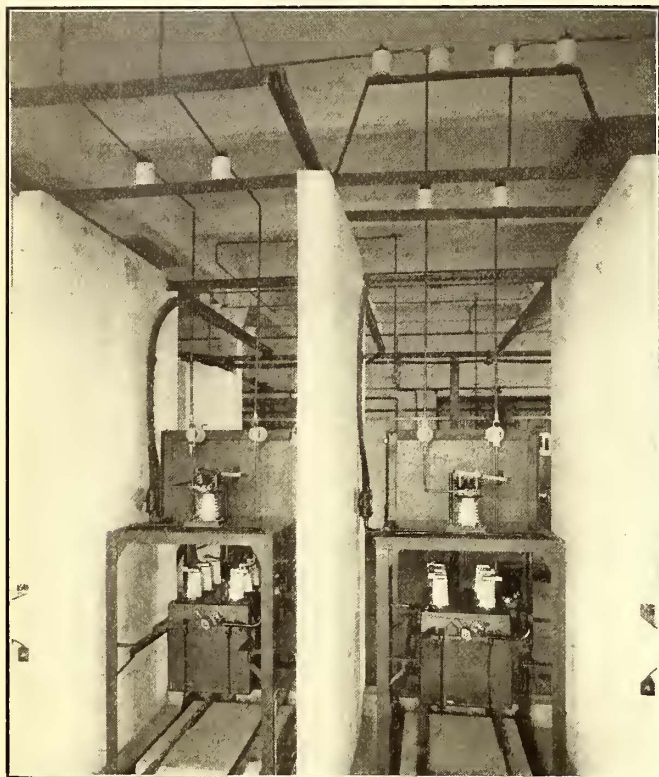
strap-iron stilts with one central insulator and two pull-offs. The catenary is attached to the iron caps of the pull-offs, and the latter, through their curved arms, are connected in turn to the iron cap of the central insulator. These stilt insulators may be moved sidewise if desired. The illustrations show that two types of line construction are used, namely, bridges in the stations and yards, and center-pole, double brackets in the open country. All poles and columns are either of channel or L-beams, and are grounded to the rails with copper connections. Many of the poles are set in concrete, which could be placed only with the aid of iron box forms; in other cases the prevalence of made land obliged the builders to extend arms of the concrete foundation even as far as the rails.

As the catenary is made up of short wires, which extend only from span to span, no special means were needed to



Scheveningen Single-Phase Railway—Automatic Device for Taking Up Variations in Tension of Trolley Wire

take up contraction and expansion. However, automatic tension devices are provided for the contact wire at intervals of 3280 ft. in the form of weights, which are proportioned to keep this wire under a constant tension of 990 lb. As the catenary, auxiliary and contact wires are broken and overlap at these tension regulating points, the latter places also serve for the installation of section breakers.



Scheveningen Single-Phase Railway—Cells of Oil Switches for the Control of High-Tension Lines or Machinery

These breakers are also placed on each side of every railroad station. Furthermore, every station has two 100-sq.-mm branch circuits, so that the current at the station can be cut off without affecting the rest of the line. The sections

The power wires cross the stream on two very high lattice poles to avoid fouling the masts of passing ships. At another point, where the line work is carried under an iron bridge between Leidschendam and the Hague, the trolley wire is about 8.6 in. below the bridge girders, and 15 ft. 9 in., instead of 18 ft., above the rails.

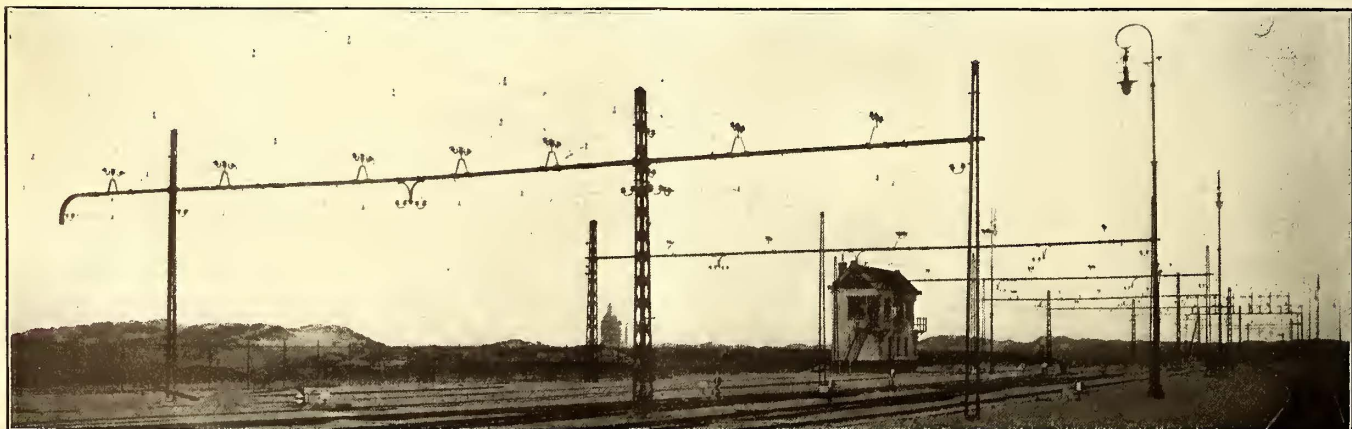
The return circuit passes through rails 40 ft. 2 in. long. The bonds at the stations consist of two plugged-in copper ribbons, having a combined cross-section of 50 sq. mm (98,700 circ. mil); elsewhere the bonds are of the curved, laminated type, soldered alongside the rail head.

ROLLING STOCK

The present rolling stock, which consists of 19 motor cars and 9 trailers, was built by J. J. Beynes Waggonfabrik, of Haarlem, Holland, and electrically equipped by the Siemens-Schuckert Works. The motor cars follow American instead of Continental, practice, as will be noted from the center-aisle and cross-seat arrangement. The compartments of nine motor cars are for 24 second and 49 third-class seated passengers, while the other 10 cars are exclusively for 56 second-class passengers. In the former cars there are four compartments, which are entered through center sliding or swinging doors, while in the latter only two compartments are made, so that the smokers are separated from the other travelers. Vestibuled platforms and partitioned motormen's cabs are provided, just as on American interurban cars.

The cars are very handsomely finished outside, in green below and ivory above the windows, with the lettering and ornamental lines in gold. The interior finish is of polished mahogany. The monitor deck is of yellow-frosted glass. In summer the second-class seating is of green leather, but in cool weather the upholstery is reversed to give seats of green plush. The third-class seats are of wooden slats.

The motor cars, which weigh 112,200 lb. completely equipped, are 56 ft. 5 in. long, and 10 ft. 2 in. wide over the bodies. The car body is 9 ft. 10 in. high, and as mounted on the trucks extends nearly 14 ft. above the rails. The framing is of channel beams, and the draw-bar and buffer equipment is connected directly to the end sills. The two two-axle trucks per car have a wheel base of 8 ft. 2 in.,



Scheveningen Single-Phase Railway—Multiple Catenary Construction at One of the Yards

between the stations can also be cut out independently, as shown in the diagram previously mentioned.

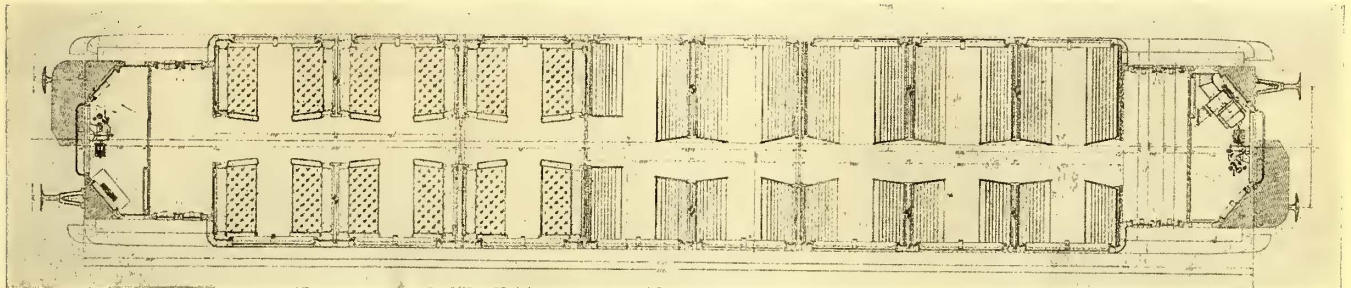
Another illustration shows the overhead construction used, as at the Leidschendam drawbridge. The circuits at each end of the bridge are broken at such a height that the collectors remain in the same horizontal position, and so the cars can cross the bridge at full speed without damage.

king-pin spacing of 39 ft. 10 in. and wheels of 43 in. diameter. All trucks are furnished with semi-elliptic and spiral springs, and four pairs of brake shoes, in connection with Westinghouse air brake equipment. The two motors per car are placed on one truck; the other truck serves to carry the 5-hp, single-phase, 110-volt motor compressor for the air brakes, the current collectors, the pneumatic sander, etc.

Every possible precaution has been taken to insure safety to the passengers and motormen from the electrical circuits. All wiring is carried in metal conduit laid in fireproof material. The metal sides and those parts of the roof of the car under the current collectors are grounded in addition to the accessible portions of the electrical equipment.

in opposite directions. These axles, which thus control the raising and lowering of the collectors, may be operated either by hand or air from the motorman's cab. As the pneumatic hose circuit is continuous, all the collectors in a train can be simultaneously operated.

After passing through the collectors, the current is trans-



Scheveningen Single-Phase Railway—Plan of Combination Second and Third-Class Motor Car

The car roof is also furnished with horn lightning arresters. Of course, all the high tension switches, etc., are placed in an isolated compartment so that the motorman's cab contains no circuits of over 300 volts. Each cab contains a master controller, hand and airbrake handles, together with pneumatic pantograph, sander and whistling apparatus. The cab nearer the motor truck also contains the artificial blast for the cooling of the motors. A two-panel board in each cab carries the usual control switches and fuses for light, heat, signal lamps, master controller circuit, etc.

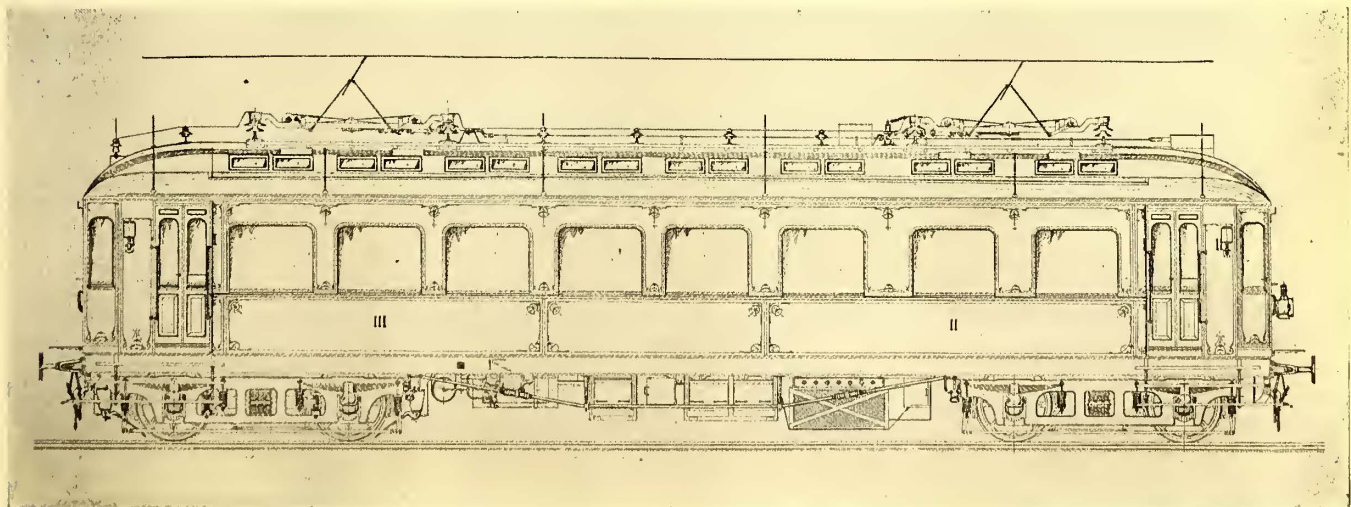
The trailer cars, which weigh about 68,200 lb., are only for third-class passengers. Their seating capacity is 88 and standing capacity 20. A standard multiple unit train consists of two of these trailers (or one) between two motor cars.

ELECTRIC CAR EQUIPMENTS

Current from the line is taken through two collectors, each of which is mounted on 12 grooved insulators. The

mitted to the high-tension chamber under the car via a tube, which is insulated with micanite and closed by an insulator at each end. The high-tension compartment contains one fuse for the main transformer and another for the lighting and control circuit transformer, an electro-magnetically operated high-tension switch with release magnets, a resistance circuit which dampens the shocks of the entering current on the transformer and is short-circuited when the high-tension switch is fully closed, a relay circuit to provide current for operating on overloads, the release magnets of the high-tension switch, and a grounding switch, which must be closed before the high-tension chamber is opened. The release magneto of the main switch can also be actuated by current sent through an emergency switch in the motorman's cab, thereby making it possible to cut off immediately all high-voltage current throughout the train in case of danger.

The current from the high-tension chamber goes directly into the primary windings of the power and lighting trans-



Scheveningen Single-Phase Railway—Combination Second and Third-Class Motor Car

contact piece is an aluminum insert with a grease-filled gutter. The contact section proper adjusts itself to variations in height by turning on the spring-connected shaft of the supporting triangular frame. The lower ends of this frame, as shown in the drawing on page 601, are cranked to two axles. The latter are joined by a closed chain, so that when they turn, the links must move through the same angle, but

formers. Both transformers are oil-cooled and of the core type. They are bolted to the under side of the car body in boxes, which are lined with metal to secure better radiation. The two motors per car are of the single-phase compensated series type, rated at 180 hp each on a one-hour basis and when running at 750 r.p.m. The gear ratio is practically 1:3, which allows a speed of 55.8 m.p.h. to 62 m.p.h.

The motors are provided with auxiliary poles and eight sets of brush-holders, with four brushes each. The motors, of course, are controlled through voltage regulation. A special arrangement of circuits was devised for the purpose, whereby seven voltages can be obtained with only four steps per motor. Two of the eight step switches are always

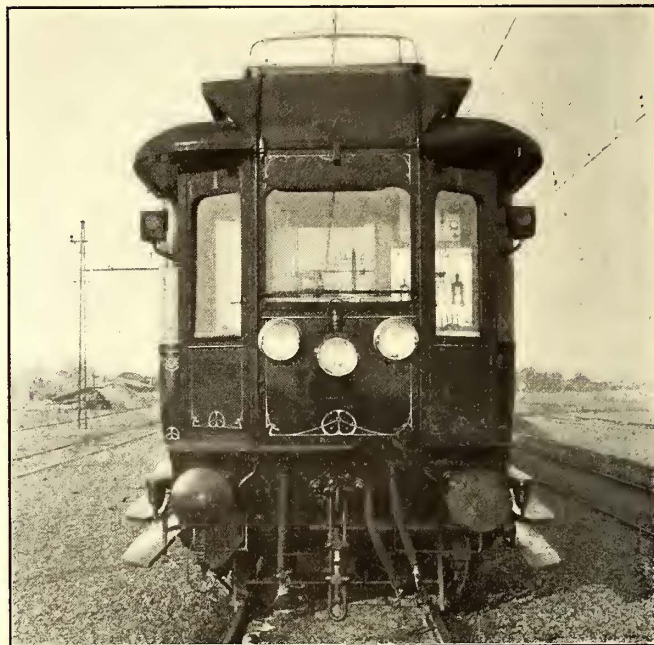


Scheveningen Single-Phase Railway—View in Motorman's Cab

closed. The secondary winding of the main transformer is made in two parts, which are so connected with the motors that a transformer winding and motor always follow one another. Both motors, therefore, conduct the same current, and divide equally between themselves the total voltage of both transformer windings. The first winding has taps for 116, 175, 244 and 314 volts, and the second winding for 151, 210, 280 and 361 volts. It will be seen from

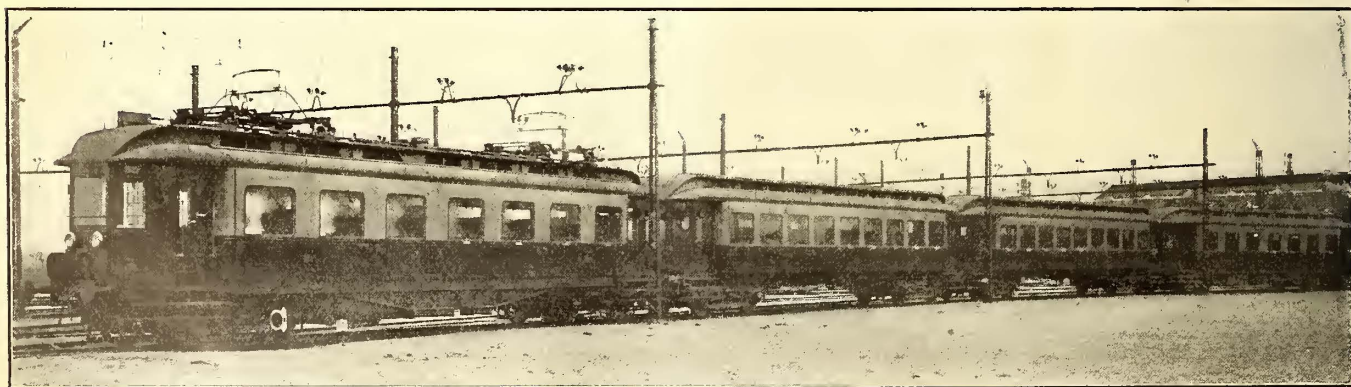
volts is induced in the first winding, whereas 133.5 volts is taken by the first motor, leaving a negative balance of 17.5 volts; the second winding gives 151 volts, of which the second motor takes 133.5 volts, leaving a positive balance of 17.5 volts. As these differences cancel each other, the difference of potential is again zero, as at the starting of the motor.

In connection with the foregoing there is used an "equalizing" transformer which is wound for a 1:1 ratio. The two primary terminals of this transformer are connected to



Scheveningen Single-Phase Railway—Head-on View of Motor Car

the starting points, and the two secondary ends to the end points of the motors. The purpose of this transformer is two-fold: First, to permit cutting out a motor if injured; second, to prevent the interruption of the entire circuit when the several contactors are cut out in moving from step to step. If a contactor is opened, the motor which it serves will receive current from the other winding by way of the equalizing transformer. Naturally this produces a certain



Scheveningen Single-Phase Railway—A Standard Four-Car Train, Consisting of a Motor Car at Each End and Two Trailers in the Center, Seating 305 Passengers in All

this that on the first step the voltage must be 116 plus 151 divided by 2, giving 133.5 volts per motor.

Owing to these special connections, the series arrangement does not give a higher difference of potential between any two points than would a shunt connection. Thus, 116

choke-coil effect, which ceases immediately, however, upon the closing of the next step.

The several differences of potential are obtained by alternately raising the voltage of one or the other transformer secondary windings. If steps 1, 3, 5 and 7 be taken for

winding No. 1, and 2, 4, 6 and 8 for winding No. 2, the control would take place as follows:

Step No.	Motor Voltage	Step Switches Closed
1	133.3	1-2
2	163.0	3-2
3	192.5	3-4
4	227	5-4
5	262	5-6
6	297	7-6
7	337.5	7-8

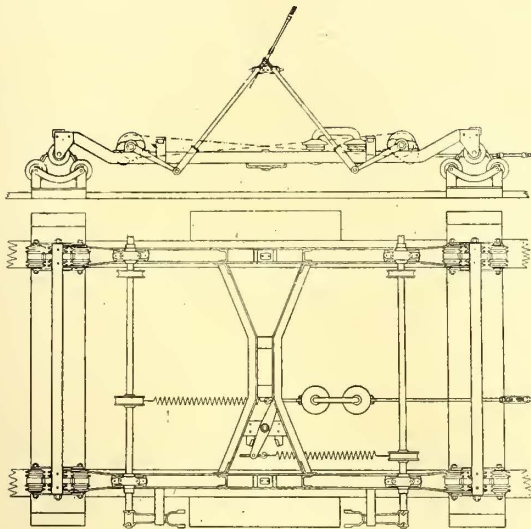
The cars are provided with plug-in connections, to permit

cars are raised by the electrically operated hoist shown in one of the illustrations.

The high-tension wires are carried into the car house or shops, but one isolated outside track is used for testing motor cars. Switching service is handled by two storage battery locomotives, each of which carries two 31-hp, 220-volt motors and 120 cells, having a capacity of 185-amp hours on one hour's discharge. One locomotive can haul a standard four-car train at 3.4 m.p.h., or the line repair car at 10.8 m.p.h.

TRAIN SERVICE

During last winter the Rottendam-Haag-Scheveningen Railway ran 52 trains every 16-hour day between The Hague and Rotterdam, averaging over 235 miles a day per motor car. The running time for the 14.5 miles was 23 minutes. The service during the Scheveningen bathing season calls for 144 trains a day, and an average of 357 miles a day. The electrical equipment for the signals and switches, together with the telephones, was supplied by the Siemens-Schuckert Works.

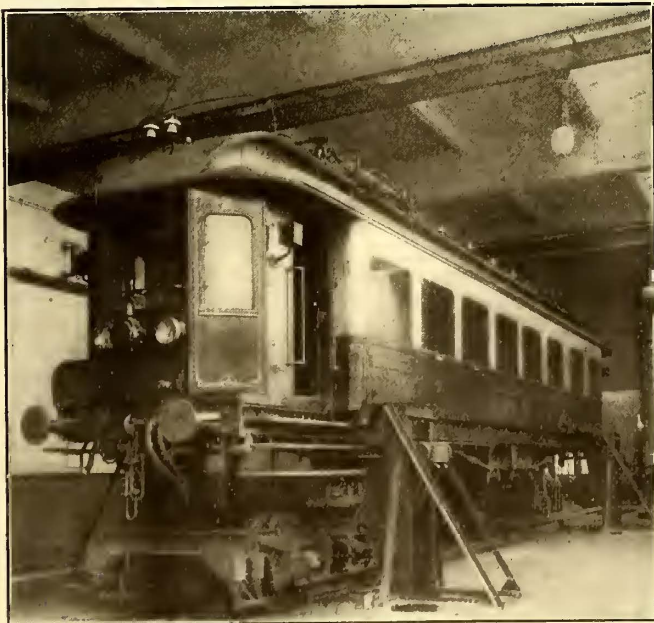


Scheveningen Single-Phase Railway—Current Collector for High Speed

shop tests of the lighting and motor compressor circuits with 300-volt or 80-volt, single-phase current.

CAR STORAGE AND SHOP

The car storage and shop are combined in one structure at Leidschendam near the power house. The building con-



Scheveningen Single-Phase Railway—Electric Car Hoist in the Shops

tains 12 tracks for 48 cars, and is divided in half by a partition. Six of the tracks are provided with pits, lighting and test circuits, etc. Both arc and incandescent lamps are used for illumination. All of the machine tools are driven by direct-current, either singly or in groups. The

DECISIONS ON QUESTIONS CONCERNING INTERSTATE CLASSIFICATION OF ACCOUNTS

The Interstate Commerce Commission has issued a bulletin giving the answers to questions submitted by electric railways to the bureau of statistics and accounts in relation to the system of accounts prescribed by the commission for electric roads under its jurisdiction.

An introductory letter by Prof. Henry C. Adams, in charge of statistics and accounts, addressed "To Carriers Concerned," says:

This bulletin, entitled "Accounting Bulletin No. 2," contains the final answers to a series of questions submitted to the bureau of statistics and accounts in relation to the accounting classifications, prescribed by the commission for electric railway companies, that became effective on Jan. 1, 1909. The cases selected are regarded as important for the reason that they make clear the meaning or application of the text descriptive of the primary accounts covered by the classification of operating expenses, the classification of operating revenues and the classification of expenditures for road and equipment of electric railways.

As a matter of information it may be proper to state that the answers to questions recorded in this bulletin have received the approval of the committee on standard classification of accounts of the American Street & Interurban Railway Accountants' Association.

There are 58 questions, some of which follow:

Query. Is it permissible for electric carriers to renumber the primary accounts of the various classifications for their own convenience, provided the Interstate Commerce Commission numbers are maintained for proper reference and report?

Answer. It is permissible for electric carriers to renumber the primary accounts of the various classifications for their own convenience. For the sake of uniformity, however, it is recommended that the account numbers mentioned in the classifications be used. It is suggested that companies of Class B and Class C, in numbering their operating expense accounts, combine the numbers used in the text of the classification of operating expenses of electric railways; for example, the text for the account "maintenance of roadway and track" for companies of Class B is covered by accounts 2 to 12, inclusive, and the suggested number would be 2/12; the text for account "maintenance of way" for companies of Class C is covered by accounts 2 to 19, inclusive, and the suggested number would be 2/19, etc.

Query. Is it proper to charge assessments for construc-

tion and maintenance of paving to "taxes" under "deductions from income?"

Answer. No. Account No. 10, "paving," in the classification of expenditures for road and equipment of electric railways, provides for paving incident to original track construction, while account No. 9, "paving," in the classification of operating expenses of electric railways, covers repairs and renewals of such paving.

Query. Are carriers required to keep subaccounts for paragraphs (a) to (f) under account No. 23, "distribution system," and (a) to (i) under account No. 25, "buildings and structures," of the classification of operating expenses of electric railways; or will it be satisfactory to show the cost in total under such primary accounts?

Answer. The Interstate Commerce Commission does not require the subdivision of account No. 23, "distribution system," or account No. 25, "buildings and structures;" but any carrier desiring to do so may make subdivisions, provided a list of the subprimary accounts be first filed with the commission.

Query. Are electric carriers at liberty to open a clearing account for store expenses and apportion same on a basis of material issued? If so, should only the amount chargeable to operating expenses be charged to account No. 85, "store expenses," and so reported to the commission, or should this account also include expenses incurred in connection with material issued for construction and betterments?

Answer. Electric railway carriers are at liberty to open a clearing account for store expenses and apportion the amounts charged thereto. The total amount chargeable to operating expenses should be charged to account No. 85, "store expenses."

Account No. 85 should not include expenses incurred primarily in connection with material issued for construction and additions and betterments. Carriers are at liberty to distribute for their own purposes items covered by this account to other operating expense accounts affected, but in their reports to the Interstate Commerce Commission the entire charge for store expenses chargeable to operating expenses should be reported under account No. 85.

Query. Please explain the various accounts "other operations—Dr. and Cr.," contained in the classification of operating expenses of electric railways, particularly the paragraphs entitled "co-ordinate departments."

In connection with these accounts our understanding of account No. 56, "power purchased," is that it should show the total amount expended for this purpose, and that the amounts used for lighting shops, car houses, etc., should be charged to accounts affected and an offsetting credit made to account No. 59, "other operations—Cr." Is this correct?

Answer. The accounts "other operations—Dr., co-ordinate departments" and "other operations—Cr., co-ordinate departments," are to be used by electric railways which engage in other lines of business, such as the production of light and power for sale. In case the cost of producing power is carried in the primary accounts of the light department, the proportion of operating expenses chargeable to the railway department should be charged to the various "other operations—Dr." accounts. In case the cost of producing power is carried in the primary accounts of the railway department, the proportion of operating expenses chargeable to the light or other departments should be credited to the various "other operations—Cr." accounts.

Account No. 56, "power purchased," covers the cost of power purchased from other companies primarily for the propulsion of cars, and account No. 59, "other operations—Cr.," should not be used in connection therewith unless a portion of the power purchased is used by another co-ordinate department, such as electric light, heat, power or gas, within the same company.

Query. Account No. 63, "miscellaneous car-service expenses," provides for the cost of tickets, transfers and baggage checks. Should not the cost of all stationery, such as rate sheets, waybills, bills of lading, etc., used in connection with the operation of passenger, express or freight cars be charged to this account?

Answer. No. Charge to account No. 84, "stationery and printing." Carriers are at liberty to distribute the items covered by the undistributed accounts in the classification

of operating expenses of electric railways, but all reports to the commission should agree with the accounts which are prescribed.

Query. To what account should be charged the cost of printing expense bills, balance sheets and other stationery used in the handling of express and freight business incident to the operation of an electric railway?

Answer. The cost of expense bills, balance sheets and other stationery should be charged to account No. 84, "stationery and printing." By referring to the note under "undistributed accounts," on page 45 of the classification of operating expenses of electric railways, it will be found that carriers are at liberty to distribute items covered by accounts Nos. 82 to 88, inclusive, but that all reports to the commission must agree with the accounts which are prescribed.

Query. We have electric cars equipped and used as pile driver, steam shovel, concrete mixer and stone crusher. To what accounts should be charged the maintenance of these cars and the machinery?

Answer. The maintenance of such cars and machinery should be charged to account No. 35, "service cars," or account No. 36, "electric equipment of cars," except when the cars are used on work not chargeable to operating expenses.

Query. To what account should an electric carrier charge commissions and wages paid for the sale of school and other tickets at various stores along the line?

Answer. If the tickets are sold at stores which can be considered stations, charge commissions and wages paid to account No. 64, "station employees;" if the stores cannot be considered stations, charge to account No. 45, "superintendence and solicitation."

Query. To what account should be charged the salary and expenses of a supervising engineer in charge of the construction of a new line and buildings and the installation of machinery in power plants? It is not clear to us whether these expenses should be charged to account No. 1, "engineering and superintendence," or charged directly to the account for which incurred, in accordance with Note B.

Answer. If the engineer in question has direct supervision over all of the work in connection with the construction of a new line, it will probably not be possible to apportion his salary and expenses among the various construction accounts, and charges should, therefore, be made to account No. 1, "engineering and superintendence," in the classification of expenditures for road and equipment of electric railways.

Note B, under account No. 1, provides that, whenever it is possible, the expenses enumerated should be charged directly to the account for which incurred, as for example, power-plant buildings or shops and car houses. However, it is not the intention to insist upon any unnecessary refinement in accounting for such matters.

Query. What instructions, if any, have been issued by the Interstate Commerce Commission covering the treatment of amounts expended by electric railways for betterments and improvements?

Answer. The commission has issued no instructions to electric railways relative to additions and betterments expenditures. Until advised to the contrary, it will only be necessary for such carriers to dispose of expenditures of this nature in accordance with the classification of expenditures for road and equipment of electric railways.

Query. We note that the accounts "interest, discount and exchange" and "taxes," heretofore carried by many companies in their general expense, have been dropped from the classification of the Interstate Commerce Commission. Please advise as to the manner in which they should be handled.

Answer. Interest, discount, exchange and taxes, when arising in connection with operations, should be handled through the income account. Interest in connection with expenditures for road and equipment should be handled through primary account No. 41, "interest," in the classification of expenditures for road and equipment of electric railways.

Query. To what account or accounts should be credited charges made against operation and construction accounts for electricity furnished by an electric railway company for

the use of its shop motors, car-house lighting, running of construction cars engaged in company service, such as building new tracks, etc.?

Answer. The classification of operating expenses of electric railways does not require a segregation of the cost of power to shops, car houses, etc. The last paragraph on page 7 of the classification provides that any carrier may "keep any temporary or experimental accounts, the purpose of which is to develop the efficiency of operations: *Provided, however,* That such temporary or experimental accounts shall not impair the integrity of any general or primary account hereby prescribed; and that any such temporary or experimental accounts shall be open to inspection by the commission." It is therefore permissible for any carrier to ascertain for its own information the cost of power used at shops or car houses.

The classification of operating expenses of electric railways does not contemplate that any distribution shall be made to maintenance accounts for electricity furnished by an electric railway for the use of its shop motors, car-house lighting or running of work cars engaged in maintenance.

The actual cost of operating work cars for construction purposes, such as building new tracks, etc., is properly chargeable to construction accounts, and proper credit may be given to revenue account No. 16, "rents of equipment," and revenue account No. 18, "power."

Query. What is meant by "undistributed accounts" in the classification of operating expenses of electric railways?

Answer. Undistributed accounts are those which contain expenses properly chargeable to more than one of the five general accounts under operating expenses. For example, there are injuries which, from a strict accounting standpoint, should be charged under "way and structures," "equipment," etc. There are various difficulties in distributing these expenses among the various general accounts and the commission is willing that all expenses for injuries should be carried in account No. 82, "injuries and damages," under general account "general and miscellaneous."

Query. A carrier conducting a railway, lighting and power business carries its general accounts in the lighting and power department. A monthly charge for power is made to the street railway department and to the lighting department. Are the monthly charges for power to the lighting and street railway departments satisfactory and is a single balance sheet for the entire business permissible?

Answer. Each carrier conducting a railway, lighting and power business is at liberty to decide for itself under which department the primary operating expense accounts shall be carried, and should decide upon the basis of division of expenses among the various departments. If the expenses are carried under the lighting and power department, it will be necessary to show on the books of the railway department under accounts Nos. 27, 43, 58 and 80, "other operations—Dr.," the proportions chargeable to the railway department under "way and structures," "equipment," "conducting transportation" and "general and miscellaneous." The amounts charged to the railway department should be handled in the books of the lighting and power department through such accounts as "other operations—Cr."

The commission has not prescribed a classification of revenues and expenses for outside operations for electric railways.

One balance sheet is all that is necessary for the entire business described in this query.

Query. To what account should be charged payments made to the Government, on the basis of a specific charge per passenger, for the privilege of operating cars over its bridge?

Answer. Charge to "taxes."

Query. To what account should be charged the cost of new structures and general improvements in a free private park and the maintenance expenses of such park?

Answer. The cost of new structures and improvements of a substantial character in a free private park should be charged to account No. 33, "park and resort property," in the classification of expenditures for road and equipment of electric railways.

Maintenance expenses of such park should be charged to operating expense account No. 46, "advertising."

Query. Should the expense of sprinkling streets be charged to the same account as sanding and cleaning track?

Answer. The cost of sprinkling roadway and track, when not done directly in connection with construction or repairs of track or paving, should be charged to operating expense account No. 11, "cleaning and sanding tracks." The cost of sprinkling rendered necessary by construction or repairs of track or paving should be charged to the proper construction or maintenance account.

Query. The A & B Light & Traction Company operates gas, electric light and street railway properties. The operating expenses of the three co-ordinate departments are kept entirely separate, except the general expenses, consisting of clerical salaries, rent, taxes and office supplies. Will it be satisfactory to the commission for us to continue carrying expenses of this character in one account covering all departments, and so state the fact in our annual report?

Answer. Where a company operates both a railway department and a lighting department, the entire cost of producing power should be carried in the primary accounts either of the railway department or of the lighting department, and the amounts chargeable to the other department should be handled through the various accounts, "other operations—Dr." and "other operations—Cr." For example, if the cost of power is carried in the primary accounts of the railway department, the proportion of operating expenses chargeable to the lighting department should be credited to the various "other operations—Cr." accounts. In the case cited, the proportion of "general expenses" chargeable to the lighting department would appear as a credit under account No. 81, "other operations—Cr."

Taxes need not be subdivided between the railway and lighting departments. Taxes should be treated through the income account.

Query. This company operates a sprinkling car for the purpose of sprinkling certain streets and highways on which our track is laid. The city in which this service is performed pays us, as its proportion of the cost of this service, from 15 to 20 cents per sprinkler car-mile run. Please advise to what accounts the corresponding debits and credits should be made.

Answer. The amount received from the city should be credited to revenue account No. 9, "miscellaneous transportation revenue."

In case the service mentioned is performed primarily as a service for the benefit of the road, and the amount received from the city is only incidental, the expense of operating the sprinkling car should be charged to operating expense account No. 11, "cleaning and sanding tracks," and the cost of maintenance and repairs to account No. 35, "service cars." If, however, the service rendered is primarily for revenue purposes, the operating expenses should be charged to the appropriate operating expense accounts, as in any other revenue movements.

Query. Has the Interstate Commerce Commission prescribed any account for depreciation of way and structures or equipment?

Answer. The Interstate Commerce Commission does not require any electric railway company to keep account No. 26, "depreciation of way and structures," and account No. 42, "depreciation of equipment," unless these accounts are prescribed by the railway commission of any State in which such company operates mileage.

Query. Is it proper to charge to account No. 41, "interest," in the classification of expenditures for road and equipment of electric railways, interest paid on loans made for construction purposes by an operating electric railway company, said interest accruing on money used in building new tracks and for additional power-plant equipment and other construction purposes?

Answer. Interest which is paid or which accrues during construction should be charged to account No. 41, "interest." Interest which accrues after the completion of the work is not chargeable to this account.

Query. We are in doubt as to the proper account to be charged for trolley parts, namely, wheels, axles, washers, springs, harps, poles, bushings, etc., and carbon brushes,

carbons, headlight parts, etc. Should these items be charged to accounts 32 and 37, inclusive, or to account No. 63, "miscellaneous car-service expenses?"

Answer. All such parts as pertain to maintenance of equipment are chargeable to operating expense account No. 32, "passenger and combination cars;" account No. 33, "freight, express and mail cars;" account No. 34, "locomotives;" account No. 35, "service cars;" account No. 36, "electric equipment of cars;" or account No. 37, "electric equipment of locomotives." Account No. 63, "miscellaneous car-service expenses," includes only such items as do not pertain to maintenance of equipment. The following indicates the line of demarcation between the electric equipment of a car and a car: Electric equipment of a car includes the electric *motive* equipment and wiring; the term "car" includes the car body and trucks, electric bells and wiring, electric heaters and wiring, electric lighting and wiring and air-brake equipment and wiring. Under this segregation carbons used in electric arc headlights are chargeable to account No. 67, "miscellaneous car-service expenses," and the other items named to accounts 32 to 37, inclusive.

Query. Are Class B and Class C electric carriers required to keep the 44 accounts composing the classification of expenditures for road and equipment of electric railways, and the 19 accounts composing the classification of operating revenues of electric railways, the same as Class A carriers?

Answer. All electric carriers subject to the jurisdiction of the Interstate Commerce Commission are required to keep their road and equipment and revenue accounts in the same manner, no condensed classification of road and equipment accounts or of revenue accounts being provided for Class B or Class C carriers.

Query. What is meant by the term "car hours" as used in the mileage, traffic and miscellaneous statistics of the annual report, particularly with reference to "passenger-car hours?"

Answer. "Passenger-car hours" include not only the actual time while in revenue service, but also the time consumed in running from car houses to points where regular service is begun, time lost between trips, and time lost on account of delays caused by blockades, parades, etc. It includes the entire time during which the cars are in charge of the motormen and conductors.

FINES FOR DAMAGING STREET CARS

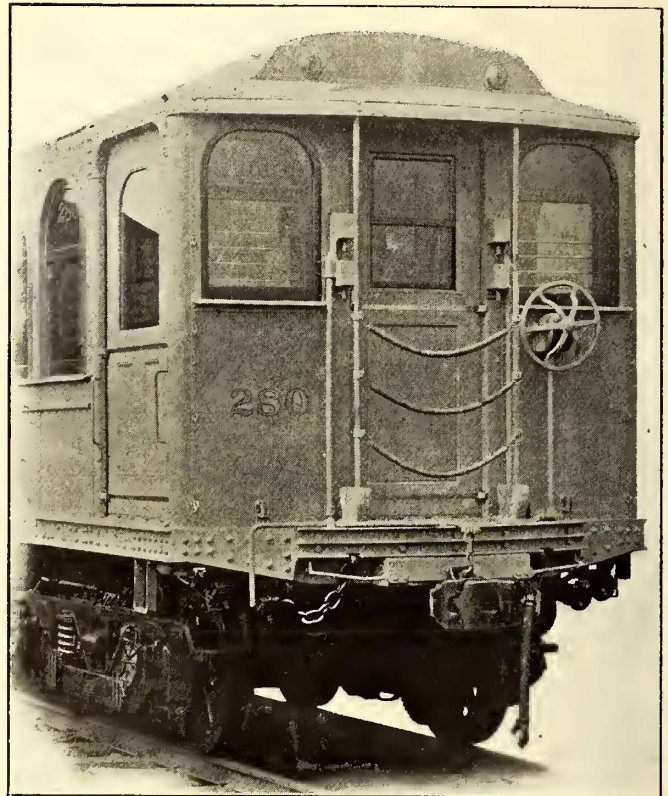
Although American street railway companies will not suffer with impunity the destruction of their car fittings, none has considered the adoption of a scale of damage charges. The latter practice, however, is in vogue on a number of European city systems. The following is a translation of a damage schedule posted in the cars of the Basel (Switzerland) municipal tramways: Breakage of mirrors, \$1.93; of a large side window, \$1; of an end window, 60 cents; of ventilator glass, 30 cents; of a marker lamp lens, 20 cents; of a corner lamp lens, 20 cents; of an incandescent lamp, 15 cents; for disturbing the lighting circuit, \$1; for soiling seats or windows, 20 cents to 60 cents, according to the conditions. If unruly passengers fail to pay the penalties imposed for their misconduct, the conductor simply calls on the police for assistance.

AMERICAN EXPOSITION AT BERLIN IN 1910

Arrangements are being made for holding an American exposition in Berlin, Germany, from May to July, 1910, under the royal presidency of Prince Henry of Prussia. The exposition is to be confined strictly to American products, and has the indorsement of the Department of Commerce and Labor of the United States. The New York office of the American committee in charge of the exposition is at 50 Church Street.

STEEL PASSENGER CARS FOR THE HUDSON & MANHATTAN RAILROAD

On July 19, 1909, the Hudson & Manhattan Railroad opened for service the two downtown tunnels under the Hudson River connecting the new terminal building at Cortlandt and Church Streets, Manhattan, with the Pennsylvania Railroad station in Jersey City, N. J., and early in August the land tunnels under Jersey City and Hoboken were completed, thus making it possible to run through trains from the downtown terminal station to the Delaware, Lackawanna & Western station in Hoboken, where connection is made with the uptown system of tunnels. To provide ample rolling stock to handle the heavy traffic in this new extension the railroad company placed an order with the Pressed Steel Car Company, Pittsburgh, Pa., in



Hudson & Manhattan Steel Car—End View

November, 1908, for 50 all-steel cars of a design somewhat similar to the original cars purchased in 1907, but embodying many improvements which experience with the earlier cars indicated would be desirable. In January, 1909, 40 more cars of the improved design were ordered from the same builders, making a total of 90 new equipments. The completion of the entire order by the date planned for the opening of the new tunnels was specially stipulated in the orders, and through close co-operation between the railroad company and the builder most of the cars were delivered on time, notwithstanding labor troubles which subsequently arose and delayed delivery of part of the order for some weeks.

The trucks for these cars were ordered from the American Locomotive Company, the total order including 92 motor and the same number of trailer trucks.

The new cars were built to the designs and specifications of the engineers of the railroad company, with some slight modifications which were found desirable in the early stages of construction. They weigh 3000 lb. less than the original

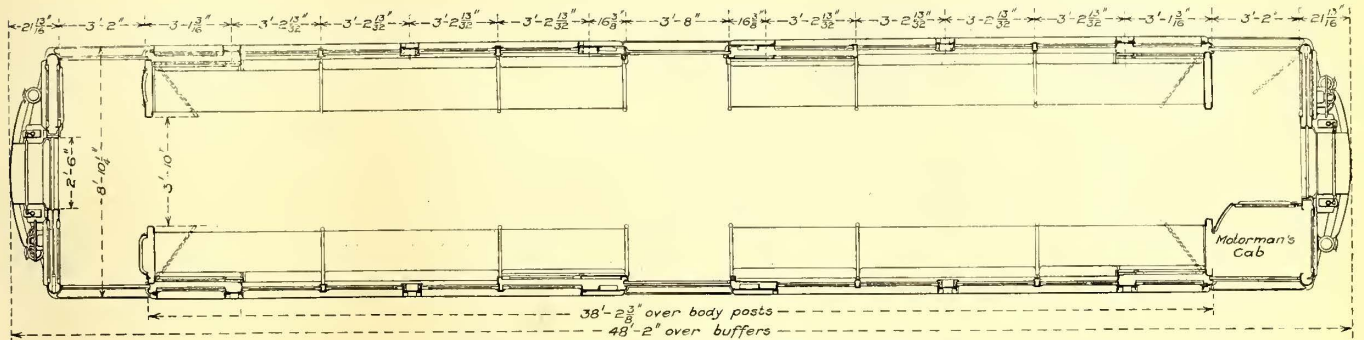
cars built for the Hudson and Manhattan Railroad, which had the same general dimensions. Particular attention was paid to the fire-proofing and sanitary features and to the prevention of telescoping of cars in the event of a collision. The general dimensions of the cars follow:

Length over buffers.....	48 ft. 2 in.
Length over corner posts.....	36 ft. 2 7/8 in.
Width over side sills.....	8 ft. 6 3/8 in.
Width over all at windows.....	8 ft. 11 in.
Height, top of rail to top of roof.....	11 ft. 8 7/16 in.
Weight, total with electrical equipment.....	69,600 lb.
Seating capacity	44

The underframe consists of two 6-in. channel side sills and 6-in. channel center sills. At the center and end side door openings the side sills are reinforced with lengths of 6-in. bulb angles riveted to the webs and between the

forming the middle panel. The side plate, or top chord of the truss, is a 6-in. channel and the 6-in. channel side sill forms the bottom chord. The main vertical posts are 8-in. channels and between these 2-in. window posts formed of pressed steel sections are inserted. Steel plates 1/16 in. thick are used for the outside sheathing and these are panelled by pressed vertical and horizontal ribs which are blocked out to cover all rows of rivet heads in side framing. The sheathing is thus applied independently of the main frame riveting and can be quickly and easily removed. The platform door and corner posts and the body end posts also are formed of pressed plate sections.

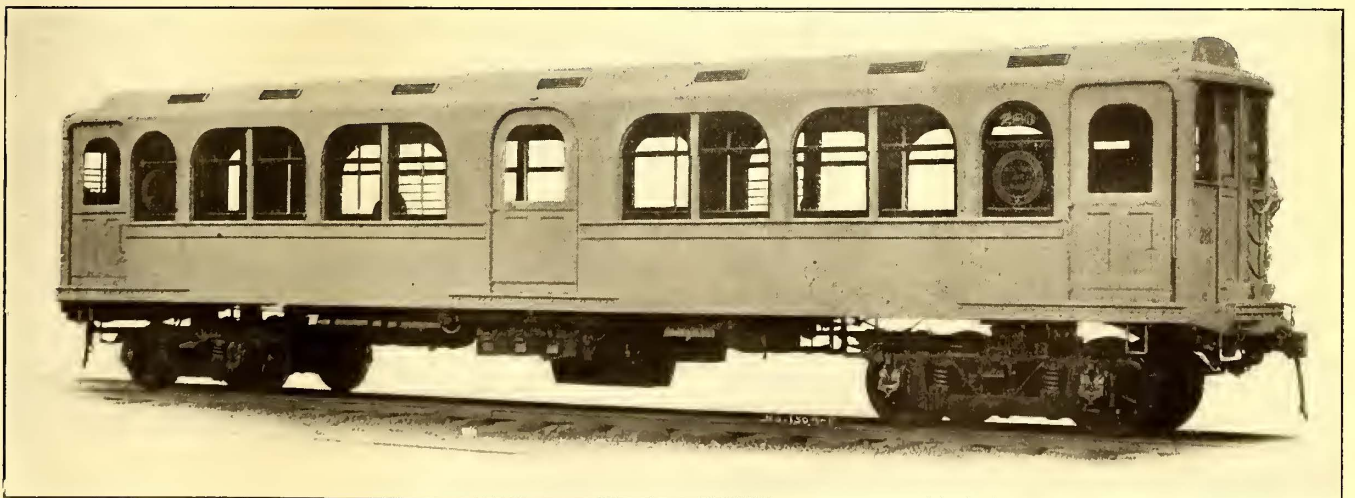
The roof of the cars has a contour which is a combination of a plain curved roof and a monitor deck. The special object in view in designing this compromise roof con-



Hudson & Manhattan Steel Car—Floor Plan

bolsters and end sills the center sills are also reinforced with lengths of 6-in. channels riveted back to back through the webs. The bolsters are built up of rolled plates with cast-steel center plate fillers inserted between the center sills. The platform end sills are built up of two angles in channel section and are plated with a 1/8-in. cover plate on top. Two steel castings of special form provided with heavy vertical projecting lugs are riveted to the outside face and on top of the end sill to protect the car from telescoping in case the end sill of the adjoining car rises in a collision. Hedley grooved anti-climber plates are also bolted to the face of

tour was to provide for the proper distribution of ventilating devices and at the same time give the necessary headroom for the lighting fixtures without encroaching on the operating clearances to the extent required by an elliptical shaped roof. Since the cars are to be operated continuously in subways under water the roofs must be maintained absolutely water-tight and it was thought best to adopt the form shown in order to meet satisfactorily all the conditions of operation and maintenance. Seven Perry automatic ventilators are inserted in each side of the semi-monitor between carlines. The carlines are 1 3/4-in. x 1 1/4-in.



Hudson & Manhattan Steel Car—Exterior View

the end sill as an additional precaution against telescoping. The body underframe is stiffened transversely between bolsters by four trussed beams each composed of double angles and a truss rod.

The side framing is designed as a truss 7 ft. 3/4 in. high and divided into five panels, the center side door opening

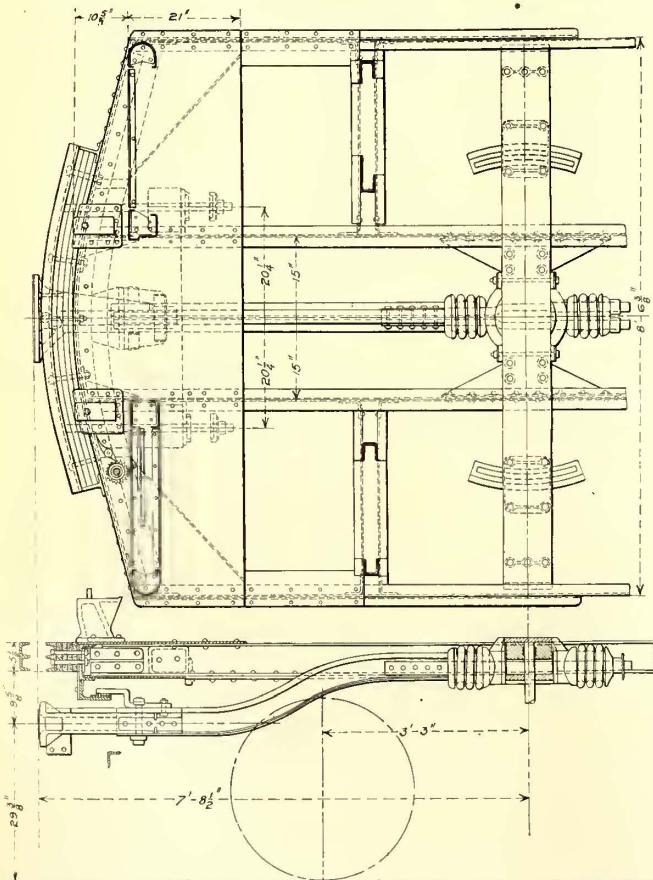
x 3/16-in. angles in one piece and bent to the contour of the roof. They are riveted at their ends with angle knees to the top flanges of the channel side plates. The exterior roof covering is 1/16-in. leaded steel plates secured to the carlines by tinned rivets. All joints in the roof plates are soldered to make them water-tight. The roof construction

over the platform vestibules was designed to be collapsible, so that in the event of a collision the damage would be localized at the ends of the car and would not be transmitted to the body roofing.



Hudson & Manhattan Steel Car—Interior View

Throughout the design and construction of the body framing special care was taken to insure rigidity of the structure as a unit. The cars have proved very satisfactory in service in this respect and are capable of withstanding



Hudson & Manhattan Steel Car—Platform Framing

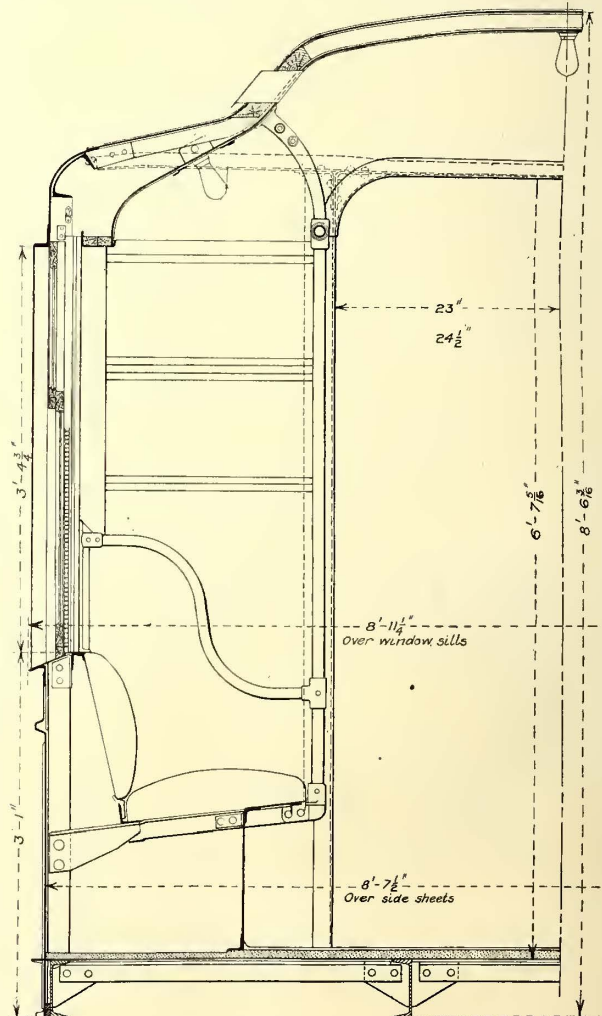
without serious damage shocks which would totally destroy cars of ordinary design.

The floor plan of the new cars is similar to the first cars built for this railroad. Longitudinal seats only are built on

each side of the aisle between the end bulkheads and the center side door openings. These seats are formed of steel frames with fire-proofed canvas-lined rattan backs and cushions. Each longitudinal seat is divided into three sections by pipe partitions which extend up to the roof and serve as hand holds for standing passengers. These partitions reduce surging of passengers during acceleration when the car is on a heavy grade.

The platforms are entirely enclosed and a motorman's cab is provided at the right-hand side on each end. When the cab is not in use the partition doors by which it is enclosed can be folded back, leaving the platform space and entrance passageways entirely free. Hand-operated sliding end doors are provided in each vestibule to permit of passage from one car to another in a train. The sliding end side doors have a 3-ft. 2-in. opening and the center side doors a 3-ft. 8-in. opening. All side doors are pneumatically operated and are electrically controlled from either platform. All doors are fitted with Reliance ball-bearing hangers furnished by the Pitt Car Gate Company.

The service in which these cars will be operated is such that they will be subjected constantly to the influence of moist salt air. Special attention, therefore, has been given to the prevention of corrosion of the steel of which they are built. The usual coats of varnish on the exterior were



Hudson & Manhattan Steel Car—Half Cross-Section

purposely omitted. Two coats of Harrison Brothers' anti-oxide base paints were applied to all exterior metal surfaces and these were followed by a single coat of anti-oxide black surface paint.

The interior finish has been designed with special care to make it attractive and perfectly sanitary. Advantage was taken also of the special shape given to the headlining to improve the lighting of the car. Smooth panel surfaces without pockets or projections, in which dirt or dust could lodge, have been used throughout. All exposed surfaces were given two coats of anti-oxide base paint and three coats of enamel. The vertical and horizontal hand rods which take the place of the usual hand straps, together with the headlining, are finished in white enamel and the re-

the same general design as the motor trucks, both being built to carry a load on the center plate of 30,400 lb.

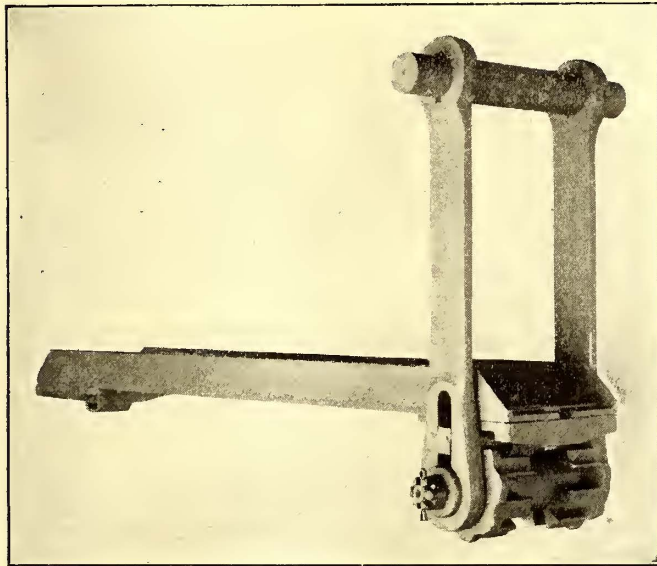
Some of the principal dimensions of these trucks follow:

	Motor truck	Trailer truck
Type	A-378	A-366-T
Gage of track	4 ft. 8½ in.	4 ft. 8½ in.
Wheel base	78 in.	66 in.
Length over all	10 ft. 3 in.	8 ft. 11 in.
Load carried at center plate.....	30,400 lb.	30,400 lb.
Weight complete, without motors..	11,738 lb.	9,200 lb.
Weight of each motor complete with axle gear.....	5,500 lb.	.....
Wheels, type	Steel tired cast steel spoke centers	Solid rolled steel
Wheel diameter	34¼ in.	30 in.
Journals, diameter and length....	5 in. x 9 in.	4½ in. x 8 in.
Radius of shortest curve.....	90 ft.	90 ft.

The motor truck is equipped with two GE-76 motors, each having a rated capacity of 160 hp and suspended inside of the axles with nose type of suspension. The top frame is of wrought iron, the end frames being forged solid with the sides. One end is dropped down to clear the coupler attachments. The pedestals are also of wrought iron and are slotted out for the frame fit. The transoms are 10-in. channels, weighing 25 lb. per foot, and are carried on shoulders provided on the frame center braces to take the shear off of the bolts securing them to the braces. Cast-steel transom gussets are used to tie the transoms and top frames together. These gussets also form the bearings for the swing link pins and lugs for the brake levers, thus simplifying the construction.

The swinging bolster is constructed with a bottom member of pressed steel and a steel channel top member. It has no bearing against the transoms, but, following the builder's latest practice, the driving thrust of the motors is transmitted from the truck side frames directly to the ends of the bolster and through it to the center plate by means of vertical thrust bearings cast integral with the transom gussets and raised to a level with the center plate. This construction relieves the transoms of the driving stresses. These bearings also prevent any canting or tipping of the bolster, and are provided with wear plates which may be readily replaced.

As it is very necessary to maintain the proper height of the car body platform to correspond with the height of

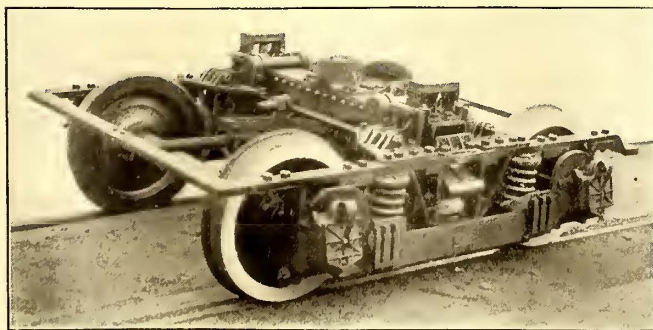


Hudson & Manhattan Steel Cars—Adjustable Spring Plank-Hanger

mainder of the interior is finished in green enamel paint decorated with gold leaf striping. Provision has been made for displaying advertising signs in double rows in the headlining, also in wide panels adjoining the center side doors over the inside sashes in the end bulkheads.

The flooring consists of Keystone steel floor plates filled with carbolith cement and finished with a ¼-in. layer of carborundum cement.

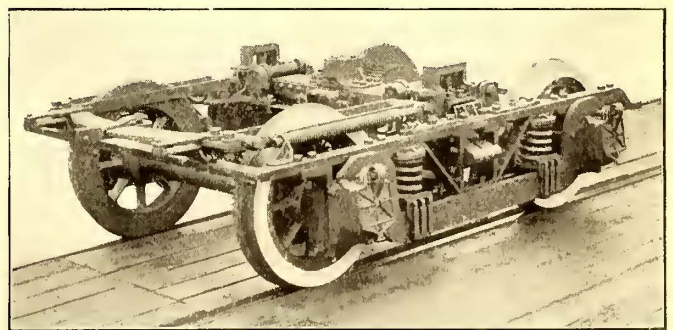
Incandescent lamps are mounted in the headlining under the center of the roof and immediately over the seats. Four



Hudson & Manhattan Steel Cars—Trailer Truck

of the lamps are connected to a storage battery carried on each car and charged from the third-rail circuit, but entirely independent of it. In case the third-rail current should fail these four lamps would continue to burn and not leave the car in total darkness.

The cars are mounted on M. C. B. type trucks, which, as before stated, were built by the American Locomotive Company. Except that they have a shorter wheel base and are of somewhat lighter construction, the trailer trucks are of



Hudson & Manhattan Steel Cars—Motor Truck

the subway station platforms, a device has been applied by which the height of the spring plank, and consequently the height of the bolster, may be easily adjusted to provide for the wear of the wheels or other parts. This device is shown in one of the accompanying illustrations. As will be seen, it consists of an eccentric shaped swing-link rocker, which is provided with a number of pockets, in which the pin passing through the spring plank seat rests. This pin has rectangular shaped ends, having a sliding fit

in the slots in the swing links. By jacking up the spring plank and turning the eccentric around, the spring plank may be raised a total height equal to the throw of the eccentric. In this case the swing-link rocker is so designed as to permit of a total adjustment of $1\frac{1}{2}$ in. in steps of $\frac{1}{4}$ in. each.

The specifications under which these cars were built were prepared by L. B. Stillwell, consulting engineer, and Hugh Hazelton, electrical engineer, of the Hudson & Manhattan Railroad. They were represented at the works of the builder by F. M. Brinckerhoff, who supervised the construction of the cars.

ILLINOIS CENTRAL ELECTRIFICATION PROGRESS

During the past few months the engineering department of the Illinois Central Railway has been engaged actively in studying the problem of electrifying this company's tracks within the city of Chicago and the nearby suburban district. As the result of this study, L. C. Fritch, consulting engineer, Illinois Central Railroad, has just issued a preliminary report addressed to the special commission appointed by the city to look after the suppression of the so-called "smoke nuisance." The members of this commission are Dr. W. A. Evans, commissioner of health; H. H. Evans, secretary of the local transportation committee; Paul Bird, chief smoke inspector, and T. E. Donnelly, chairman of the special smoke commission.

No definite announcements regarding electrification have been made by the Illinois Central Railroad to the city commission, and it should be understood that the plans submitted this week are only tentative, because decisions on the method of generation and distribution of power and on the choice of motive power equipment have not been made. The tentative scheme, as submitted by the Illinois Central engineers, is of interest, however, because it shows that the problem is being attacked seriously and because a few figures regarding the number of trains to be operated, the daily ton mileage and the maximum hourly demand for power, so far as can be determined in a preliminary way, are presented.

The present track facilities of the Illinois Central Railroad within the city and suburban district include eight tracks from Randolph Street to Sixty-seventh Street, 8.5 route miles; six tracks from Sixty-seventh Street to Kensington, 6.5 route miles; four tracks from Kensington to Riverdale, 2 route miles, and two tracks from Riverdale to Flossmoor, 8 miles. The foregoing trackage comprises the main trunk line of the Illinois Central Railroad from its northern terminus in Chicago to the southern end of the suburban district. In addition to this trackage there are three branch lines also to be considered for electrification: A single-track line from Kensington to Blue Island, 4 miles; a double-track line from Sixty-seventh Street to South Chicago, 5 miles, and the double-track Omaha division from the Park Row station to Hawthorne, 8 miles. The completion of the electrification project as proposed would include the rearrangement of the track system and the redistribution of local and express suburban trains and through freight and passenger trains. This work would require the reconstruction of the switching yards at the downtown terminal and at Sixty-seventh Street. Suggested plans for progressively carrying on the work of electrification are as follows (plan 1-a does not contemplate the rearrangement of the tracks):

(1-a) Electrify the local suburban district from Ran-

dolph Street to Sixty-third Street without rearranging the tracks.

(1) Electrify the local suburban service from Randolph Street to Sixty-third Street.

(2) Electrify the local and express suburban service to Sixty-seventh Street and on the South Chicago branch.

(3) Electrify the local and express suburban service to Kensington, South Chicago and Blue Island.

(4) Electrify the local and express suburban service to Flossmoor, South Chicago and Blue Island, and through passenger service to Burnside.

(5) Extension of electric service to freight trains to Burnside and all service to Hawthorne and in the Chicago switch yards.

(6) Complete electrification for all service to Riverdale, South Chicago, Blue Island and Hawthorne; electrification for passenger service to Flossmoor.

At the present time the Illinois Central Railroad operates about 250 scheduled trains in and out of Chicago. With the electrification project completed it is tentatively estimated that the number of trains operated daily would be approximately as follows:

Suburban trains (proposed schedule).....	396
Through passenger	82
Freight trains	190
Switching movements (estimated)	400

Total movements daily..... 1,068

According to present estimates the daily ton mileage of these trains would be as follows:

Suburban trains (proposed schedule).....	895,440
Through passenger trains	431,610
Freight trains	1,789,776
Switching service	1,915,800

Total ton-mileage daily..... 5,032,626

These amounts are in excess of the present service.

The city commission was furnished with estimates for the maximum hourly demand on the power station which would be required for the six successive stages in the electrification work: The train service for the electrified local suburban tracks between Randolph and Sixty-third Streets is estimated to have a maximum hourly demand on the power station of 3500 kw, and the complete electrified terminal to have a maximum hourly demand of 20,000 kw.

Details are not available regarding the motive-power equipment proposed and the method of power distribution. A map of the territory under consideration submitted to the city commission shows a tentative plan for the use of direct current delivered to the cars by a third-rail. This power-distribution arrangement includes six substations fed with high-tension current carried for the major part of the way in conduit laid between the tracks and partly on a steel-pole aerial line. Supplementary feeders are carried similarly. The South Chicago and Blue Island branches are shown on the map to be operated with bracket-supported trolley lines.

GASOLINE MOTOR CAR FOR VIRGINIA RAILWAY

On page 468 of the *ELECTRIC RAILWAY JOURNAL* for Sept. 25 it was erroneously stated that a gasoline motor car building at the works of The J. G. Brill Company, Philadelphia, Pa., was to be put in service on the Metropolitan Street Railway Company, New York. This car, which is to be equipped with two 24-hp gasoline engines under the patents of the Gas Car Manufacturing Company, of Philadelphia, has been sold to the Elizabeth River Railroad Company, of Norfolk, Va.

COMMUNICATION

THE CORPORATION TAX LAW AND ACCOUNTING

PHILADELPHIA, PA., Sept. 22, 1909.

To the Editors:

When the electric railway accountants get together in Denver they will confront a situation somewhat similar to that of two years ago. Then, after having brought to a successful conclusion a long struggle for a uniform system of accounting, they were presented with an entirely different classification by the Interstate Commerce Commission. Through the good work of our most efficient classification committee that matter has been fairly and amicably settled, and we were rapidly adjusting ourselves to the inevitable changes—at least, those of us who come under the jurisdiction of the Interstate Commerce Commission. After the final encounters over the reports for the year ending June, 1909, were over and the perplexities of reconciling the old and new classifications solved, we hoped to settle down to peace and quiet on a solid basis once more.

Now comes the corporation tax law to upset all our pleasant anticipations!

It is to be observed that the struggle with the Interstate Commerce Commission was conducted between accountants on both sides who understood the fundamental principles of their subject and differed mainly on details. The coming contest with the Internal Revenue Department promises another kind of war—one in which the points of view of the two parties are so wide apart that it will be difficult for either to appreciate the stand of the other. As the opening gun, we have the written statement of the Attorney-General of the United States, which shows plainly his utter inability to appreciate the difference between income earned and income received. Moreover, he declares that the tax is not laid upon a corporation's "profits," but upon its "net income * * * received." Some of us have been laboring under the impression that these terms were practically synonymous (barring the "received"), but we live to learn. Without going further into discussion of the remarkable letter (which was written in reply to a friendly protest from a number of prominent public accountants, calling his attention to several glaring inconsistencies and absurdities in the tax clause), it is plain to see that corporation accountants generally are in for a lot of extra work and trouble when the Internal Revenue Department calls for the first reports.

A good many of us are hoping, and, in fact, feel more or less certain, that the law will be declared unconstitutional as soon as the Supreme Court gets a chance at it. Possibly. If it is a direct tax, it is clearly unconstitutional. In the *Spreckels* case, however, the court held that the income tax of 1894 was an *excise* tax, but became a direct tax when applied to *persons*. The obvious inference is that it will be held to be an excise tax pure and simple when applied to corporations only, and, as such, within the power of Congress to levy. Inasmuch as certain corporations are exempted and certain deductions are permitted to one corporation which another may not have, it is possible that the law might fail as not being "uniformly" laid within the meaning of the Constitution. It is to be hoped that the companies represented at Denver will find some way to have a test case carried to the Supreme Court at an early date to decide the question.

In the meantime we will undoubtedly have to make the reports. It seems to me the Accountants' Association

might well take some action to have the classification committee add to its well-earned laurels by getting in touch with the Internal Revenue Department and coming to some mutual understanding as to the data required for the income tax reports. Certainly, as it stands the law is full of perplexing points, and, taken under any construction, means trouble for the unfortunate accountant who is under the jurisdiction of the Interstate Commerce Commission. At the very outset he is confronted with the penalties threatened by the Interstate Commerce Act if he keeps accounts or memoranda other than prescribed by the commission. Yet how can he comply strictly with the corporation tax law if he does not? How will he be able to tell just how much of the "income received" has been expended for operating expense when his balance sheet at the end of the year shows a large amount invested in stores? If the company has borrowed any money during the year and paid it out indiscriminately for operating and construction bills, how can he tell without a special receipt and disbursement book just how much of his total expenses has been paid from loans and how much from "income received"? Obviously, under a strict construction of the law, he cannot deduct expenses unless they have been paid out of "income received."

Many similar points will occur to those who have been studying the subject, and it is to be hoped something can be done to minimize the friction bound to arise with the Internal Revenue Department. It seems to me a subject which the classification committee is peculiarly fitted to handle, and possibly the aid of the Interstate Commerce Commission might also be enlisted to prevent much of its own good work from being hampered or destroyed.

ACCOUNTANT.

HISTORY OF CARBON BRUSHES

Carbon brushes were invented by Professor Forbes, and were first manufactured on a commercial scale in 1889 by Le Carbone Company, of Paris, France. It was not until the Crystal Palace Exposition in 1893 that efforts to introduce this then radical departure in brush design met with any degree of success. At that time the publishers of the *Electrician*, of London, realizing the advantages to be gained by the use of carbon brushes, and being desirous of bringing this knowledge more closely before designers, opened the columns of their publication to a discussion of the merits of carbon as a brush material. Many prominent men contributed to this discussion, among whom were Sir David Salomons and Lord Russell, who had obtained excellent results with Le Carbone carbon brushes. This interchange of ideas gave the necessary impetus to the invention, and since that time carbon brushes have been adopted for all types of dynamo-electric machinery.

Le Carbone Company has been favored at all times with the friendly collaboration of the leading designers in Europe, and for several years past of those in the United States. In order to meet the varying conditions brought to its notice by users, a comprehensive range of qualities has been developed, embracing every type of electrical machine. Because of this wide experience, Le Carbone Company is able to supply brushes having special qualities which will satisfactorily meet almost any condition of commutation or current density. Le Carbone brushes of each grade are claimed by the manufacturers to be absolutely uniform as to their mechanical and electrical characteristics. Special types of brushes are made to overcome com-

mutation or other troubles, and when the need arises for a brush of particular construction Le Carbone Company is prepared to place its experience of 20 years in this work at the service of its customers.

SIGNALS ON THE YOUNGSTOWN & SHARON STREET RAILWAY COMPANY

The Youngstown and Sharon division of the Mahoning & Shenango Railway & Light Company maintains an inter-urban service between the points named, a distance of 14.5 miles, at a schedule speed of 20 m.p.h. Through cars leave each terminus every half-hour, the time of running being 53 minutes, with a 2-minute layover at Youngstown and a 10-minute layover at Sharon. The line is single-track, and cars pass regularly at the turnouts, or switches 4, 7 and 11, numbered consecutively from Youngstown. The running time between each switch is about 15 minutes. There are also other turnouts used as extra passing points when required. The track is laid with T-rails outside of the city, with spring switches which may also be thrown by hand. The trolley wire is No. 00, figure 8, with side pole and span construction and wood strain insulators.

At Hubbard Junction, switch 7, about 8 miles from Sharon, there is a branch to New Castle, between which and Hubbard Junction cars run hourly each way. The car house is located at Masury, switch 11, and the repair shop at Hazelton, outside of Youngstown. There are industrial establishments on the line of the road at Masury and between switches 10 and 11. An express freight service is maintained between Sharon, Youngstown and New Castle, on which service, as also with that for passengers, double-heading is used in times of heavy traffic, the first section carrying green marker flags and the last white.

An idea of the varied traffic may be obtained by consider-



Automatic Signal at Switch in Hubbard, Ohio

ing the following schedule of regular daily trips one way on the single-track block, 2¼ miles long, between switches 10 and 11, where most cars pass.

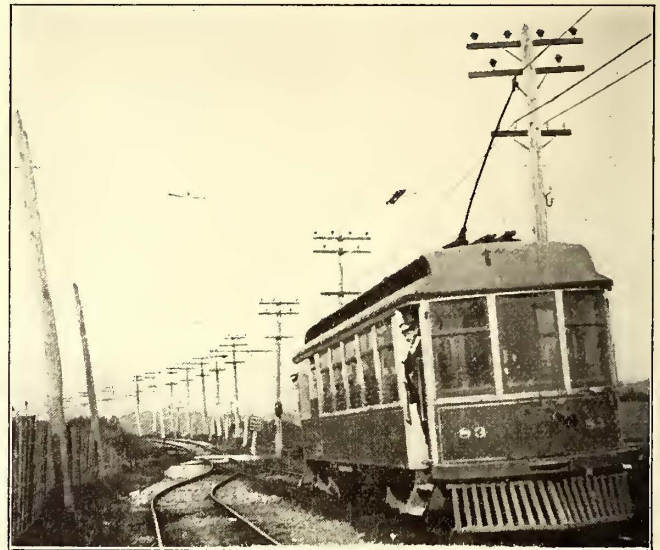
Through cars, half-hourly schedule.....	40
Trippers	12
Freights	4
Sprinklers	2
Work trains	4

62

Thus a total of 114 trips daily is made by the regular cars alone, not counting other trips of the work train and line car, the weekly end-for-end reversal of the Sharon local cars between the car house and the "Y" at Hubbard

Junction, together with the double-heading with extra traffic. There is a dispatcher at Masury and Hubbard Junction, and telephone boxes are located at the switches, to permit crews to call up the dispatcher in an emergency, but not vice versa.

At the regular passing points there are either hand or automatic signals. The latter were designed by the com-



Automatic Signal at Switch No. 10

pany, and have been in use about two years. They permit but one car in the block at a time, so that if two or more cars follow in, the first out pulls down the trolley to hold the block for cars following. Indications are by lamps only, which under certain voltage and lighting conditions are hard to distinguish.

As the nature of the traffic between switches 10 and 11 frequently results in four or five cars following each other, a car-counting system is required. The railway company more than a year ago installed the Nachod automatic signal on this block and on that between switches 6 and 7, each block being about 1 mile long. The balance of the line is now being equipped with the same type of signal. A description of the system is given herewith.

The installation comprises at each end a signal box, fuse box and two trolley contact switches on the double-track part. The latter consists of two inclined contact strips, one connected to trolley and the other to ground through the relay, the trolley wheel bridging them and forming a temporary connection. These contact switches have no moving parts, and, not being sensitive to the direction of the cars, are placed on parts of the double track on which cars run in only one direction.

The signal indications are given simultaneously by a lamp and a semaphore disk of the same color, making them independent of conditions of light or voltage fluctuations. When there is no car on the block of single track, the signals are at no indication, or "dark." The motorman about to take the block runs under the "on" contact switch and sees the white light and white semaphore appear before he passes the signal box. This is an indication that the red signal is displayed at the other end to protect him from a car entering against him. When this car leaves the block it clears the signal when running under the "off" switch. A car at the other end, which may have been held up by the red signal, may now enter the block in the same way, setting the signals oppositely, and will clear them again on passing out.

The motorman of a second car approaching the block before the first has left it will see a white signal, which indicates that the block has at least one car on it going in the same direction. The second car will, therefore, enter the block, producing no change in the signals, except a blinking of the white light as it runs under the switch, to indicate registration, and so on for each successive car that enters that block. During all the time the block is occupied the red light and red semaphore show at the far end, so that the signal system maintains an absolute block at the red end and a permissive entrance at the white end. When these cars leave the block, one by one, the indications are unchanged until the last one leaves, when the signals are cleared. When the red signal is displayed the "on" switch at that end is cut out of operation, thereby preventing any change by a car wrongly entering. Should a car, having set the signals, not pass through the block, but back out the other track, the signals will be automatically cleared.

The signal box is a cast-iron, weatherproof case mounted on a pole and facing outward toward the double track. It contains the lamps and semaphore disks in the upper part and the oil-immersed relay in the lower. The upper portion has openings for a red and clear lens, behind which are lamps, and for a roundel of clear glass which shows a white or a red semaphore disk when the signal is set, and a void when the signal is dark. All connections are made with No. 12 weatherproof, insulated hard-drawn copper wire, and a single line wire of the same is run the length of the block, connecting the boxes.

Owing to the satisfaction these signals have given, the railway company has placed an order for the complete equipment of the division mentioned, comprising 24 additional boxes, and contemplates still further signal extensions in the future.

PLIABLE INSULATING MATERIAL FOR FLOORS

The success with which "Electrose" insulation has met for line work and other electrical purposes has led to its adoption for insulating flooring. The "Electrose" pliable insulating flooring, which was recently invented by Louis Steinberger and placed on the market by the Western Electric Company, is already being used extensively in connection with high-tension switchboards, and as a protective covering for floors and walls adjacent to high-tension apparatus. Two strong points made for this flooring are that it has both extraordinary dielectric properties and a uniform composition. Its dielectric strength may be judged from the fact that on an official test a slab 12 in. x 12 in. x $\frac{3}{8}$ in. arced over at 89,000 volts without puncturing. The material is permanently pliable, tough, strong and waterproof. It possesses a dull surface which will not become smooth or slippery from wear, and is made in various colors for practically any size or thickness.

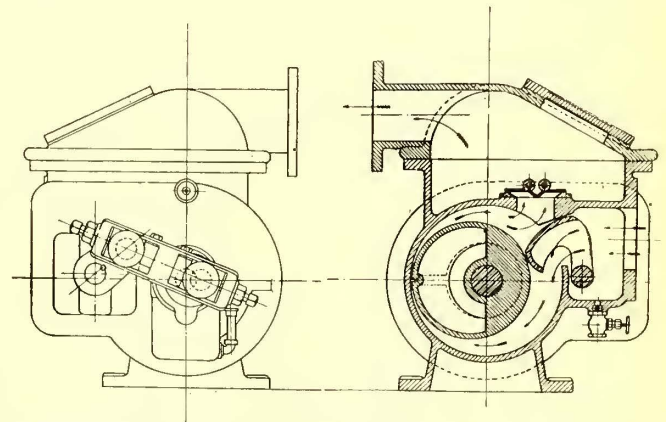
The material conforms to any inequalities of a floor upon which it is laid, but while the standard form is pliable, it can be made very hard and inflexible. When installing the covering the slabs are placed on the floor or secured to a wall and spaced about $\frac{1}{4}$ in. apart. A cement made of the same material is then poured, or otherwise applied, between the slabs. When this cement "sets," within, say, 10 minutes after application, the homogeneous mass thereby formed becomes an integral part of the slabs.

This flooring may be sawed, planed or drilled and nails may be driven through it without danger of cracking or other injury. The material naturally clings to the floor or other surfaces upon which it is laid, and does not curl at

the edges or corners. Hence it is not essential to secure the material to the floor, except under certain conditions, such as when the slabs are small and it is necessary to keep them from moving along the floor surface.

IMPROVED HIGH-VACUUM AIR PUMP

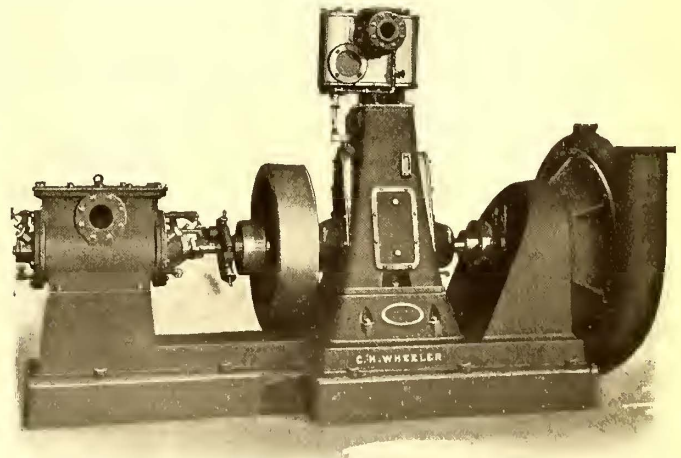
The C. H. Wheeler Manufacturing Company, Philadelphia, Pa., has recently developed a new type of rotary high-vacuum air pump for condenser purposes which occupies much less space than other types of pumps commonly used. It also has the advantage of being adapted for direct connection to one of the other auxiliaries, as shown in the



End Elevation and Cross-Section of Rotary Air Pump

accompanying engraving. This cut shows a Rotrex air pump and a centrifugal circulating pump direct connected to opposite ends of the shaft of a high-speed vertical engine.

The construction of the Rotrex air pump is very simple. It consists of a light cylindrical casing and a single rotor eccentrically mounted on a heavy steel shaft carried in ring-oiled outboard bearings which are independent of the



Rotary Air Pump and Circulating Pump Driven by Single Engine

stuffing boxes. Division between the suction and discharge in the pump cylinder is made by means of a radius cam which is carried in independent bearings and is operated by a connecting rod and crank arm from the rotor shaft outside of the pump. By this arrangement internal contact is entirely eliminated. The rotor operates with a close clearance between the bore of the pump and the cam maintains a close clearance with the rotor. An ingenious arrangement of ports provides for a water seal of the clearance spaces at all times. This produces a high vacuum, not

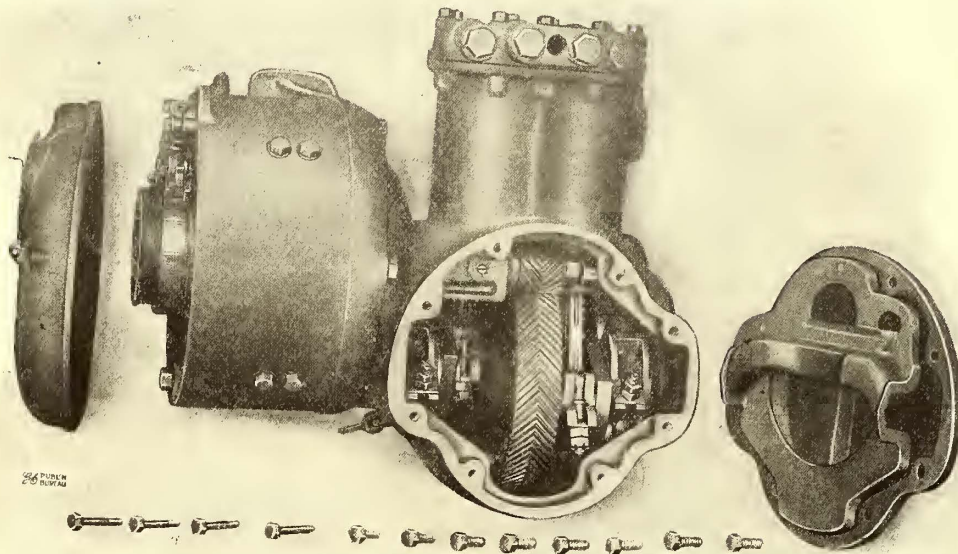
possible with surface contact or sliding fits. No suction valves are used, thus eliminating one source of expensive maintenance. Due to the high speed at which it is operated the over-all dimensions of the pump are small. The pumps are made in sizes from 50 hp to 5000 hp in single units. For larger sizes two units are mounted on opposite ends of an independent air-pump engine shaft.

NEW AIR COMPRESSORS

The General Electric Company is making a new motor-driven air compressor in three sizes for 600-volt service—the CP-27, CP-28 and CP-30, rated respectively at 15 cu. ft., 25 cu. ft. and 35 cu. ft. piston displacement. While primarily designed for use on electric cars and locomotives, these compressors are equally suited for stationary work where an intermittent supply of compressed air is desired. A substantial frame casting completely encloses all working parts and contains both the motor and crankshaft bearings. Securely bolted to this casting is the motor frame, which simply supports the pole pieces and brush holders. The

brush holder and the frame is unusually large, thus eliminating the possibility of grounding from deposits of carbon dust on the brush holder insulation. The brush holders are adjustable for commutator wear and are interchangeable. The oil deflectors on the armature shaft divert any oil that may pass the motor bearing into a pocket, from which the oil returns to the crankcase. A light frame head bolted to the motor frame protects the interior of the motor. A cam-locked, accessible dust-proof door in the frame-head permits convenient inspection of the brushes or the commutator. The motor frame interior is free from dust-collecting pockets, and by removing the frame-head it can be thoroughly and quickly cleaned by an air blast. The armature can be quickly removed by turning the brush holders back, taking off the motor frame head and loosening the pinion nut, without having either to remove the compressor from the car or to touch the crankshaft or the gear.

The compressor frame consists of one casting, containing all motor and crankshaft bearings. A large opening is located directly over the crankshaft, provided with a removable cover to permit of convenient inspection of the gearing, connecting rods and crankcase. The two cylinders, forming an integral part of the frame casting, project horizontally, so that the maximum heat dissipation is obtained. The cylinder heads are formed by a single casting secured to the cylinder by tap bolts. There is one inlet and one outlet valve in this head for each cylinder. The valves operate in a vertical position, and are of the tubular type. The intake air passages have liberal areas and are arranged so that



Motor-Driven Air Compressor with the Covers Removed

clean air may be taken from the inside of the car. An air strainer is provided for the receiving end of the intake pipe. The vent to the crankcase opens to atmosphere at the bottom side of the compressor, where it is impossible for dirt to collect and work into the machine. A standpipe rises from this vent hole into a large hood pocket in the frame casting, which makes the escape of oil through the pipe impossible. A drain plug at the bottom of the frame casting completely drains the crankcase.

The motor frame is an independent cylindrical steel casting bolted to the compressor frame. Four laminated steel pole pieces are held to the frame by two bolts, the heads of which are outside the frame and readily accessible. The four field coils are held by spring steel flanges clamped between the pole pieces and the frame. The armature is of standard railway construction, and the commutator is exceptionally large. The brush holders are thoroughly insulated from the frame. The creepage surface between the

gear is in the center of the crankshaft, and as the gearing is entirely enclosed in the crankcase, a separate gearcase is unnecessary. With this construction the dimensions of the motor are not limited by the distance between gear centers, and therefore it is possible to design a motor with electrical characteristics better suited for the service required. Since the motor dimensions are not limited by mechanical considerations, it is possible to use four salient poles as in railway motors. Better commutation is thus obtained than is possible with the consequent pole construction necessary in former compressors.

The bearings for the crankshaft and connecting rods have hinged caps. After removing the armature and taking off the crank chamber cover the crankshaft can be removed by swinging up these caps and then lifting the crankshaft out. All bearings and working parts are automatically lubricated from a well in the compressor frame below the gear. This oil well has one oiling filler, consisting of a projecting elbow fitted with a handle plug, so designed that any dirt collected around it is lifted off when it is unscrewed, thus preventing dirt from entering the oil hole. This oil filler is accessible from the car side, and is

of such a height as to insure a proper oil level in the crankcase. The driving gear picks up oil from the well and throws it in a steady stream into an oil pan riveted to the inside of the crank chamber cover. Oil distribution to bearings is effected through large channels in the oil pan, from which the oil flows into the various bearings. No oil waste or oil rings are used, and there are no pipes or small holes to clog with oil sediment.

The gear and pinion have herringbone teeth. The pinion is secured to the armature shaft on a taper fit, allowing the pinion to be readily removed after loosening the pinion nut. The gear teeth are formed on forged rims, riveted together and bolted to a central hub made in one piece with the forged steel crankshaft, so that the gear can be readily replaced at small cost. Since gear and pinion are located centrally between the cranks, the bearing pressures are practically constant in direction, and as they do not oppose gravity are very uniform in amount. Hence wear on the bearings is largely reduced, the operation of the gears is noiseless and free from vibration, bending strains are eliminated, and the most efficient driving arrangement is obtained. The crankshaft and armature shaft bearings are in the same casting, so that a perfect mesh of the gear with the pinion is obtained at all times.

The standard compressors are intended to operate on an intermittent basis, the total running time not exceeding 30 minutes in each hour. The compressors are also made in the 25-ft. and 35-ft. sizes for 1200-volt d.c. railway systems. Such compressors can be operated for 30 minutes out of each hour on 1200 volts, and when used in service requiring both 1200-volt and 600-volt operation will operate at approximately half-speed at the lower voltage for a period of 50 minutes out of each hour.

The general dimensions, weights, speeds and capacities of these compressors are given below when working against the tank pressure of 90 lb. per square inch:

	CP-27	CP-28	CP-30
Piston displacement cu. ft. per minute.....	15	25	35
Voltage	600	600	600
R.P.M. of compressor	200	203	182
R.P.M. of motor	1100	1100	1025
Amperes input, approximate.....	4.3	7.0	8.5
Cylinder diameter	4 3/8"	4 3/4"	5 1/2"
Stroke of pistons	4 7/8"	6"	7"
Intake pipe	1"	1 1/4"	1 1/2"
Discharge pipe	3/4"	1"	1 1/4"
Length over all.....	29 1/2"	33 5/8"	36 1/4"
Width over all.....	25"	29"	35 1/16"
Height over all.....	18"	20 7/8"	24 1/8"
Weight, approximate in pounds.....	575	880	1100

SERVICE RECORDS OF ROLLED AND FORGED STEEL WHEELS

The following data on the life of rolled and forged steel wheels have been furnished this paper by the Carnegie Steel Company, Pittsburgh, Pa.:

The first solid rolled and forged steel wheel made by the Schoen Steel Wheel Company under the patents of Charles T. Schoen was rolled on Oct. 5, 1903, at McKees Rocks, Pa., in what is now known as mill No. 1 of the Schoen Steel Wheel Works of the Carnegie Steel Company. This wheel was rolled and forged from a cast-steel blank, and in spite of the defects inherent in all steel castings wheels made from cast blanks gave excellent service owing to the work which they received in the process of manufacture.

A few of these early wheels were put in use on the Intramural Railroad at the World's Fair, St. Louis, Mo., in 1904. On this road 56 cars were operated at an average speed of 12 miles per hour for 177 days, each car averaging 138 miles a day. After the close of the Fair the wheels

under these cars were bought by the Metropolitan Street Railway Company, Kansas City, Mo., and put in service under St. Louis Car Company's type 47-A trucks carrying cars with an approximate total weight of 49,280 lb. The service in which these cars were run was 60 per cent city and 40 per cent interurban with an average grade of 3.25 per cent and a maximum grade of 6.3 per cent. Wheels Nos. 344 and 345 were placed in service in February, 1905, and ran together 222,727 miles. They were turned twice and taken out of service in 1908 on account of their diameter being too small to permit the motors clearing the paved streets. The total mileage of these two wheels in St. Louis and Kansas City was 247,200. The wheels under car No. 230 had made 210,000 miles, under car No. 236, 220,000 miles, and under car No. 249, 230,000 miles in Kansas City alone and were still in service on June 1, 1909. The average life of a cast-iron wheel on the same road under the same conditions was 46,000 miles.

The manufacture of Schoen steel wheels from cast-steel blanks was superseded about December, 1904, by the present process of manufacture which substitutes steel slabs for the cast-steel blanks originally used. By reason of the rolling in the slabbing mill these blanks receive a considerable amount of work before they reach the wheel plant, which fits them more perfectly for severe service. The slab is first heated, subjected to forging under a hydraulic press of 7000 tons pressure and sheared to a circular form, the hub being raised in this first forging by acorn-shaped dies. The steel is then reheated and forged under a second hydraulic press at 5000 tons pressure. This forging produces the rough contour of the flange, and before the wheel is withdrawn from the press the rim alone is subjected to an extra forging operation. From the second forging press the wheel passes to the punch, where the metal left in the center of the hub by the acorn dies is removed. It is then heated to a wash heat in a heating furnace and passes to the rolling mill, which rolls the webs and the front, back and tread of the rim. Thence it passes to the coning press, where it is dished and made truly round under 1200 tons hydraulic pressure. The wheels for freight service are rolled to a finish only, but wheels intended for street or interurban railway service are further machined on the treads, so as to insure correct contour, and on the front and back of the hub. They are then rough bored and the tape size or circumference of the wheel is stenciled on the web.

Excellent as the service of the wheels manufactured from cast-steel blanks has been, the service of a solid wheel rolled and forged from a steel slab is better. Only a few wheels have been taken out of service and replaced because of lack of endurance in the metal. On the Alabama City, Gadsden & Atalla Railway, Gadsden, Ala., a pair of Schoen wheels have run 70,000 miles with a wear of less than 1/16 in., confined entirely to the tread.

A pair of 34-in. Schoen steel wheels in service on the elevated division of the Interborough Rapid Transit Company, New York, have run 60,400 miles without turning, showing a wear of only 1/16 in. per 12,080 miles run. The service on this road, owing to the high speeds and the frequent stops, with consequent rapid acceleration and retardation, is exceedingly severe.

Schoen steel wheels Nos. 37204 and 37221 have run together on the same axle under severe conditions on another elevated railroad in the East 89,638 miles in two years' time, and are not quite ready for the first turning. The approximate number of stops for these wheels to date is 268,914, radial wear 13/32 in. on one wheel and 15/32 in.

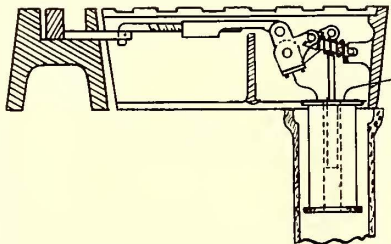
on the other, giving approximately 13,790 and 11,951 miles per 1/16 in. of wear.

The material which composes the Schoen steel wheel is homogeneous, and the extent to which the rim may be worn depends on the thickness of the rim, the diameter limit for clearance and the care taken to produce longest life. With due care, the loss of the wearing body may be greatly reduced and the ability to increase or decrease the value of the wheel in service is largely in the hands of the user. With wheels mated according to their tape sizes, finished bore smooth and true, the center line of the wheel coincident with the center line of the axle upon which it is mounted, with truck square and brake rigging kept in proper adjustment, it is reasonable to expect a large mileage and low expense in maintenance and repair.

Since the Schoen Steel Wheel Company was purchased by the Carnegie Steel Company, in July, 1908, it has been the constant endeavor to standardize so far as possible types of wheels for street railway, interurban and elevated railroad service. A number of standard street railway wheels have been designed in accordance with the recommendations of the American Street & Interurban Railway Association, with the essential purpose in view of decreasing the cost of manufacture and making these wheels economical to use under all conditions of service.

ELECTRIC SWITCHING DEVICE FOR STREET RAILWAYS

The C. W. Squires Manufacturing Company, Beverly, Mass., is placing on the market a new electric switching device for street railways, which has been given a thorough trial on a number of roads in New England during the past year, among them the Connecticut Company and the Boston & Northern Street Railway. The mechanism has been designed with the view of obtaining simplicity and positive action. As will be seen from the accompanying sectional drawing, the switch tongue is moved by a double-acting solenoid magnet which stands in a vertical position, thus doing away with friction and wear on the magnet tube. The plunger of the solenoid is connected to one arm of a pivoted bell crank. To the other arm of this crank is attached a yoke and adjusting screw connected to the switch tongue. The operating magnet is suspended in a section of standard drain tile below the bottom of the switch box. No sewer connection is needed, as the solenoid will operate equally well if covered with water. A compartment in the switch box catches any dirt which might wash in under the cover, and it is easily removed when necessary by lifting the lid of the box.



Sectional View of Electric Switching Device

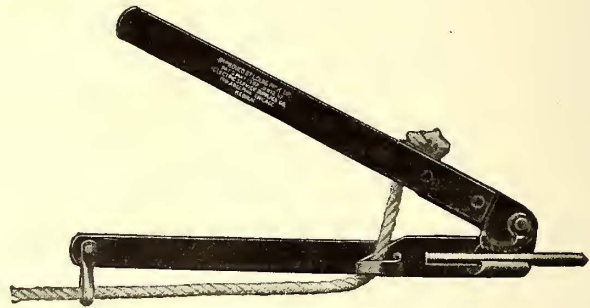
The circuit-controlling mechanism consists of a magnet coil inserted in the car circuit. When this magnet is energized it lifts an armature which makes a contact from the trolley wire, through the operating solenoid to ground. About 2 amp is required in the operating circuit, and no resistance coils are needed. The trolley contactor consists of a section of angle iron about 18 in. long electrically connected to the trolley wire through the controlling magnet. A car can stand with the trolley wheel under the contactor for any length of time, it is claimed, without in-

jury to the mechanism. Only a single wire is used between the controlling magnet and the operating magnet, as the latter is entirely automatic in its action.

With this device a switch may be passed by a car climbing a steep grade without throwing off the power and coasting. Neither does the current required for the light, heaters or air compressor on a car affect the proper working of the switch.

TROLLEY WIRE PICK-UP

A broken trolley wire is often the cause of serious delay to cars, especially if the car crews are not supplied with a device for handling a live wire or the emergency wagon is stationed a long distance from the break. The accompanying engravings show the improved St. Louis trolley



Trolley Pick-Up, Ready for Use

pick-up device recently designed and now being sold by the Electric Service Supplies Company, Philadelphia and Chicago.

The two handles are made of hard fiber, hinged together at one end by malleable iron castings. One casting is made with a jaw and the other with teeth, so that when grasped between them the trolley wire is firmly held in place and in a perfectly straight position. The wire is not bent, therefore, when the strain is applied. The rope provided with each pick-up is fastened to the malleable iron casting of the upper handle and passes through an eye in the casting of the lower handle, and from this eye through a second eye at the end of the handle, so that the harder the rope is pulled the stronger the wire is gripped. All of the pulling strain comes on the malleable iron jaws, and no strain is put on the fiber handles.

In case a trolley wire breaks it is gripped in the jaws of the pick-up, the loose end of the rope thrown up over the limb of a tree or other support, the wire drawn up and the rope fastened. This allows a car to proceed without waiting for a repair wagon. Each improved pick-up is furnished with 50 ft. of either cotton or manila rope, making a bundle only 18 in. long which can be conveniently placed under the seat of a car.

Several railways are equipping their cars with a pick-up of this type and, it is said, they have found the small expense of this device is more than saved in the delays which it overcomes.

The Ganz steam motor car built by the Railway Auto Car Company and tested by the Chicago, Rock Island & Pacific Railroad about a year ago has been returned to the railroad fitted with a new Ganz engine of low steam pressure and a new Baldwin boiler and superheater. The car will shortly be placed in service on one of the company's branch lines.

HIGH TENSION PORCELAIN INSULATOR

To meet the demand for insulators suitable for high-tension transmission lines carrying current at from 70,000 to 100,000 volts the Ohio Brass Company, Mansfield, Ohio, has recently designed and put on the market the suspended type of insulator shown in the accompanying engraving. Cost, weight, size and efficiency were all considered in the design. This type of insulator was recently selected by the Hydroelectric Power Commission of Ontario, Canada, for use on its 110,000-volt transmission line after a very exhaustive investigation and series of competitive tests of a number of patterns submitted.

The design of the lower surface of each porcelain shell is such as to confine the static discharges to an area immediately surrounding the forged stud until the voltage impressed has approached that of flash-over. The operation of the insulator is very quiet up to flash-over. Only the best grade of Portland cement is used in assembling the parts. The electrostatic capacity is small, as each unit consists of a single porcelain shell (in place of several shells), a malleable iron cap and a forged steel pin.

The mechanical breaking strain of this insulator is approximately 9500 lb. to 10,000 lb., which allows ample factor of safety for normal conditions. The weight of each unit complete with cap and forged stud is $10\frac{1}{4}$ lb. and when assembled the distance between the edges of adjacent porcelain shells is $6\frac{1}{4}$ in. The length of two assembled units, from center of eyes in top unit to lower edge of forged pin in lower unit, is $13\frac{9}{16}$ in. and each unit added increases the length by $6\frac{1}{4}$ in.

Each assembled unit when tested dry will flash over at approximately 95,000 to 100,000 volts, and under a heavy precipitation of 0.3 in. to 0.4 in. of water per minute at an angle of 45 deg. will flash over at approximately 50,000 to 55,000 volts. When tested under oil it punctures at approximately 120,000 to 150,000 volts. Each insulator is tested to 6000 lb. before packing and is given a flash-over test after the mechanical test, in addition to a severe electrical test before assembling.

In an assembled condition of two units with a separation between the porcelain shells of $6\frac{1}{4}$ in. the flash-over dry is approximately at 175,000 volts and each unit which is added increases the flash-over approximately 75,000 volts. Two units under 0.3 in. to 0.4 in. precipitation per minute flash over at approximately 110,000 volts and each additional unit increases the precipitation flash-over by approximately 45,000 volts.

Representatives of the steam railroads and a number of Government officials have joined in a co-operative plan to conduct an inquiry into the physical properties and methods of manufacture of steel rails to ascertain what can be done to improve the rails now purchased.

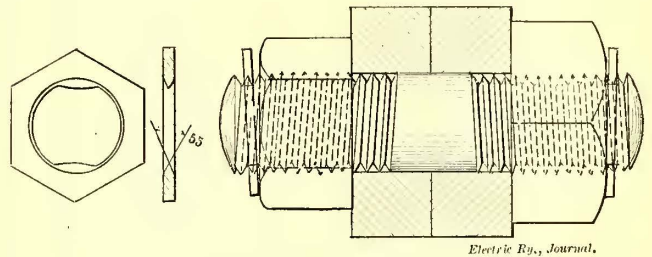


High-Tension
Porcelain
Insulator

A NEW LOCK WASHER

A new nut lock, or more properly a lock washer, has recently been placed upon the market by the United Lock Washer Company, Springfield, Mass. It is known as the Hugtite and is claimed to possess a number of advantages over other styles of nut lock or washer.

As illustrated in the engraving, it consists of a hexagonal disk of metal from the hole in the center of which are two opposite tongues projecting for the purpose of engaging the bolt thread. The washer is put on over the end of the bolt outside or after the nut, and not between the nut and bolt seat, as is usually the case. It is then screwed up by hand until it has reached the face of the nut, which is assumed to be first firmly screwed to place. Then a slight turn of the wrench is sufficient to fix or jam the washer to a lock. The rim of the washer is amply sufficient for wrench use, while not as thick as lock nuts now in use.



A New Lock Washer

Hence the saving in bolt length by using this washer is obvious, a not inconsiderable item for large consumers.

The Hugtite is patented and made in all sizes of suitable stock. In tests it has been found to withstand successfully jars and vibration as well as contraction and expansion. It is equally well adapted to right or left-hand thread of the same pitch and diameter.

It has been used by the Springfield Street Railway and Worcester Consolidated Street Railway in track work and other service and has also been successfully tested on steam railroads, autotrucks, drop hammers and machinery subject to considerable vibration.

The manufacturers will make an exhibit at the Denver convention.

IMPROVED RADIAL COUPLER FOR INTERURBAN CARS

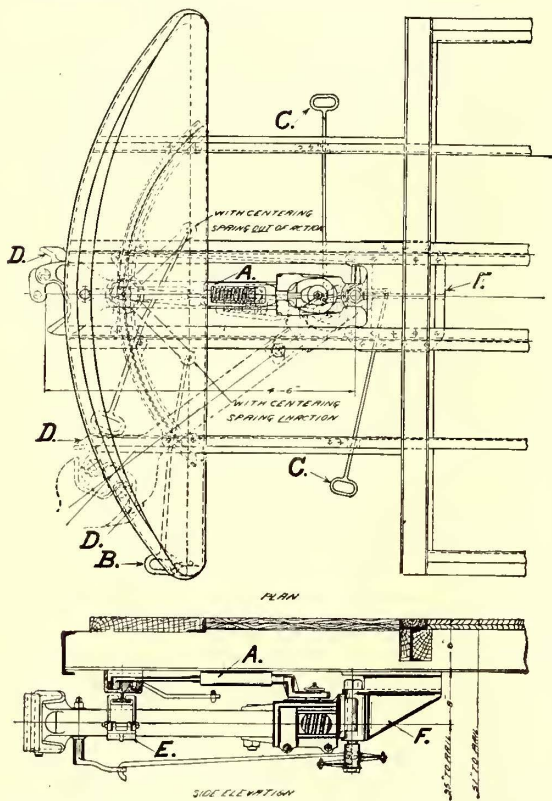
Since the Janney radial coupler was brought out by the McConway & Torley Company, two years ago, it has been applied to a large number of cars in interurban service. Experience with the first equipments put in service has suggested a number of improvements and modifications, which have been incorporated in the device as now made. The engraving on the next page illustrates the application of the coupler in its latest form to an interurban car of the ordinary type.

The coupler head is of the steam railroad M. C. B. standard type, with the addition of a lug, *D*, cast on the side back of the knuckle pin, to engage with the point of the guard arm of the connecting coupler, and thus prevents buckling when the cars are pushed around sharp curves. The couplers are interchangeable with all steam railroad couplers, and cars equipped with them may be run in steam trains without any adjustment or modification. The M. C. B. contour lines of the knuckle and head permit of the operation of 50-ft. interurban cars with the usual overhang over sudden changes of grade of from 6 to 7 per cent. If it is necessary to provide for greater vertical variations

the equipment can be furnished with a spring carrier, but the use of this is not recommended, as this carrier does not operate unless the coupler heads are bound together, and the free vertical movement of the two couplers within each other is prevented.

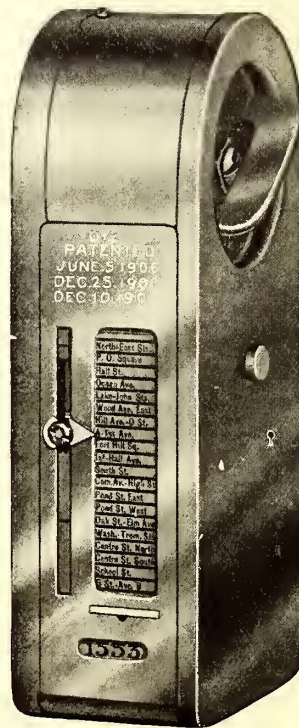
Two couplers of this type will couple automatically by impact on straight track, and by means of the rods *C* may be uncoupled on either straight or curved track without going between the cars. The position of the rods *C* is not affected by lateral movement of the coupler head, as they are attached to a crank pivoted under the swiveling pin by which the drawbar is fastened to the underframe. They project out to the side under the platform steps.

Under normal operating conditions the coupler is held in position under the center line of the car body by the centering spring and rod *A*. When it is desired to couple cars standing on curves the tension on spring *A* can be released by means of rod *B*. The coupler head can then be



Plan and Side Elevation of Radial Coupler and Attachment

slot of the machine, moves the destination hand to the proper transfer point and turns the handle of the machine once around. This pushes out a transfer, properly numbered and punched as to date, time and destination. The time is indicated by an automatic clock enclosed within the machine, which prints the exact time at which the transfer was issued. The machine registers the number of transfers issued, and the conductor at all times can tell how many transfers have been issued and how many remain in the machine. Each conductor receives a machine fully charged on starting to work, and turns it in to the receiving clerk with his cash and trip sheet at the end of the day. No one but the receiving clerk, who is supplied with a key, can open the machine to insert or remove transfers or cash. The cash inserted in the machine to issue transfers remains in it until removed at the office. The machine cannot be operated until unlocked by the insertion of a nickel in the slot, and if any other coin than a nickel or any foreign article is inserted the machine locks itself and thus furnishes proof of tampering with it.



Transfer Issuing Machine and Reproduction of Sample Transfer as Punched

W. & A. St. Ry. Co.	
NORTH-EAST STS.	
P. O. SQUARE	
HALL ST.	●
OCEAN	AVE.
LAKE-JOHN STS.	
WOOD AVE. EAST	
HILL AVE.-O ST.	
A-1st Ave.	
FORT HILL SQUARE	
1st-HALL AVE.	
SOUTH ST.	
COM. AVE.-HIGH ST.	
POND ST. EAST	
POND ST. WEST	
OAK ST.-ELM AVE.	
WASH.-TREMONT STS.	
CENTRE ST. NORTH	
CENTRE ST. SOUTH	
SCHOOL ST.	
G ST.-AVE. B	

Good only at transfer points cancelled, on next connecting car at time indicated. Subject to Company's rules.

Transfer issued only when fare is paid.

Not Transferable

moved laterally to either side. After coupling the centering spring can again be put in tension and locked by a pull on rod *B*.

A TRANSFER ISSUING MACHINE

The auditing and checking of transfers on a large street railway system is unsatisfactory at best with the ordinary method of issuing and accounting for them. The machine shown in the accompanying engraving is intended to give the auditing department of a street railway the same control over the sale of transfers as is exercised by the auditing department of a steam railroad over tickets sold at stations by agents. The machine does automatically all that a conductor does when issuing a transfer in the ordinary manner.

The conductor on receiving a cash fare from a passenger desiring a transfer inserts the fare in the receiving

Only one transfer can be taken out for each nickel inserted.

On lines issuing transfers on tickets the conductor uses one of the cash fares received from a passenger who did not ask for a transfer to insert in the machine and substitutes the ticket for the cash in making up his record of cash and tickets as shown by the fare register.

The machine is 7 in. high, 2 in. wide and 3 in. deep, or about the size of a folding camera. It weighs 2½ lb. and is carried on a strap over the shoulder of the conductor. The capacity of the machine at one charge is 250 transfers and it may be recharged in two minutes. The makers claim that transfers can be issued with one of these machines more rapidly than when punched by hand in the ordinary way.

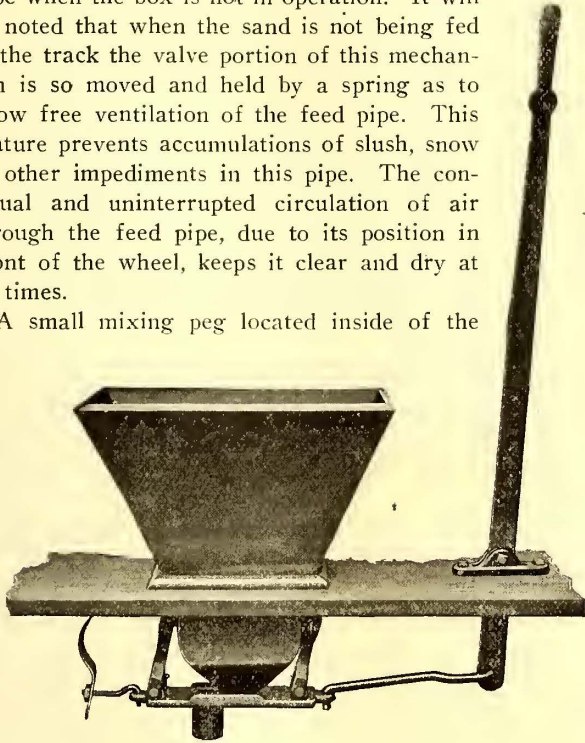
This system of issuing transfers is patented by the Transfer Issuing Machine Company, Boston, Mass., which makes and leases the machines to street railway companies.

NEW SAND BOX

The accompanying illustration shows a new sand box recently brought out by the Western Electric Company, which has been successfully used on the cars operated by the Richmond Light & Railway Company for some time.

The accompanying view shows the position of the feed tube when the box is not in operation. It will be noted that when the sand is not being fed to the track the valve portion of this mechanism is so moved and held by a spring as to allow free ventilation of the feed pipe. This feature prevents accumulations of slush, snow or other impediments in this pipe. The continual and uninterrupted circulation of air through the feed pipe, due to its position in front of the wheel, keeps it clear and dry at all times.

A small mixing peg located inside of the

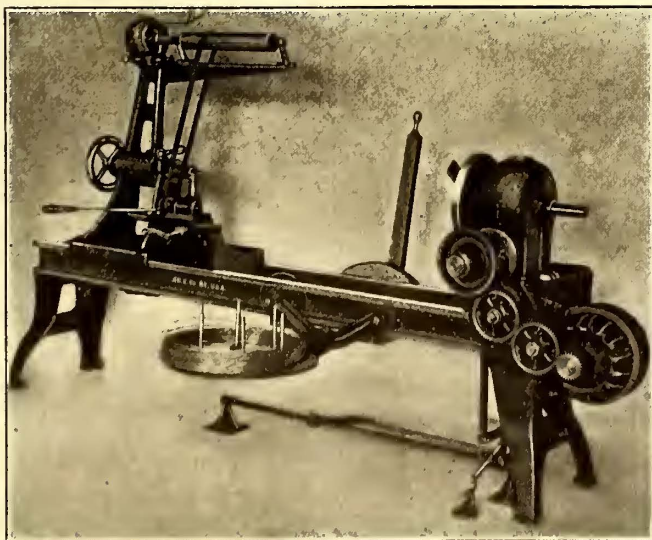


Hand-Operated Sand Box

box at the valve seat prevents the sand from banking at the edges of the opening, and also breaks up any lumps in the sand, so that the moment the valve opens a stream of fine sand flows to the rail. The valve opens through levers, which may be arranged for hand or foot operation.

COMBINATION ARMATURE REPAIR MACHINE

The American General Engineering Company, of New York, has just completed a motor-driven or direct-drive



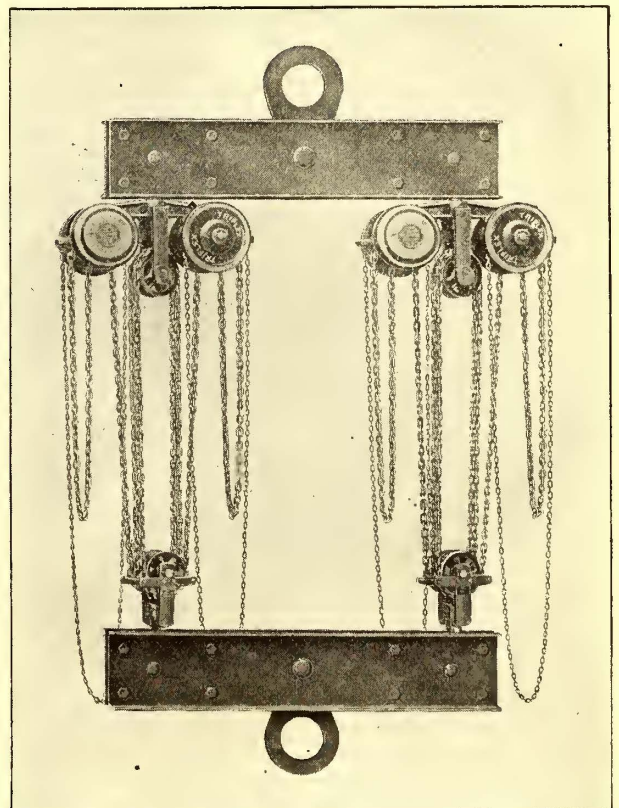
Combination Armature Repair Machine

armature banding machine, which combines its various devices and attachments for slotting, truing and grinding

commutators. A view of the machine showing the gears and motors is presented in the accompanying illustration. A Westinghouse motor is suspended below the headstock and geared to the friction clutch pulley by the set of gears shown, but the machine can also be belt driven by disengaging the gears, which are easily removed. A rheostat is placed in an accessible position in front of the machine, so that the operator can turn the current on or off at will. The commutator slotting device is driven by an independent motor mounted on a slide rest, and is operated by a lever. By changing this slotter the slide can also be used for truing and grinding.

A 40-TON CHAIN BLOCK HOIST

The 40-ton triplex chain block illustrated herewith has recently been developed by the Yale & Towne Manufacturing Company, New York, to meet the demands of engineers for a hand hoist to handle very heavy loads where



40-Ton Triplex Chain Hoist

the installation of an electric crane or powerful steam hoist is not practicable either because of time or cost. The 40-ton triplex hoist is composed of two 20-ton blocks with equalizing bars at the top and bottom. This provides for single point suspension and for a single point for attachment of load. The equalizing bars are made of two channels placed back to back with separators between. Provision is made for the switching of each unit at the top and bottom. The clevises or points of attachment enable the hoist to be put in place easily wherever used, and also afford a convenient point for the attachment of the load. This hoist is especially useful in wrecking work, in manufacturing plants and generally for loading and unloading. It may be installed over railroad tracks on a properly guyed temporary or permanent trestle. Lateral motion may be secured by one or more trolleys running on a large I-beam.

The hand chains are arranged to permit two, four or

eight men to work effectively. Where the load is heavier than the capacity of one hoist, it is generally of sufficient bulk to permit the attachment of two of these 40-ton units to be worked together, and thus giving a total capacity of 80 tons.

COMBINED STEAM SHOVEL AND LOCOMOTIVE CRANE

The accompanying engraving shows a new type of revolving power shovel combining in one machine a locomotive crane for handling all kinds of structural work, either with a swivel hook or lifting magnet, a clam-shell or orange-peel bucket for unloading coal from cars or at stock piles, digging sand, gravel, marl or other soft materials and a revolving power shovel equipped with the ordinary dipper and dipper handle for excavating harder material or for regular steam shovel work. The boom is 36 ft. long and can be raised or lowered to suit different classes of work by means of a cable which operates over sheaves at the point of the boom and is attached to a drum on the deck of the car. This feature is necessary for economy of operation when the machine is used as a crane or with a clam-shell or orange-peel bucket and is of assistance when the machine is being used as a steam shovel. The boom is equipped with a shipper-shaft and pinions over which the dipper handle operates and also a double drum for operating the clam-shell or orange-peel buckets and a counterweight and line for holding the clam-shell bucket

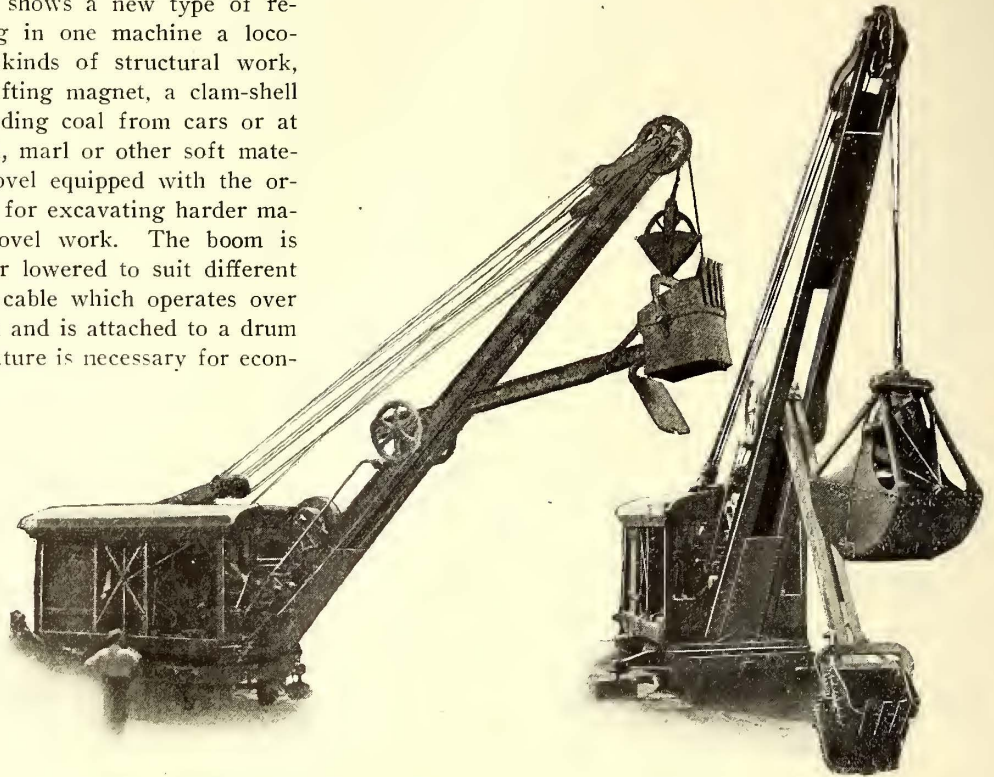
in line with the boom when the bucket is being hoisted.

When used as a steam shovel with dipper and handle it is possible to bring the shipper-shaft to a point within 10 ft. of the rail by lowering the boom. This enables the dipper to dig considerably below the rail and much lower than if the boom were stationary. The dipper can also be raised sufficiently to bring the shipper-shaft 18 ft. from the rail, thus enabling the dipper to dump into cars or wagons on a high bank. This feature is especially desirable for cellar excavating and trench digging. When the boom is in its normal position, which is at an angle of about 45 deg., the shovel will make a cut 48 ft. wide in a 6-ft. bank. It has a clear height of lift of dipper with dipper door open of 14 ft. and will dump out 26 ft. in any direction from the center. Such a wide range of action would be difficult to get in any other type of shovel of this size.

The truck frame of this machine is composed of one solid steel casting practically indestructible, so designed and machine finished as to accommodate either road traction wheels or railroad trucks. The change from traction wheels to railroad trucks or vice versa can be made on the work in less than two hours. The machinery is mounted on a car body 17 ft. 4 in. long x 8 ft. 4 in. wide. The upper body revolves on a cast steel turntable 6 ft. 6 in. in diameter, which carries a machine-finished wheel-path, over which the rollers operate. The rack which swings the car body is a separate steel casting with straight-faced teeth machined to fit and securely bolted to a turntable casting. The car body is equipped with strong cast-steel swinging jack-arms with a spread of 11 ft. 8 in.

The machine is self-propelling in either direction at a

speed of from 280 ft. to 500 ft. per minute on a level track. When used as a locomotive crane it has a lifting capacity of 16,000 lb. at a 22-ft. radius and 7500 lb. at a 38-ft. radius. When used as a steam shovel it has a digging capacity in ordinary material of from 400 to 600 cu. yd. per day of 10 hours. It carries a 1-cu. yd. dipper and a 1½-cu. yd. clam-shell or orange-peel bucket.



Combined Steam Shovel and Locomotive Crane

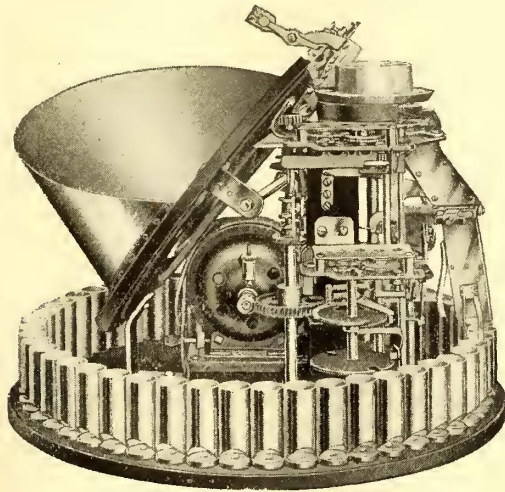
The shovel illustrated is equipped with direct-current, 550-volt motors for electric operation. The hoisting motor is 75 hp and the swinging motor is 30 hp. Both are of the railway type, series wound, with relay magnetic control, solenoid brake, resistance contactors, circuit breakers, etc. The shovel is propelled from the swinging motor and the boom is raised or lowered from the hoisting motor. When steam is used for power a 54-in. vertical boiler, a set of double 7-in. x 6-in. hoisting engines and a set of double 5-in. x 6-in. swinging engines are substituted for the motors and electrical equipment. Otherwise the machinery is practically the same.

This machine was built by the Vulcan Steam Shovel Company, Toledo, Ohio, for the Winona Interurban Railway Company, Warsaw, Ind., and will be used by the purchaser for digging gravel ballast, grading and for handling material in the yards.

AUTOMATIC COIN COUNTING AND PACKAGING MACHINE

The machine shown in the accompanying engraving is designed to automatically count and deposit into either bags or paper rolls any quantity of coins of denominations from pennies to quarters. It is small, rapid, accurate and durable, is only 20 in. in diameter and 16 in. high. A small motor, which will operate on an ordinary electric-light circuit, drives the counting mechanism through a worm gear. The coins are deposited in the hopper shown at the left and are picked up by the inclined feeding wheel which deposits them in the counting head. From the counting

head the coins drop through a chute into the ring of cups, each of which holds a paper roll for packaging. Packages can be made up to hold 50 pennies or dimes or 40 nickels or quarters. If it is desired to deposit the money in a bag after counting the bag is hung under the bottom of the delivery chute. The machine is fitted with two registers, one counting from 0 up to 10,000 and the other counting



Coin Counting and Packaging Machine

from 10,000 down to 0. These counters are so constructed that any or all digits can be set to zero instantly. With these double registers any desired method of checking accounts of cashiers, collectors or conductors can be used, the machine acting in the double capacity of bookkeeper and money packager. The machine is made and sold by the Couch & Seeley Company, Boston, Mass.

1200-VOLT DIRECT CURRENT RAILWAY INSTALLATIONS

The General Electric Company, Schenectady, N. Y., has recently closed a number of important contracts for 1200-volt, direct-current railway equipments. The rapidly increasing use of this system for interurban and suburban lines is shown by the following list of roads using 1200 volts on the trolley which are operating or under active construction:

ternating current to 1200-volt direct current by two 500-kw motor-generator sets. The generator ends of these units are straight 1200-volt machines.

The Pittsburgh, Harmony, Butler & New Castle Railway has been in operation for about one year.

The Southern Cambria Railway, of Johnstown, Pa., will commence operation shortly with four motor cars. There are no substations on the entire 24 miles of road, power being furnished directly from the power station at 1200 volts direct current by two 300-kw, 600-volt, direct-current generators connected in series.

The Sapulpa Interurban Railway, which now operates 600-volt lines in the Sapulpa, is building a 9-mile extension which will be operated with 1200 volts on the trolley. Power is to be furnished for the entire line from the power house at 1200 volts, direct current. Two 200-kw, 600-volt generators driven by gas engines are connected in series. A further extension of some 15 miles will later be built and operated with 1200-volt d.c. trolley.

The Aroostook Valley Railway Company will operate a combined passenger and freight service, using two 4-motor, 50-hp equipments for passenger service and one 4-motor, 75-hp equipment for locomotive service. The entire line is supplied from one substation. Power is purchased at 60-cycle alternating current and converted to 1200-volt direct current by two 200-kw, 60-cycle, 600-volt rotaries connected in series.

The Washington, Baltimore & Annapolis Electric Railway recently decided to change over from the 6600-volt, single-phase system now in use to the 1200-volt, direct-current system to permit the use of smaller cars required for entrance into Washington, D. C., and the operation of a more economical service. Power is purchased as 25-cycle alternating current and distributed to four substations which supply 1200-volt direct current for the entire line and also 600-volt direct current for operation of the terminal in Annapolis. The equipment of the substations includes a varying number of units, each consisting of two 300-kw, 25-cycle, 600-volt rotary converters connected in series.

The Southern Pacific Railroad installation will include the electrification of the suburban lines around Oakland, Cal. Although the length of line equipped is short, the service is extremely heavy. The operation of trains as high as 12

1200-VOLT DIRECT CURRENT RAILWAYS IN THE UNITED STATES

	Mileage	Car equipments	Substation units
Indianapolis & Louisville Traction Company, Louisville, Ky.....	41	13 4-motor 75 hp	*No substations
Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.....	64	16 4-motor 75 hp	7 400-kw motor-generator sets
Southern Cambria Railway, Johnstown, Pa.....	24	4 4-motor 75 hp	*No substations
Sapulpa Interurban Railway, Sapulpa, Okla.....	9	7 4-motor 50 hp	*No substations
Aroostook Valley Railway, Presque Isle, Me.....	12	2 4-motor 50 hp	2 200-kw rotaries
Central California Traction Company, Stockton, Cal.....	16	6 4-motor 75 hp	2 500-kw motor-generator sets
Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.....	60	30 4-motor 75 hp	15 300-kw rotaries
		3 4-motor 125 hp	
Southern Pacific Railroad, Oakland, Cal.....	12	44 4-motor 125 hp	12 750-kw rotaries
Milwaukee Electric Railway & Light Company, Milwaukee, Wis.....	99	15 4-motor 50 hp	12 300-kw rotaries
Shore Line Electric Railway, New Haven, Conn.....	52	12 4-motor 50 hp	6 200-kw rotaries

*Entire line supplied direct from power stations.

The Indianapolis & Louisville Traction Company and the Indianapolis, Columbus & Southern Traction Company operate a combined through service between Indianapolis and Louisville. The 1200-volt section of this road has now been in operation for two years. The trouble due to electrical apparatus is said to have been even less than ordinarily experienced on systems equipped with 600-volt trolley.

The Central California Traction Company has been operating for a little over a year, and the absence of troubles of any character has been particularly marked. This road uses a 1200-volt third-rail of the inverted type. The power is purchased and converted in a substation from 60-cycle al-

ternating current to 1200-volt direct current by two 500-kw motor-generator sets. The generator ends of these units are straight 1200-volt machines.

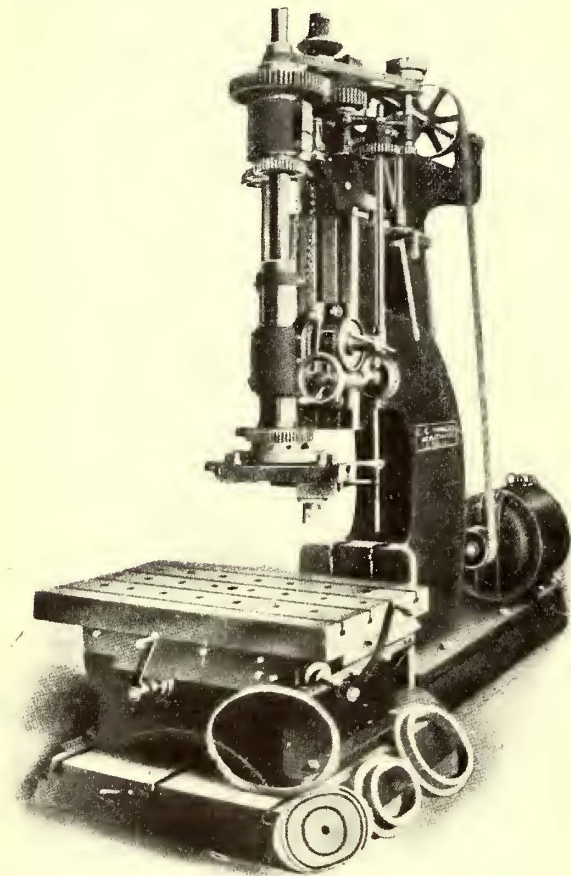
The Milwaukee Electric Railway & Light Company is changing the lines now operated with the 3300-volt, single-phase system to 1200-volt direct-current operation. The service on these lines is extremely severe owing to the necessity of hauling trains of several cars during short periods of the year. Current at 1200 volts is supplied from five substations. Three of these contain four 300-kw, 25-cycle, 600-volt rotary converters, one is equipped with three 500-kw rotary converters and the fifth is equipped with two

500-kw rotary converters. It is expected that operation with 1200-volt current will be commenced on this line at an early date.

On the Shore Line Electric Railway the entire 52 miles of road will be supplied from two substations, each containing three 200-kw, 25-cycle, 600-volt rotary converters. The power house will contain two 1500-kw, 25-cycle Curtis turbines. The arrangement of the substations is of interest in that two rotaries are operated in series, the third rotary being used as a spare. The switchboard is arranged so that any two of the three rotaries can be operated together.

ELLIPTICAL BORING MACHINE

There are frequent occasions in the machine shop when it is necessary to machine an elliptical casting such as a manhole cover or ring. The machine shown in the accompanying engraving is designed for use as an ordinary heavy boring and turning mill, but it is also supplied with a special gear-head attachment whereby true ellipses or ovals



Elliptical Boring Machine

can be cut without the use of patterns or forms. An experienced machinist can face and turn an elliptical casting as quickly and accurately as a true cylinder. By making suitable changes in the gears oval, triangular, square and other regular shapes can be turned or bored. To turn rounds an idler gear in the head is thrown out of engagement. The machine is fitted with a tapping attachment and the table can be furnished with automatic feed for milling. Other special tools and attachments are made to order for a wide variety of work.

The maker is the Covington Machine Company, Covington, Va., which also makes a complete line of punches and shears.

TANTALUM LAMPS FOR RAILWAY SERVICE

In the opinion of many illuminating engineers the invention and commercial introduction of high efficiency lamps have constituted the most important improvement in electric light effected for many years, but up to this time these lamps have not been

practically available for railway service. The Buckeye Electric Company, Cleveland, Ohio, however, has just made the important announcement that it has developed its tantalum lamp in two sizes—16 cp and the 32 cp—for use on street railways. These lamps consume only 2.3 watts per candle, as compared with the ordinary 4 watts per candle lamp, so that they use approximately only about four-sevenths as much power as the latter.



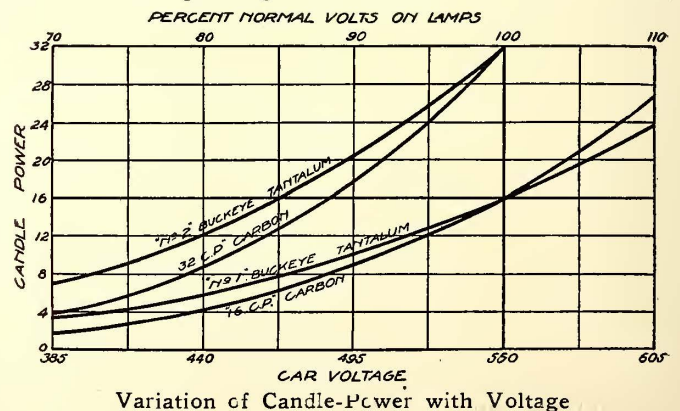
Tantalum Lamp

To those who are unacquainted with the properties of tantalum it might be said that tantalum wire, when in a state of purity, only recently made commercially possible, has a tensile strength of 57 tons per square inch, about equal to that of the best steel wire. The metal tantalum melts at about 2300 deg. C. It is unaffected by strong acids or alkalis at



Car Equipped with Tantalum Lamps

ordinary temperatures, and is no longer classed among the very rare metals. Before putting this lamp on the market the Buckeye Electric Company thoroughly tested it out under actual operating conditions on five different roads,



where it gave very good satisfaction. A view, taken at night, of a large city touring car equipped with tantalum lamps is shown in one of the engravings on this page.

The company has also prepared a list of the qualifications demanded in a lamp, and has given each qualification a

value to correspond with its relative importance. The comparative numbers of points accorded the tantalum and ordinary lamps are given in the two final columns in the table. While all electric railway engineers may not agree with the exact numbers assigned to each of these qualities, the table is at least interesting. For cases in which energy costs more than 0.4 cent per kw-hour for tantalum lamp, on this basis, is more economical than the carbon lamp.

Qualification	Points (Standard Points Rating)	Estimated Points Carbon	Estimated Points Tantalum
(1)—Lamps should be economical when considering cost of power plus renewals....	3.8	2.9	3.4
(2)—Candle-power of lamps should not be greatly affected by the ordinary voltage variation found on street railway systems	1.9	1.0	1.4
(3)—Light should be good in color quality....	0.4	0.3	0.35
(4)—Light should be free from glare....	0.5	0.3	0.45
(5)—Lamps should be inherently long-lived....	1.0	0.9	0.9
(6)—Filaments should be mechanically rugged, especially when cold.....	2.0	1.7	1.9
(7)—Lamps should be economical in current consumption, since the generator may be overloaded at times, and all the current possible needed for the motors.....	0.4	0.1	0.3
Points total.....	10.1	7.2	8.7

*When frosted. About 0.25 when clear.

Another point from which to consider lamps is their freedom from extreme candle-power variation with fluctuations in voltage. This is especially important in railway work, where, with changes of load, variations in light in the car are apt to be produced. The diagram on the opposite page gives the results of a series of tests conducted by the company to show the relation between candle-power and voltage for the two sizes of tantalum lamps and for 16-cp and 32-cp carbon lamps.

Other claims made for the lamp are that its color is more nearly white than the carbon lamp; that where the lamp is frosted, either entirely or on the bowl, a better diffusion of light is obtained; that the life of the lamp is good, and that the tensile strength of the wire is greater and offers greater resistance to mechanical breakage than a carbon filament.

The installation of these lamps requires no changes in the car or structural wiring.

The Buckeye Electric Company expects to make an exhibit of these lamps at the Denver convention.

VACUUM VENTILATION FOR PAY-AS-YOU-ENTER CARS IN CHICAGO

The Chicago Railways Company has just contracted for the equipment of 350 of its new pay-as-you-enter type cars with the vacuum ventilation apparatus known as the "Cooke System." It is thought that this company is the first to

ing Engineers of Chicago Traction have carried on a series of car ventilation experiments. The Department of Health of the city of Chicago has been highly interested in this work, and in connection with the investigation has carefully studied the principles of ventilation and observed the quality of the air maintained by the several types of ventilating

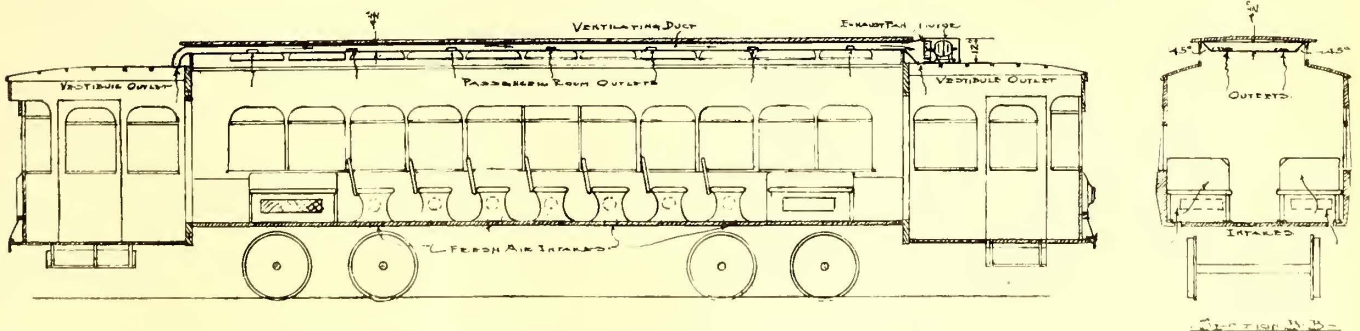


Interior of Chicago Car, Showing Exhaust Ventilators in Ceiling

systems which have been tested. The results of the earlier tests made under the direction of the Board of Health were presented in the *ELECTRIC RAILWAY JOURNAL* for May 8, 1909, page 876, in an article entitled "The results of a Study of Car Ventilation in Chicago," by W. A. Evans, Commissioner of Health. As a result of the exhaustive tests carried on by the railway and city representatives, the Board of Supervising Engineers has approved the Cooke system of ventilation, and the order for 350 equipments has been placed by the Chicago Railways Company.

The Cooke system of car ventilation is designed to exhaust the vitiated air by means of a motor-driven fan connected to an exhaust chamber in the roof of the car. Fresh air is drawn in through the lower part of the car body and distributed by ducts which terminate at electric heaters under the car seats, thus affording a means for continuously tempering the air.

An accompanying engraving showing a cross-section of one of the Chicago Railways Company's cars exhibits the



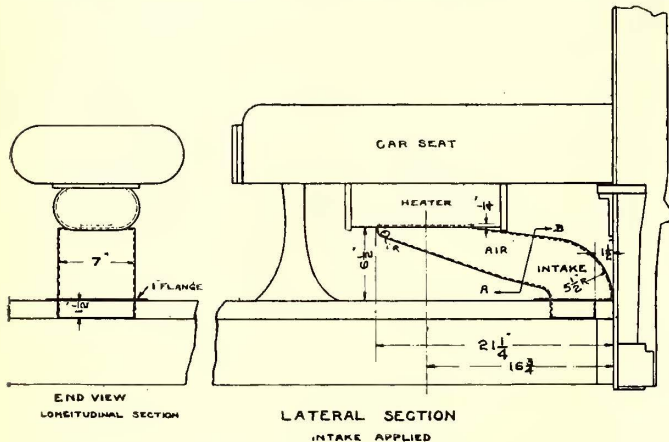
Longitudinal and Cross-Sections of Chicago Car, Showing Ventilating Apparatus

adopt any mechanical ventilating system for improving the sanitary conditions of its street cars. With the use of pay-as-you-enter cars equipped with doors kept normally in the closed position, the necessity for some positive method of ventilation is apparent. During the past year the electric railway companies in Chicago and the Board of Supervising

Engineers of Chicago Traction have carried on a series of car ventilation experiments. The Department of Health of the city of Chicago has been highly interested in this work, and in connection with the investigation has carefully studied the principles of ventilation and observed the quality of the air maintained by the several types of ventilating

passes between the coils of the electric heaters mounted under the car seats. The respective areas of the fresh-air intakes and the exhaust ports are proportioned so as to permit the passage of air at a velocity so low that its movement is imperceptible; and yet the amount of air drawn in, heated and exhausted, is sufficient to change the body of air within the car often enough to maintain a standard of purity well within sanitary limits.

Vitiated air is exhausted by a motor-driven fan permanently mounted on the top of the vestibule roof close to the monitor deck. The intake for this fan and the fan housing are made of sheet copper so designed that the exterior does not detract from the appearance of the car. Only one fan is used. A cone-shaped duct connects the fan housing with the exhaust chamber, which is formed within the full length



Fresh Air Intakes Under Seats

of the car by means of a false ceiling supported $4\frac{1}{2}$ in. below the main ceiling. This exhaust chamber extends for the full width of the monitor deck and connects with exhaust outlets in each vestibule. It is continuously kept under a partial vacuum by the motor-operated fan. The vitiated air from within the car body and the vestibules enters the exhaust chamber through $14\frac{5}{8}$ -in. register openings in the body of the car and 2-in. x 12-in. screened openings, one in each vestibule. The registers fitted into these openings are located on 4-ft. 6-in. centers, and each register is provided with a damper mechanism, so that the air velocity through each exhaust port may be equalized, irrespective of its distance from the fan.

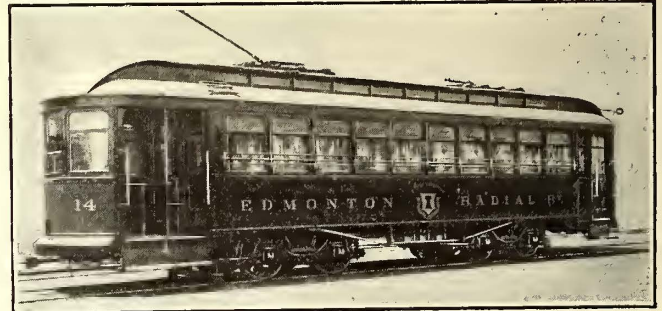
This system of ventilation is said to provide an even and constant circulation of air throughout the car, which is in no way affected by the speed of the car, direction of motion of the car or the wind pressure. The motor which operates the exhaust fan is controlled by a snap switch located within easy reach of the motorman.

The Cooke system of ventilation is a recent development. The patents for the apparatus and the principle of operation are owned by the Vacuum Car Ventilating Company, which has sales offices in the Fisher Building, Chicago, Ill. A plant for assembling and testing the car ventilating apparatus furnished by this company has been established at 76 West Monroe Street, Chicago, Ill.

The Chicago, Wheaton & Western Railway has just opened to traffic a portion of its line, 4 miles in length, extending from Pleasant Hill to West Chicago, in Du Page County, Illinois. The road is being extended to Geneva, Ill., and will be 10 miles long. At Pleasant Hill it forms a connection with the Elgin branch of the Aurora, Elgin & Chicago Railway.

PAY-AS-YOU-ENTER CARS AND SPRINKLERS FOR WESTERN CANADA

The handsome pay-as-you-enter cars shown in the accompanying illustrations have been built by the Preston Car & Coach Company, Preston, Ont., for the rapidly growing cities of Edmonton and Calgary in Western Canada. The car shown with the two trolley stands is for the Edmonton Radial Railway. It is of the double-end type, having a sliding door on the right-hand side of each vestibule and double folding doors on the left-hand side, equipped with gates for summer use. The disappearing platform



Pay-as-You-Enter Car for Edmonton, Alta.

steps are controlled through a lever and staff extending up into the vestibule and manipulated by the conductor.

The car body is 28 ft. long and the vestibules 7 ft. each. The body is mounted on Bemis No. 45 trucks, with 4 ft. 6 in. wheelbase, which carry four GE motors. The exterior is painted Newport green below the belt rail and Carmilion light above, thereby giving a very pleasing effect. The car interior is finished in birch, stained mahogany, with headlinings painted a light green with gold trimmings. The seats are of the car-builder's "Walkover" type and are upholstered in rattan. Crouse-Hinds interchangeable headlights are standard.

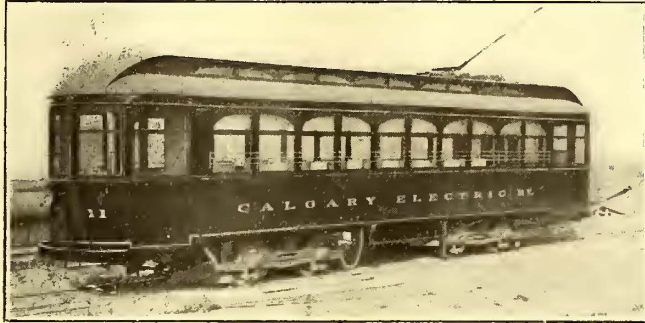
The Calgary cars, which have wide arched windows, are of the single-end pay-as-you-enter design, with the usual



Interior of Edmonton Car

exit and entrance doors at one end. The vestibule railings are similar to those used on the cars of the Montreal Street Railway Company. The car body is 28 ft. long, the rear vestibule 7 ft. and the front vestibule 5 ft. The trucks are of the same type as those used for the Edmonton cars. The roof is of the full monitor type, with the bullnose extending to the points of the vestibule. The top side and the deck sash are semi-elliptic, glazed with chipped glass and

having a $\frac{3}{4}$ -in. clear margin with imitation bevel. The lower side sash drop into the wall of the car. The covers for the sash openings cannot be lifted by passengers when the sash is up, although no lock is required. The seats are also of the "Walkover" rattan type. All the trimmings are of solid, polished bronze. The car exterior is painted Newport green below the belt rail and Carmilion light above. The electrical equipment consists of four Westinghouse 101-B-2 motors and K-6 control. Other fix-



Pay-As-You-Enter Car for Calgary, Alta.

tures of the Calgary design are Jenkins fenders, Brill scrapers and an illuminated sign box in the front dash.

The Calgary and Edmonton systems have also purchased one 5000-gal. sprinkler each from the Preston company. These sprinklers are mounted on the same trucks as the cars. The electrical equipment for the Calgary sprinkler consists of four Westinghouse 101-B-2 motors and K-6 control, and that for the Edmonton sprinkler consists of four GE-80 motors. The pumps are of the Allis-Chalmers centrifugal type, and in tests have enabled the sprinklers to throw spray as far as 55 ft. on each side of the track. The sprinkler heads were supplied by the McGuire-Cummings Company, Paris, Ill. The sprinkler frame is made of structural steel throughout. An awning of striped duck extends over each platform.

COIN SEPARATING AND REGISTERING FARE BOX

The Coin Counting Machine Company, New York, manufacturer of the well-known Johnson coin counting machines, has recently perfected a fare box for use on pre-payment cars. This new fare box will receive any coin up to a quarter, register one, two or five fares, as the coin passes through the mechanism, and automatically separate coins of different denominations into cups in a change drawer to which the conductor has access. The counting and separating principle of the mechanism is similar to that of the Johnson coin counting machine, which has been adopted by the United States Treasury Department, leading banks and many street railway companies. An experience of seven years in making these coin counting machines has demonstrated their accuracy, reliability and ruggedness of construction. The mechanism of the new fare box is equally accurate and reliable.

As will be seen from the illustration, the mechanism is enclosed in a metallic casing having rounded corners about 8 in. x 9 in. square and 14 in. high, including the examination box. The upper half of the casing, which can be removed to examine the interior mechanism, is sealed to the lower half, which contains the removable change drawer. It is impossible to tamper with the mechanism or the register dial, which is exposed through a small opening on one side of the casing, without breaking the seal. On top of the casing is a glass cylinder protected by four stout

posts bolted into the casing. This cylinder carries a shallow cup on top, in which is a circular hole just large enough to permit a quarter to pass through. The coin in dropping through this plate enters a bent tube containing toothed guards, which prevent any attempt to withdraw coins which have once dropped on the examination plate. After passing through the tube, the coin falls on a pivoted metal examination plate, where it can be clearly seen through the surrounding glass cylinder. Any foreign, counterfeit or mutilated coins or foreign substance can be thrown into a separate compartment inside the box, to which the conductor does not have access, by pressing a small button projecting through the casing. If the coin tendered is satisfactory the conductor gives the handle on the side of the machine one turn, which tilts the examination plate and drops the coin into the mechanism by which they are picked up, registered and separated. Only a few coins can remain on the plate at one time if the conductor fails to turn the crank, as the plate is held horizontal by a light spring, which yields when a weight exceeding about eight nickels rests on the plate.

The dumping crank is geared with a worm and gear to the axis of the revolving feeding plate, and each time it is turned the plate moves through a small angle. As the coins fall from the examination plate they are picked up in the notches on the edge of the feeding plate and carried to sprockets which simultaneously count and separate them as the plate is revolved. Pennies, dimes, nickels and quarters pass through different separators and fall by gravity into the cups of the change tray below. The counters are geared to the register dial with positive bevel gears and rods in such a way that a nickel in passing



Fare Box Mounted on Car Platform

through registers one fare, a dime two fares and a quarter five fares. The first penny which passes through registers one fare, and four more pennies must pass through before another fare will be registered by a sixth penny.

The accuracy of counting and separating mechanism is not affected in any way by the jolting or movement of the car. Any number of coins of different denominations may

be inserted in the machine simultaneously and passed through without clogging. After being dropped in the cup at the top the coins cannot be removed by inverting the box or in any other manner except by passing through and registering.

The box is small and light, and can be transferred readily from one end of the car to the other at turning points. It is substantially built in every detail to withstand hard usage, and its mechanism is simple and not subject to injury or failure. Severe road tests on New York City lines have demonstrated that it is accurate, practical and equal to the requirements of heavy city traffic.

EQUALIZING AND CLEANING SYSTEM FOR AIR BRAKES

C. S. Banghart, general superintendent of the New York & Queens County Railway Company and the New York & Long Island Traction Company, has recently made some tests on the Spencer method for supplying clean, cool air to railway compressors and thereby improving their efficiency. It was noted that under ordinary conditions a new compressor is seriously affected by dust after a few days' operation. Furthermore, as the screens become clogged, the pump valves gummed and the cylinders and packing rings cut, the full volume of the pump cylinder cannot enter or be retained. Hence the compressor is underloaded and the motor speed correspondingly increased. The tests showed that with clean pump valves and a clear intake the motor operated at normal speed, but after three days' exposure to dust the speed increased over 300 r.p.m. and almost doubled in five days. In every case of a damaged armature or other electrical trouble it was found that the compressor was operating on light loads at excessive speed. When the Spencer method was applied a power saving of about 25 per cent was attained and no further trouble arose from dirt.

The principle of this equalizing and cleaning system mentioned may be understood from the following explanation of the accompanying drawing: *A* is the connection to the brake cylinder exhaust. *B* is an automatic check valve which allows the exhaust to pass to the tank *C* until the pressures are comparatively equalized and then opens the

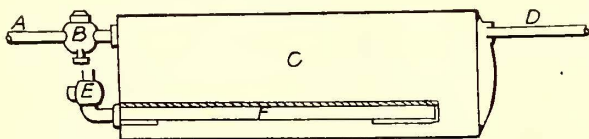


Diagram of Connections of Auxiliary Storage Tank

brake cylinder to atmosphere while retaining the volume in the tank. *D* is the connection from the tank *C* to the compressor. *E* is a commercial check valve which admits the atmosphere when the pressure in tank *C* is below that of the atmosphere. *F* is a route through the tank *C* which permits the atmospheric volume to expand against the bottom wall, where all injurious matter is deposited and remains despite the suction of the pump.

It will be seen that the device consists of means to trap under an item of pressure the greater portion of the exhaust from the brake cylinder at the time of releasing the brakes. This exhaust is not only clean, but also cold, owing to its expansion. On the other hand, air drawn from the atmosphere is cleaned without screens merely by having it expand against the bottom wall of the tank in the manner illustrated. The pressure from the trapped air rests on

the pump pistons while they are out of operation, thus preventing an excessive amount of oil from entering the compressor cylinders and flooding the brake mechanism. In the trials made the ammeter showed that there was no overload on the motor, because the pressure action of the trapped volume on the filling piston assists to drive the compressing piston enough to compensate for the additional volume handled.

The following comparison of the atmospheric and equalizing systems is based on compressing 5 cu. ft. of air up to 50 lb. or 65 lb. per square inch pressure.

	Time in seconds	Watt-hours	Amp	Volts	R.p.m. of armature
Atmospheric system	29	54.66	4	500	900
Equalizing system	18	37.83	4	500	400

The foregoing figures were for clean compressors of standard 11 ft. per minute type which had been installed five years. The service requires less than 1 ft. of air per minute. The average of many trials showed that to make one supply operation or compress 5 cu. ft. of air a compressor required 38 seconds at 1120 r.p.m., 4 amp and 550 volts, whereas according to their rated capacity they should have required only 27 seconds at 610 r.p.m., 4 amp and 650 volts. Thus the compressors actually required one-third more time and almost double the speed than was indicated by their rated efficiency. The net deficiency was placed at 80 per cent, a figure large enough to have placed all the compressors out of commission had it not been for their excessive capacity.

After a 40-day experiment under adverse running conditions with a compressor equipped with the equalizing system it was found that the valves were perfectly clean and free-acting. The regular operation of compressing 5 cu. ft. of air was carried out in 27 seconds at 620 r.p.m., 4 amp and 550 volts. In general the numerous trials indicated that under these improved conditions smaller compressors may be used at a considerable saving in power and maintenance costs.

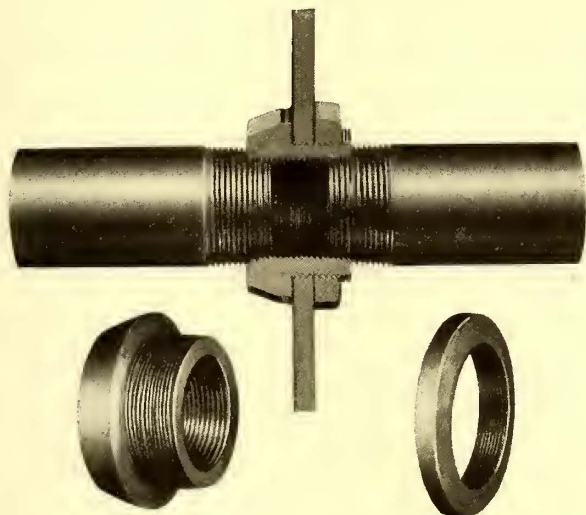
A CANADIAN RECORD FOR THE SIMMEN CAB SIGNAL

The Toronto & York Radial Railway Company's installation of the Simmen automatic railway cab signals on the Mimico division, as described in the *ELECTRIC RAILWAY JOURNAL* of June 12, 1909, continues to give the most satisfactory results. For example, an efficiency of 99.99 per cent was obtained for a total of 86,825 signal indications in August of this year. It will be recalled by readers of the article mentioned that one of the strongest features of this system is the use of cab indications instead of fixed semaphore signals along the track. One great advantage of the cab signal over the track signal is that the call of the dispatcher can be heard throughout the car by bell or buzzer indications, so that neglect of the summons is practically impossible. This, however, is not the only advantage. The strongest argument for cab signals, assuming that they have only equal merit with semaphore signals, is the question of first cost and maintenance. A single-track road equipped with automatic signals requires an average of two to the mile. Statistics show that on the American continent there is now one locomotive for every 5 miles of track. Consequently, with the cab system only one signal is required for every 5 miles, instead of 10 track signals for the same distance. Furthermore, the cost of a track signal is placed at double the cost of a cab signal, so that in the instance assumed the track installation would cost 20 times as much. The maintenance per individual track

signal is also more difficult, as it must be inspected and repaired at its fixed location, whereas the cab signals can receive attention at some central point every day.

REINFORCED SCREWED PIPE CONNECTION

The accompanying engraving illustrates the construction and application of a patented reinforced screwed pipe connection made by the Edge Moor Iron Company, Edge Moor, Del. It is intended especially for attaching a pipe to a plate of any thickness from either or both sides, and is adapted for boilers and tanks under pressure. As will be seen, it consists of an internally threaded, shouldered nipple inserted through a hole in the plate and calked at the



Reinforced Screwed Pipe Connection

shoulder. The part which projects through the plate is also threaded on the outside, and on it is screwed a collar which is turned up tight against the plate. This supplies a standard pipe threaded joint in solid metal, irrespective of the thickness of the plate to which it is attached. The connection requires no special tools to attach it in place, and has a neat appearance on both sides. It has been thoroughly tried out under a variety of conditions for more than three years with entire satisfaction.

CHANGE IN BOSTON ELEVATED POWER SYSTEM

The Boston Elevated Railway Company has begun to build a substation in the Forest Hills district of the city of Boston, for use in connection with the opening of the new elevated line from Dudley Street. It will be supplied with current from a turbo-alternator at the company's Dorchester power station and will contain the usual complement of step-down transformers and rotaries. This equipment will be the first alternating-current apparatus ever supplied from a power plant of the Boston Elevated system, the service having been exclusively direct current from scattered stations of high economy in the past, with the exception of a small amount of energy which has been purchased from central stations in times of emergency and extra heavy load. It is probable that as the Boston system expands, the use of alternating-current transmission will become more necessary, and the initial installation will be watched with interest. The turbo set will be rebuilt for alternating service at Dorchester, several years of experiment with a 200-kw, d.c. turbine having indicated little success with the latter apparatus in railway work.

CONVENTION NOTES

The complete program of entertainment for the Denver convention and other information for delegates and exhibitors has been printed in a small booklet which will be distributed at the time of registration in Denver. The following features of the entertainment program have been abstracted from an advance copy of this booklet.

The official convention badge will be honored for transportation on all cars of the following lines from Sunday, Oct. 3, to and including Sunday, Oct. 10: The Denver City Tramway Company, operating the city lines in Denver; the Denver & Northwestern Railway Company, operating the interurban line to Golden and Layden; the Denver & Inter-Mountain Railway Company, operating an interurban line to Boulder; the Denver & South Platte Railway Company, operating an interurban line from the suburb of Englewood to Littleton. The Denver & Interurban Railway Company, operating to Golden, will furnish transportation upon presentation of the official badge at its general office, 711 Cooper Building, Denver.

On Monday afternoon, Oct. 4, special sight-seeing trolley cars will leave the Brown Palace Hotel at 3 o'clock and will make stops at all of the headquarters hotels, followed by a trip through the residential section of Denver and the boulevards and parks, returning about 5 p. m. This trip is for the ladies of the convention only and is complimentary on the part of the Denver City Tramway Company and the "Seeing Denver" Company.

On Monday evening at 9 o'clock will occur the annual reception to the officers of the railway associations and their wives. The reception will be held in the parlors of the Brown Palace Hotel. Madame Sobrino, of London, and Clifford Wiley, of New York, will furnish vocal music. The reception will be followed by informal dancing.

On Tuesday afternoon the ladies will be given an automobile trip through the parks of Denver. Automobiles seating 12 and 20 persons will leave the Brown Palace Hotel at 3 o'clock, and all those who expect to take this trip are requested to be at the Brown Palace Hotel promptly at the starting time. A guide and lecturer will accompany each automobile.

The fifth annual Supply Men's amateur vaudeville and theatrical performance will be given on Tuesday night at 8:45 o'clock at the Tabor Grand Opera House, Sixteenth and Curtis Streets. The Denver City Tramway Minstrel Troupe and Band will participate. Music for informal dancing until midnight will be provided in the ballroom of the Brown Palace Hotel.

On Wednesday afternoon a trip of 51 miles in special sight-seeing trolley cars will be given the ladies. The cars will leave the Brown Palace Hotel at 2 o'clock and will run to Golden, where a stop will be made to permit the party to inspect the Colorado School of Mines. The return trip will terminate at the "White City" for the barbecue, where the evening is to be spent. This trip is also complimentary on the part of the Denver City Tramway Company and the "Seeing Denver" Company.

A wild game barbecue will be held at the "White City" at 6:30 o'clock on Wednesday evening, and the exclusive use of the "White City" and all of its attractions has been offered by the Denver City Tramway Company, which will also provide the barbecue. A number of special cars will leave the Brown Palace Hotel at 6 o'clock and regular cars on the Berkeley line will leave the central loop every five minutes. The Denver City Tramway band and orchestra will furnish music during the evening.

Thursday afternoon will be given over to a reception for the ladies at the Denver Country Club from 2:30 to 5 p. m. Golf, tennis, music and afternoon tea will be provided. A special ladies' clock golf contest with suitable prizes has been arranged. Automobiles will leave the Brown Palace Hotel at 2 o'clock for the country club, and trolley cars via the Fourth Avenue and Washington lines leave from the central loop every 15 minutes.

For Thursday evening the entertainment committee has secured the exclusive use of the Broadway Theater, opposite the Brown Palace Hotel, for the performance of Mrs. Leslie Carter. There will be informal dancing in the ballroom of the Brown Palace Hotel following the theater party.

On Friday, Oct. 8, the official excursion over the celebrated Moffat route to Corona and return will be run. Special cars will leave the station at Fifteenth and Basset Streets at 8:30 a. m. sharp, returning about 5:30 p. m. The fare for the round trip, including luncheon, will be \$3. Tickets must be secured from the entertainment committee not later than noon on Thursday in order that complete arrangements may be made for extra cars and luncheon. This special rate is for Friday only with the exception that tickets secured from the committee before Thursday night will be honored on regular trains on Saturday.

On Friday night the Colorado Electric Light, Power & Railway Association, which will hold its meetings simultaneously with the American Associations, will initiate a number of candidates into the order of "The Rejuvenated Sons of Jove."

A golf tournament will be held during the convention on the links of the Denver Country Club. Delegates of railway associations and members of the Manufacturers' Association are invited and expected to play. The Denver Country Club, one of the finest in the country, has extended the privileges of its clubhouse and links to delegates free of charge during the convention period. It is hoped and expected that a large number will avail themselves of this courtesy. The club is only 15 minutes by trolley from the hotels and the service is frequent. Hence delegates may get in a round of golf before and after the meetings without interfering with the serious business of the convention. A number of prizes have been provided, and under the conditions of the contests the veriest "duffer" may win a prize.

The annual meeting of the American Street & Interurban Railway Manufacturers' Association will be held on Wednesday afternoon at 5 o'clock in the convention hall of the auditorium building. Five members of the executive committee are to be elected at this time.

The executive committee of the Manufacturers' Association will meet in its office near the entrance of the auditorium at 12 o'clock noon each day. At this time the committee will undertake to adjust any complaints received in writing or in person.

Automatic telephones will be located in convenient places throughout the auditorium buildings, where the usual local charge will be made. The Western Union Telegraph Company and the Postal Telegraph & Cable Company will maintain temporary offices in the main building of the auditorium. A station of the Denver City Post Office will be located in the main building adjoining the convention hall. Mail addressed to members and delegates in care of the associations may be called for at this station.

The official badge of the association will be required for

identification and admission to all of the entertainments. It should be worn at all times in plain sight.

In addition to the list of railway officers expecting to attend the Denver convention which was printed in the *ELECTRIC RAILWAY JOURNAL* last week the following have signified their intention of going to Denver:

Chicago City Railway Company, Chicago, Ill.:
 R. B. Hamilton, vice-president.
 F. D. Hoffmann, secretary.
 A. G. Mitten, general claim agent.
 J. J. Duck, auditor.
 Chicago Railways Company, Chicago, Ill.:
 Three representatives.
 Hot Springs Water, Light & Railway Company, Hot Springs, Ark.:
 E. H. Hardin, superintendent.
 Indiana Union Traction Company, Anderson, Ind.:
 A. W. Brady, president.
 H. A. Nicholl, general manager.
 W. H. Forse, Jr., secretary and treasurer.
 C. A. Baldwin, superintendent of transportation.
 E. C. Carpenter, claim adjuster.
 R. C. Taylor, superintendent of motive power.
 Iowa & Illinois Railway Company, Clinton, Iowa:
 G. E. Lamb, president.
 P. P. Crafts, general manager.
 Michigan United Railways Company, Jackson, Mich.:
 J. L. Millsbaugh, general superintendent, western division.
 B. F. O'Mara, general superintendent, eastern division.
 Oklahoma Railway Company, Oklahoma City, Okla.:
 Anton H. Classen, president.
 J. J. Johnson, secretary.
 Charles W. Ford, general superintendent.
 People's Railway Company, Dayton, Ohio:
 George C. Towle, general manager.
 Pittsburg & Butler Street Railway, Butler, Pa.:
 Paul H. Smith, superintendent.

HINTS FROM A CONDUCTOR

CIVIL SERVICE FOR INSPECTORS AND STARTERS

While many arguments can be presented against civil service for political positions there is no doubt that inspectors, dispatchers and starters should be made answer certain questions relative to the operation of the road before being appointed. As I pointed out in a former article, if one man is promoted on an electric railway system 99 will get jealous. Again, I have seen cars leave on their runs out of order and a new inspector did not know what to do to remedy the trouble. Before his promotion to inspector a man should be prepared to answer a list of questions somewhat like the following:

If your route (or post) lay along Blank Street and a car going north should be reported to you as being out of order what would be the first thing you would do? What, if the car was going south?

If a motorman or conductor reported to you for work and you suspected that he was under the influence of liquor, what would you do?

If a conductor at Blank Street and Second Street informed you that his register was out of order, what would you do?

If you could not fix the register what would you do?

What do you consider the nature of daily reports that you should turn in every day?

If a conductor informed you that a certain passenger refused to pay his fare, what would you do?

If, after your regular work was over, and you were going home, something serious happened, would you take hold of it?

If a former friend of yours in the depot committed some offense, would you report him as quickly as a stranger?

What course would you pursue in case a trolley wire broke and lay across the street?

What would be the first thing to do if a fire took place at the Blank Street barn and you were the only superior officer near by?

The series could be continued indefinitely, but enough has been said to indicate the advisability of making the questions concrete and also of anticipating possible conditions.

The Cincinnati Traction Company expects to build a pavilion and theater at the Zoological Garden, Cincinnati, Ohio.

ELECTRIC RAILWAY LEGAL DECISIONS

LIABILITY FOR NEGLIGENCE

Kentucky.—New Trial—Grounds—Misconduct of Jury—Master and Servant—Injuries to Servant—Negligence—Question for Jury—Care Required—Contributory Negligence.

In an action for injuries to a motorman, plaintiff alleged that, by reason of defendant's failure to equip the car with a proper controller, he was unable to reduce the electric current, which caused the car to collide with another car, to plaintiff's injury. On defendant's motion the jury was sent to view the car, during which one of defendant's servants, in the presence of the jury, started and checked the car several times to show the facility with which it could be started and stopped with the controller which plaintiff claimed was out of order. Held, that such act was improper and constituted ground for a new trial.

In an action for injuries to a street car motorman by an alleged defective controller, whether defendant company by the exercise of ordinary care could have discovered in advance that the controller was out of repair, and could have prevented the injury, held for the jury.

In an action for injuries to a motorman, resulting from a defective controller, whether plaintiff was negligent in failing to take his tool box with him when he took charge of the car so as to enable him to reach a cut-off switch by standing on the box which he could not otherwise do and as was his custom, he being too short to otherwise reach the switch, was for the jury.

Where a street railway motorman in operating a car found that his controller was out of repair and failed to work, it was his duty to stop the car by operating the cut-off switch before it collided with a car in advance, if he could reasonably do so.

Where plaintiff, a street car motorman, was injured in a collision caused by a defect in his controller, and defendant claimed that it was plaintiff's duty to have stopped the car before collision by the use of a cut-off switch when he found that his controller could not be used, defendant was entitled to a specific instruction that it was plaintiff's duty to use all the instrumentalities furnished by defendant, including the cut-off switch, which were necessary under the circumstances to stop the car, and if he negligently failed to do so, or if his inability to do so was caused by his own negligence, he could not recover. (*Louisville Ry. Co. vs. Hallahan*, 119 S. W. Rep., 200.)

Massachusetts.—Street Railroads—Actions for Injuries—Evidence—Negligence—Contributory Negligence—Imputed Negligence—Injuries to Persons on Track—Actions—Sufficiency of Evidence.

Evidence in an action against a street railroad company for injuries received while attempting to cross the track in a vehicle driven by another person considered, and held sufficient to warrant the jury in finding that plaintiff was in the exercise of proper care.

If a father is driving with his young child, or if a child is driving with his parent while under the general control or special supervision of the parent, the negligence of the one who is driving, in driving upon a street railroad track, would be imputed to the other; but, unless there is a voluntary, unconstrained surrender of all care to the caution of the driver, the question of the liability of the parent for the negligent acts of the child in driving across a railroad track is one of fact.

Evidence in an action against a street railway company for injuries received while attempting to cross defendant's track considered, and held to justify a finding that the collision was due to the negligence of defendant's motorman. (*Peabody vs. Flaverhill, G. & D. St. Ry. Co.* (two cases), 85 N. E. Rep., 1051.)

Michigan.—Statutes—Title—Sufficiency—Regulations—Non-compliance—Negligence—Carriers—Passengers—Injuries—Evidence—Instructions—Damages—Personal Injuries—Permanent Injuries—Evidence—Instructions.

The title of Loc. Act 1901, p. 485, No. 439, entitled "An act to regulate the operation of electric cars within" a designated county, is sufficiently broad to cover the provision that one neglecting to comply with the act, requiring operators of electric cars to equip them with electric air brakes, shall be liable for the damages sustained by any person by reason thereof, and hence does not violate Const., art. 4, § 20, providing that no law shall embrace more than one subject, which shall be expressed in the title.

Where a statute regulating the operation of electric cars is obviously for the benefit of the public in general, a failure to comply with the mandatory requirements thereof

is at least evidence of negligence in any action by an individual for injuries occasioned by such failure.

Where, in an action for injury to a street car passenger, there was evidence that if there had been braking power, as required by Loc. Acts 1901, p. 485, No. 439, requiring cars to be equipped with electric air brakes, there would have been no difficulty in stopping the car and preventing the injury, an instruction that the fact that the car did not have electric brakes would make no difference unless the accident was caused or contributed to by lack of braking power was sufficiently favorable to defendant.

Where, in an action for personal injury, there was evidence of injury to plaintiff's ankle, and a physician testified that some impairment would always remain, a requested charge that there was no testimony that plaintiff's injuries were permanent was properly refused.—(*Fortin v. Bay City Traction & Electric Co.*, 117 N. W. Rep., 741.)

Missouri.—Street Railroads—Collisions—Contributory Negligence—Question for Jury—Damages—Loss of Property—Instructions.

Whether a person struck by a street car at a crossing was guilty of contributory negligence precluding a recovery, held, under the facts, for the jury.

A person struck by a street car negligently operated, who was in no manner responsible for the collision, may recover for the loss of money and jewelry, caused by the collision.

An instruction in an action for injuries in a collision with a street car at a crossing, authorizing a recovery on finding that the operators of the car were negligent, and that such negligence "directly contributed to cause said collision," and that plaintiff exercised ordinary care, etc., is erroneous, for failing to require a finding that the negligence of the operators caused the injury, and for failing to limit the jury to a consideration of the acts of negligence alleged in the petition.

A street railway company trying an action against it for injuries from a collision with a street car, on the theory that a city had the power to create by ordinance a civil liability in favor of citizens, and introducing in evidence an ordinance authorizing the running of cars at a maximum rate of speed, and asking an instruction recognizing the authority to pass the ordinance, cannot on appeal urge that the court erred in admitting the ordinance in evidence. (*Hof vs. St. Louis Transit Co.*, 111 S. W. Rep., 1166.)

New Jersey.—Master and Servant—Injuries to Servant—Actions—Evidence—Sufficiency—Negligence—Reports by Motorman—Admissibility.

A motorman had charge of a trolley car on which the sand box was out of order through his neglect. He had run the car twice over the same route, on which there was a steep grade, at the bottom of which a railroad crossed the street. On the third trip the car ran on the railroad and collided with an engine thereon, injuring the motorman. It appeared that on the previous trips the brake and controller were in working order; that in descending the grade on the third trip the brake and controller were applied to arrest the forward motion of the car, but failed to do so; the rails were covered with ice and snow, and the car wheels slid along the rails to the point of collision; the brake shoes were found, immediately after the accident, firmly locked against the wheels. No sand could be applied by the motorman, as was usually done in such cases to aid in stopping the car, because of a defect chargeable to his negligence. Held, that no presumption arises from these facts that the brake and controller were defective and unsafe.

An entry in a book kept by the company, in which motormen were required to enter the condition of their cars at the end of each round trip, that the car had "bad hand brakes," is admissible in evidence as showing notice to the master of an existing condition, when such notice is a material inquiry, but it is not competent proof of the fact itself. (*Brady vs. North Jersey St. Ry. Co.*, 71 Atl. Rep., 238.)

New York.—Street Railroads—Injuries to Persons on Track—Contributory Negligence—Evidence—Presumptions—Personal Status—Infants—"Non Sui Juris"—Trial—Instructions—Duty of Request.

In an action for the death of a child 8½ years old by being run over by a street car, her intellectual capacity to appreciate the dangerous character of a car is not to be determined by a consideration of the abstract intelligence of children of that age, but by what she understood; and, if she exercised care commensurate with her intelligence, she discharged her duty to the company, and was not guilty of contributory negligence.

Children under 12 years old are presumptively non sui

juris, and the burden is on one claiming that a child under that age was as a matter of fact sui juris to show it.

"Non sui juris" means not yet arrived at the age of adult discretion.

If, in an action for the death of a child, defendant wanted it left to the jury to determine whether the parents were negligent in letting the child go to school accompanied only by her 10-year-old sister, it should have asked for such an instruction after seeing that the judge omitted to instruct on that point. (*Grealish vs. Brooklyn, Q. C. & S. R. Co.*, 114 N. Y. Sup., 382.)

New York.—Street Railroads—Use of Highways—Frightening Animals—Negligence—Evidence.

The right of a surface railroad company to use its cars within the bounds of a highway includes the right to do such things and make such noises as are necessary, usual and incidental to such use.

A car of a surface railroad laid along a highway stopped to allow a driver of a horse to cross the track. The driver, after crossing proceeded along the side of the car and when opposite the center thereof the motorman released the air brakes, causing a hissing sound, frightening the horse and causing injury to the driver. The horse had not given any evidence of fear up to the time the accident occurred. The hissing sound was but the usual sound occasioned by releasing air brakes. Held insufficient, as a matter of law, to show actionable negligence. (*Hoag vs. South Dover Marble Co.*, 85 N. E. Rep., 667.)

Pennsylvania.—Carriers—Injury to Passenger—Evidence—Contributory Negligence.

Where plaintiff, in an action against a street railway for personal injuries, testifies that the car had stopped and she had put her foot on the step, when the conductor suddenly started the car and she was thrown to the ground, a prima facie case is made for the jury.

The question of plaintiff's contributory negligence, when injured by alleged negligent starting of a street car while she was on the step, was one for the jury. (*Rea vs. Media, M., A. & C. Electric Ry Co.*, 70 Atl. Rep., 554.)

Rhode Island.—Street Railroads—Injuries to Persons Near Track—Negligence—Res Ipsa Loquitur—Damages—Personal Injuries—Excessive Damages.

A trolley pole, which had come off the trolley wire and which had been banging the crosswires for some time, became disconnected from the spring and fell on a driver of a vehicle in the street, injuring him. Held that, under the doctrine of "res ipsa loquitur," the company had the burden of explaining its failure to stop the car forthwith, or to control the pole by the rope, and on its failure to sustain such burden a recovery was proper.

Where a person earning \$10 a week was struck by a falling trolley pole, causing him to lose about 10 weeks from his work, to suffer severely for several days, and to incur medical expenses of from \$60 to \$80, a verdict for \$1,300 was not excessive. (*Washington vs. Rhode Island Co.*, 70 Atl. Rep., 913.)

Texas.—Carriers—Injury to Passengers Alighting—Instructions.

Defendant in an action against a carrier for injury to a passenger, the petition alleging that the car stopped, and then, while plaintiff, a passenger, was attempting to alight, started forward with a sudden jerk, throwing him to the ground, is entitled to an instruction that the verdict must be for defendant if the car did not stop, and then suddenly start forward, and throw plaintiff while he was attempting to alight; the only instruction given in that respect being that if, while plaintiff was a passenger on the car, it was negligently moved forward with a sudden jerk, thereby throwing him to the ground and causing the injuries, verdict should be for him. (*Dallas Consolidated Electric Street Ry. Co. v. McGrew*, 115 S. W. Rep., 344.)

Washington.—Carriers—Injuries to Passenger—Question for Jury—Instruction as to Motorman's Duty to Stop for Passengers.

In an action for injuries to a passenger waiting to take a street car, evidence for plaintiff held sufficient to present a question for the jury as to defendant's negligence.

In an action for injuries to a passenger waiting to take a street car, it appeared that she was within a few feet of the platform and within a foot or two of the track, and on a step as high or higher than the platform as well as at a point where the general public crossed the track, and, while standing in that position, she was struck by a car, which failed to heed her signal to stop. An instruction in her favor declared that it was the motorman's duty to keep a careful and constant lookout ahead to discover persons signaling to stop in order that they may board the car, and a person who signals in time for him to do so by

exercising ordinary care has a right to assume that he is on the lookout for passengers, and will discover them if he exercises such care. Held, that the instruction was not calculated to mislead the jury into considering the motorman's duty at places other than stopping places. (*Harkins et al. vs. Seattle Electric Co.*, 101 Pac., Rep., 836.)

CHARTERS, FRANCHISES AND ORDINANCES

Hawaii.—Street Railroads—Regulation.

The enforcement of the continuance by a Hawaiian street railway company of a 10-minute schedule on certain of its lines, upon the ground that the public convenience demands such a schedule, is not within the limits of the judicial power, and is totally inconsistent with the power to regulate the management of the street railway in this respect, which is ultimately vested by Hawaii Revised Laws, sec. 843, and Session Laws 1905, act. No. 78, in the executive authorities. (*Honolulu Rapid Transit & Land Co., Appt., v. Territory of Hawaii*, by Charles R. Hemenway, Attorney-General of the Territory of Hawaii, 29 Supreme Court Rep., 55.)

Illinois.—Municipal Corporations—Grant of Use of Streets—Contracts—Street Railroads—Paving—Power to Control and Improve Streets—Requirement as to Pavement of Street.

Where the privilege of the use of a public street of a municipality is granted by an ordinance, which is accepted and acted on by the grantee of the privilege in some substantial manner, the ordinance is a valid and binding contract, and is not subject to revocation by the municipality.

A village has the power, when adopting an ordinance granting a street railway company the right to occupy a portion of the streets in the operation of a street railway system, to require the company to pave the part of the streets occupied by it at such time and with such material as the officers of the village may require.

Municipalities hold their streets in trust for the public use and benefit, and they must control and improve them for such uses, and they cannot grant their exclusive use to private individuals or corporations, nor can they make any contract that will relieve them from the performance of their duties to control and improve the streets for the public use.

Under Hurd's Revised Statutes 1905, c. 131a, sec. 4, providing that every grant to a street railroad of a right to use any street shall be subject to the right of the proper authorities to control the use, improvement and repair of the street to the same extent as if no such grant had been made, etc., a municipality granting to a street railroad the right to construct and operate railroads in designated streets may require the railroad to pave the portion of the streets occupied by it, and may prescribe the material with which the pavement shall be made, or provide that the pavement shall be made at the time, in the manner, and with such materials as the village authorities may designate, and an ordinance granting a street railway company the right to construct and operate double tracks on designated streets, and requiring the company to pave with macadam the parts of the streets occupied by its tracks and a foot outside of the rails and between the double tracks, is valid, and, on the company accepting the provisions thereof and acting under it, the ordinance is a contract, and the municipality cannot subsequently require the company to pave such portion with brick. (*Village of Madison v. Alton Granite & St. Louis Traction Co.*, 85 N. E. Rep., 596.)

Indiana.—Eminent Domain—Damages—Assessment—Speculative Damages—Condemnation Proceedings—Appeal—Harmless Error—Instructions—Province of Appellate Court.

Under Burns' Annotated Statutes, 1908, sec. 934, prescribing a rule for assessing damages in condemnation proceedings, it was error to permit an allowance for any increased danger from the operation of petitioner's railroad over the land sought to be taken, and for any other facts shown by the evidence that might be either annoying or hurtful to the defendant, necessarily caused by the permanent operation of the railroad over the land appropriated; such injuries being too remote and speculative.

Where, in condemnation proceedings, the damages allowed were double the amount awarded by the appraisers, and there was a conflict between the witnesses who testified for petitioners and defendants as to the damages sustained, an erroneous instruction permitting the recovery of remote and speculative damages was not harmless.

Where the damages in proceedings to condemn land were unliquidated and the evidence as to the amount thereof was conflicting the Supreme Court on appeal could not interpose its judgment as to the correctness of the assessment. (*Indianapolis & Western Ry Co. v. Hill et al.*—No. 21,160—86 N. E. Rep., 414.)

LONDON LETTER .

(From Our Regular Correspondent.)

The eighth annual conference of the Municipal Tramways Association was held in London in September at the County Hall, Spring Gardens, where the delegates were received by Sir Melville Beachcroft, J.P., the chairman, and members of the London County Council. The presidential address was delivered by Mr. A. L. C. Fell, chief officer of the London County Council Tramways. Following Mr. Fell Councillor A. W. Chapman, vice-chairman of the Manchester Corporation Tramways committee, read a paper entitled "Medical Examination of Tramway Employees." Luncheon was tendered to the delegates by the chairman of the London County Council. After luncheon Mr. W. E. Ireland, of the London County Council, read a paper, "The Central Repair Depot of the London County Council Tramways." In the evening the association dinner was held at the Garden Club in the Imperial International Exhibition, Shepherd's Bush. The second morning of the conference was devoted to a paper, "Some Comparisons of Continental and British Methods of Operating Tramways," by Mr. A. R. Fearnley, general manager of the Sheffield Corporation Tramways, and a paper, "Current Consumption," by Mr. R. S. Pilcher, general manager of the Aberdeen Corporation Tramways. Luncheon was tendered to the delegates on the second day by the chairman and members of the highways committee of the London County Council. In the afternoon special cars were provided for a visit to the central repair depot and the Greenwich generating station of the London County Council Tramways, where tea was served. In the evening, a reception was tendered to the delegates and ladies by the Lord Mayor at the Mansion House. The morning of the third day was devoted to the business session of the association. In the afternoon the members and their friends and the ladies were taken to Windsor by special train, and were received in the Guildhall by the Mayor and the Corporation of Windsor.

The most important event of the year in the history of the London County Council Tramways is the formal opening of the widened portion of Blackfriars Bridge, over which the Council is operating its electric cars. This forms another and important link between north and south London, from a tramway point of view, and is the natural corollary to the opening, some time ago, of Westminster Bridge to the tramways, and to the construction of the tramways along the Victoria Embankment. Heretofore all cars operated along the Embankment have come to a dead end near Blackfriars Bridge, but now that the bridge has been opened to the cars it is possible to operate circular routes and reduce the congestion of traffic at the approaches to the bridge.

Blackfriars Bridge before being reconstructed was the widest bridge across the Thames with the exception of Westminster Bridge, and formed a most important link between the north and south. Permission to build tramways across the bridge, however, could not be obtained by the London County Council until the bridge had been widened, a work which was done by Sir Wm. Arrol & Company, Glasgow, at a cost of about £200,000. The formal opening was attended with elaborate ceremonies in which the Lord Mayor, Sir G. Wyatt Truscott, and sheriffs, assisted by a large retinue of liveried servants, participated. The Lord Mayor, assisted by Mr. Fell, operated the first car across the bridge. The work of widening the bridge was commenced in 1907, four steel caissons being lowered to the bed of the river on which the new piers were to rest. After building these up, the plan was adopted of moving the old arch ribs in a piece, 30 ft. to the westward. New ribs and flooring were then put in between the outside girder which had been removed and the structure proper, and the tramway lines and conduits were constructed close to the western curb. This part of the work was done by Dick, Kerr & Company, as sub-contractors. In connection with the widening of the bridge it is interesting to note that it was decided some time ago to provide two subways at the north end of the structure to enable passengers from Queen Victoria Street and New Bridge Street to reach the tramcars without crossing the road. These subways are 10 ft. wide by 8 ft. high, and are as close to the surface of the road as possible. They greatly reduce the danger to pedestrians at the bridge.

The London County Council has begun the work of electrifying the Highgate Hill cable line, the first cable system constructed in Europe and now more than 25 years old. The passing of the system was made the occasion of a popular demonstration, the last cars which ascended the hill being boarded by enthusiasts who set off fireworks and sang popular airs. Twenty-five years ago the Highgate Hill tramway represented the very latest in street railway construction. It was visited by tramway author-

ities from all over the United Kingdom, and undoubtedly was the forerunner of similar cable lines in Birmingham, Bristol, Edinburgh and other places. There has never been a serious accident on the line. In rebuilding the line for operation by electricity it will be extended to Great North Road. The Hampstead and Highgate routes were also opened during September, and electric cars are run from Holborn to King's Cross, Hampstead and Highgate.

It is said that an American syndicate will attempt to capture the produce market of London by establishing a market center in the south of London and constructing an elaborate system of light railways, linking up the metropolitan area with the outlying country districts. The plan is to establish stations in Kent, Surrey, Middlesex and Essex, and construct light railways to connect with the London County Council Tramways and the London United Tramways, and operate over these lines at night and deliver produce to the market. The plan, of course, is tentative as the obstacles to procuring the necessary rights are very great.

The District Railway continues to make marvelous progress under the capable management of Mr. A. H. Stanley. The net receipts for August, 1909, were nearly £5,000 greater than for August, 1908, despite the fact that the exhibition at Shepherd's Bush was in progress last year. Mr. Stanley, however, is not content with the progress made. Reference was made in a recent London letter in the ELECTRIC RAILWAY JOURNAL to the non-stop trains being run on the District Railway, a novelty on a system where traffic is so dense. These non-stop trains are to be increased in number to such places as Wimbledon and Ealing, and the system is to be extended to Richmond. Later trains are also being gradually initiated, largely increasing the facilities of theater-goers. To relieve pressure at the ticket offices, an automatic electric ticket machine has been installed at the Mansion House Station, which delivers tickets on the insertion of the proper coins and rejects coins not of the proper denomination.

The proposed removal of the tramway poles from the middle of the streets was the subject of a report recently submitted to a meeting of the Belfast Tramways committee. The alteration had been recommended by the City Commissioner of Police, and the committee considered the proposals most valuable in the interests of street traffic, while not interfering with the efficiency of the overhead equipment, and instructed the officers concerned to have the alterations carried out.

Although it is unlikely that a start will be made with the tunneling at the Euston end of the new local line of the London & North-Western Railway between London and Watford, work is actively proceeding on the section between Willesden and Harrow. Operations are also under way on the Sudbury to Harrow section, but the large amount of excavation and the bridge widenings are of a character to prolong the work for many months, and it is not likely that the line will be opened for traffic until the end of next year. With the view of creating fresh local traffic on the line, which at present has only one station, that at Sudbury, between Willesden and Harrow, four new stations will be built—at Stonebridge Park, Acton-lane, East-lane, and Kenton, and a frequent service of trains will be provided by means of a rail motor shuttle service.

The question of constructing a new bridge at a cost of nearly £2,000,000, across the Thames between Blackfriars and Southwark will again come before the Bridge House Estates committee of the City Corporation at an early date. There is, however, considerable doubt even among the supporters of the scheme as to the practicability of the proposal to provide an additional link between the tramway systems of the north and south by means of the new bridge. The tramways, however, are not in any sense an integral part of the scheme for a new bridge. They are a matter for the London County Council, and not for the City Corporation, and if an application for their construction were put forward by the London County Council no scheme could be proceeded with except by the consent of the City Council.

The report of the general manager of the Newcastle-on-Tyne Tramways for the year ended March 31, 1909, has been issued. The gross receipts were £209,540, 19s. 10d., compared with £217,080, 18s. 5d. The traffic expenses were £56,912, 18s. 2d., against £58,583, 4s. 11d.; and the general expenses £21,291, 11s. 5d., against £17,600, 2s. 7d. General repairs and maintenance cost £27,924, 2s. 3d., against £22,570, 6s. 1d., and power expenses were £14,947, 3s. 6d., against £16,615, 18s. 2d. Working costs (exclusive of public street lighting) were £121,075, 15s. 4d., against £115,378, 11s. 0d. The gross capital expenditure (inclusive of public lighting) has been £1,183,346. The traffic revenue was £203,302, compared with £211,685 in the previous year.

News of Electric Railways

Modified Subway Proposal in New York

In a letter addressed to the Public Service Commission of the First District of New York on Sept. 22, T. P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., offers to build a four-track subway up Madison Avenue, to be connected with the four existing subway tracks on Park Avenue at about Thirty-eighth Street and continuing the four tracks up Madison Avenue to 149th Street, connecting two tracks with the existing subway tracks and continuing the other two tracks north-erly on Jerome Avenue to 194th Street; also to construct two tracks from the present West Farms Division of the subway, commencing at about Simpson Street, running over Westchester Avenue to Pelham Bay Park. If the Pelham Bay Park route and Jerome Avenue route are constructed they will be elevated construction. This line, if constructed, will open up a new area along Jerome Avenue in the Bronx and a new area along Westchester Avenue to Pelham Bay Park in the Bronx.

The letter of the company, dated Sept. 22, refers to a communication sent to the Public Service Commission by Mr. Shonts under date of June 30, 1909, which pertained especially to the lines proposed on Lexington Avenue and Third Avenue above Forty-second Street by the Interborough Rapid Transit Company. In its reply to this letter, under date of Aug. 27, 1909, the commission suggested that a four-track line should be built up Madison Avenue and not divided between Lexington and Third Avenues. The company carefully considered the commission's suggestion, but is still of the opinion that the line suggested up Lexington Avenue and Third Avenue is more desirable.

W. O. Wood, president of the New York & Queens County Railway, Long Island City, N. Y., has submitted a proposal to the Board of Estimate of New York to run a temporary service over the Queensboro Bridge pending a final action by the board on the request by his company for a permanent permit. In his communication to the Board of Estimate Mr. Wood says:

"The New York & Queens County Railway respectfully asks permission of the Board of Estimate to run a shuttle car service across the Queensboro Bridge, in connection with its cars now passing the Bridge Plaza. Your honorable board has already tentatively approved a form of contract franchise to this company to run through cars over this bridge. Under the city charter 30 days must elapse before the time the proposed form of contract of a franchise is submitted to your honorable board and the date upon which the final grant shall be made of the proposed franchise. So that assuming that the Public Service Commission shall grant permission to this company to operate through cars over the bridge as an extension of its present system, before the date of your final hearing on the present contract, and assuming that the Mayor signs the contract on the day of its final passage by the Board of Estimate, at least five weeks must elapse before through service can be established over the bridge. Therefore, as a convenience to the people of Queens this company asks permission to run a shuttle service over the bridge, transferring passengers to and from its several lines passing the plaza for the single fare of 5 cents."

New Interurban Railway Near Chicago

The Chicago, Wheaton & Western Railway has just opened to traffic a portion of its line four miles in length extending from Pleasant Hill to West Chicago in DuPage County, Ill. The road is being extended to Geneva, Ill., on the Fox River, a distance of 6 miles, to which place it is expected the road will be in operation by Nov. 1. At Pleasant Hill the Chicago, Wheaton & Western Railway forms a connection with the Elgin branch of the Aurora, Elgin & Chicago Railroad, and at Geneva it will connect with the Fox River division of the Aurora, Elgin & Chicago Railroad. The Aurora, Elgin & Chicago Railroad is operating the Chicago, Wheaton & Western Railway, and on its completion to Geneva through cars will be run from that city direct to the center of Chicago, passing through West Chicago, Pleasant Hill, Wheaton, Lombard and Elmhurst.

The new road is operated by means of a third-rail and is substantial and well built. Over the Fox River at Geneva there will be a seven-span reinforced concrete bridge 50 ft. wide and 500 ft. long, and over the Elgin, Joliet & Eastern Railroad and Chicago & Northwestern Railroads and at West Chicago there is a steel through-truss bridge with

two spans 126 ft. each. Three cars uniform with those on the Aurora, Elgin & Chicago Railroad are being operated on the completed portion of the new road, and they meet all trains at the junction with the Aurora, Elgin & Chicago Railroad at Pleasant Hill. The officers of the Chicago, Wheaton & Western Railway are: H. C. Wood, president; Sidney Condit, secretary; W. F. McSwiney, treasurer; I. W. Troxel, chief engineer. The office of the company is at 711 Rookery, Chicago.

Cleveland Traction Situation

The time has expired for submitting a street railway franchise to the voters of Cleveland at the regular election in November and the purpose of the Cleveland Railway in opening negotiations immediately after the defeat of the 3-cent ordinance and spending so much time since in negotiations has come to naught. The officers of the company hoped that an ordinance could be prepared for a referendum vote at the November election, although they proposed some time ago to pay the expenses of an election to submit to the voters an ordinance to be drawn by Judge R. W. Tayler.

Mayor Johnson had not returned to Cleveland up to Sept. 25, but it was stated that on his return he will submit to the company an ordinance embodying the terms included in the Baker ordinance which the company refused some months ago.

Warren Bicknell, receiver of the Municipal Traction Company, has arranged a new schedule for the Euclid Avenue line. A 2½-minute service will be given between the Public Square and University Circle, with cars every 10 minutes for the Euclid Heights, Windermere and East Cleveland lines. The ordinance approved by court calls for an 8-minute service for East Cleveland. Tripper service in the evening will give a one-minute service at the Square for 42 minutes and 1½ for 12 minutes, after which the headway will be increased. The morning service will also be improved.

Contract of City and Company in Philadelphia Upheld

Judge Kinsey of Common Pleas Court No. 1 in Philadelphia handed down a decision on Sept. 27 sustaining the contract entered into recently between the Philadelphia (Pa.) Rapid Transit Company and the City of Philadelphia. Elmore E. Brode, a taxpayer, contended that the agreement between the city and the company was unconstitutional. In his opinion Judge Kinsey says:

"This is a bill in equity filed by Elmore E. Brode, complainant and a taxpayer of Philadelphia, against said city, the Mayor, John E. Reyburn; the Philadelphia Rapid Transit Company and Market Street Passenger Elevated Railway; respondent, praying that a certain contract, dated July 1, 1907, be canceled and annulled; also that the Philadelphia Rapid Transit Company, the City of Philadelphia and the Mayor be enjoined from carrying out the provisions thereof, and that the ordinance of July 1, 1907, be declared null and void.

"The principal question presented in this case is, whether the Act of April 15, 1907, is a violation of article IX, section 7 of the Constitution, authorizing cities to acquire the property of motor power companies, for the reason, it is alleged, that this is an attempt on the part of the City of Philadelphia to acquire the property of the Philadelphia Rapid Transit Company. We do not so view it under the agreement. Whether the Constitution would prevent a municipality from holding and operating a public utility for the convenience of its citizens need not now be considered, but only whether or not such an acquirement of ownership is, or has been, accomplished by the contract in this case.

"The eleventh section of the contract concludes with certain provisions as to what the city and the company may do if the city should decide, at the expiration of the said 50 years, to take the said property. All this is dependable upon the contingency that the city should do something in that direction. Until such time comes proceedings to prevent that action would be, to say the least, unnecessary. However, the insertion of such a provision as to what may be done 50 years hence in a certain particular does not, and indeed ought not, invalidate a contract as to such other portions as may be legal and valid at the present time. Neither do we see that by the said contract the city is to become a stockholder in the said company, nor is it loaning its credit thereto.

"The court also holds that the facts that the city is represented in the directorate of the company and that the company is to pay a portion of the profits to the City Treasurer, do not make the contract a partnership in violation of the constitution.

"We cannot conceive the force of the argument offered, that the establishment of a sinking fund commission for the reception and investment of the fund paid to the city by the company under the agreement for the investment of such fund as may come into their hands in the stock of the said company is in violation of article III, section 22, or article IX, section 7 of the Constitution. * * *

"The transaction is, as a whole, as may be gathered from the purport of the entire contract, a plan by which the company is made to pay the purchase price of its own property if the city should ultimately determine to take it over, and in the meantime the purchase money is to be held apart until it shall be utilized for that purpose, or paid into the city treasury.

"The adequacy of the consideration of a contract is by law vested in Councils and the Mayor, and in the absence of fraud the citizen or the court has no right to question the wisdom of the legislative will, it being within the scope of its authority."

Association Meetings

American Street & Interurban Railway Association and Affiliated Associations—Denver, Col., week commencing Oct. 4.

Association of Car Lighting Engineers—Chicago, Ill., Oct. 4, 5, 6 and 7.

Colorado Light, Power & Railway Association—Denver, Col., Oct. 7, 8 and 9.

Railway Signal Association—Louisville, Ky., Oct. 12, 13 and 14.

Empire State Gas & Electric Association—New York City, October, 1909.

Alabama Light & Traction Association—Birmingham, Ala., Nov. 15 and 16.

National Association of Railway Commissioners—Washington, D. C., Nov. 16.

Central Electric Railway Association—Indianapolis, Ind., Nov. 18.

Central Electric Accounting Conference—Dayton, Ohio, Dec. 11.

New Line Opened in Idaho.—The Panhandle Electric Railway & Power Company has opened its line at Sandpoint, Idaho.

Restaurant for Employees in Chicago.—The Chicago (Ill.) City Railway has opened a restaurant for its employees in its new building at Seventy-seventh Street and Vincennes Road. The restaurant is designed especially to provide the men with clean, wholesome food at moderate prices served as expeditiously as possible.

New Texas Road Opened.—The Wichita Falls (Tex.) Traction Company has recently opened three miles of street railway in Wichita Falls and a 5-mile line to Lake Wichita. Some time ago the interests which control the Wichita Falls Traction Company purchased the property of the Wichita Falls Water & Light Company.

Seventh Annual Meeting Rejuvenated Sons of Jove.—The seventh annual meeting of the Rejuvenated Sons of Jove will be held in Cleveland, Ohio, on Oct. 14 and 15, 1909, with headquarters at the Hollenden Hotel. J. Robert Crouse, Cleveland, Ohio, is the reigning Jupiter of the Sons of Jove, and has decreed that the business session of the convention be concentrated so far as possible into the one day, Oct. 15.

Accounting Conference Representatives at Denver.—In the report of the meeting of the Central Electric Accounting Conference held at Indianapolis on Sept. 11, 1909, which was published in the *ELECTRIC RAILWAY JOURNAL* of Sept. 18, 1909, page 436, it was announced that a motion had been adopted authorizing the president of the conference, M. W. Glover, to appoint a committee to represent the conference at the meeting of the American Street & Interurban Railway Accountants' Association in Denver, Oct. 4 to 8. In accordance with this motion the following committee has been selected: W. H. Forse, Jr., S. C. Rogers and H. E. Vordermark.

Consideration of Matters Referred to Massachusetts and Boston Commissions.—The Massachusetts Railroad Commission and the Boston Transit Commission, sitting jointly, will give a hearing at the State House, Boston, on Oct. 5, on the transportation matters referred to in the resolves of the Legislature of 1909 under chapters 94, 110 and 85. The resolves provide for investigation by the joint board of the

advisability of providing certain additional subways, tunnels and elevated structures in Boston; to investigate the advisability of authorizing the Boston & Eastern Electric Railroad to construct a tunnel and subways in Boston, and to investigate certain matters relative to the proposed consolidation of the West End Street Railway and the Boston Elevated Railway. Interest centers on the prospective demand for a tunnel or subway from Park Street to the South Station, in tractional extension of the Cambridge subway now authorized and under construction, and in the proposition of the Boston & Eastern Electric Railroad, which contemplates building a tunnel under Boston Harbor to Post Office Square, to connect a proposed high-speed electric interurban railway from Salem and Lynn with the business center of Boston.

Meeting of Car Lighting Engineers.—A preliminary announcement of the meeting of the Association of Car Lighting Engineers was published in the *ELECTRIC RAILWAY JOURNAL* of Sept. 25, 1909, page 481. The meeting will be held at the new La Salle Hotel, Chicago, Ill., from Oct. 4 to Oct. 7, and the complete program for the sessions has been arranged. The committee will meet on Oct. 4 at 10:30 a. m. and continue in session until 12 m. At this session the address of the president will be presented, the report of the secretary and treasurer will be filed, and the minutes of the previous meetings will be read and unfinished business disposed of. On the afternoon of Sept. 4 the reports of standing committees will be presented, and a paper will be read on the application of electricity to railway shops. On the morning of Oct. 5 the report of the committee on standards will be presented, and on the afternoon of Oct. 5 a paper will be presented on the electrification of steam railroads. On the morning of Oct. 6 the reports of the special committees will be received. On the afternoon of Oct. 6 a paper will be presented on the application of storage battery to train lighting. The banquet will be held on the evening of Oct. 6. On Oct. 7 unfinished and miscellaneous business will receive attention, a place will be selected for the next meeting and officers will be elected. During the convention the question of changing the name of the body to the Association of Railway Electrical Engineers will be considered.

Farewell Dinner to Matthew C. Brush.—A farewell dinner was given to Matthew C. Brush, the retiring vice-president and general manager of the Boston Suburban Electric Companies, at the Algonquin Club, Boston, on Sept. 21 by about 65 personal friends in New England and New York electric railway and public administrative circles. Henry C. Page, general manager of the Worcester Consolidated Street Railway, was chairman of the committee on arrangements, the other members being C. Loomis Allen, Syracuse, and Edward L. Jones, Clarence Learned and F. W. Freeman, Boston. Samuel L. Powers, Boston, acted as toastmaster. The speakers were Sydney Harwood, Newton, Mass., who expressed the appreciation of the directors of the Boston Suburban Electric Companies at the efficient management of the properties under the direction of the guest of the evening; J. C. Calisch, retiring general manager of the Buffalo & Lake Erie Traction Company, who expressed his pleasure in the acceptance by Mr. Brush of the position of general manager of that property, taking effect Oct. 1; George Hutchinson, Mayor of Newton, and Benjamin S. Palmer, Alderman of Newton, who emphasized the era of good feeling inaugurated by Mr. Brush's administration and the removal of misunderstandings which it effected; C. Loomis Allen, vice-president of the Syracuse Rapid Transit Company, who welcomed Mr. Brush into the ranks of New York traction men, and Russell A. Sears, general solicitor of the Boston Elevated Railway, who performed a "friendship ceremony," wedding the guest of honor to those present by a solitaire ring. Mr. Brush, in response, emphasized his indebtedness to his friends, paying special tribute to J. L. Richards, president of the Newton & Boston Street Railway, and to the directors of the Boston Suburban Electric Companies, and stating that such success as he had attained was secured only through the co-operation of every man in the companies. Among those present were: Samuel L. Powers, Boston; Frank Remick, Boston; Mayor Hutchinson, Newton; Alderman Palmer, Newton; Thomas Beal, Boston; Sydney Harwood, Newton; J. C. Calisch, Buffalo; C. Loomis Allen, Syracuse; C. S. Sergeant, Boston; C. H. Hile, Boston; H. C. Page, Worcester; Russell A. Sears, Boston; C. L. Learned, Boston; F. W. Freeman, Newton; John Lindall, Boston; Paul Winsor, Boston; George Sabin Brush, Boston; C. A. Sylvester, Newtonville; C. A. Clark, Boston; E. L. Janes, Boston; James S. Barr, Boston; E. P. Shaw, Jr., South Framingham; R. S. Goff, Boston; E. W. Holst, Boston; E. S. Wilde, New Bedford; W. D. Wright, Providence; C. C. Peirce, Boston; Clarence Sprague, Boston, and J. J. Lane, Boston.

Financial and Corporate

New York Stock and Money Market.

September 28, 1909.

For the last two days the stock market has been decidedly strong and fairly active. Led by United States Steel common and the Harriman issues the market advanced today from 2 to 5 points. Steel made a new high record, selling up to 89½, thus coming nearer and nearer to the fulfillment of the bull prophecy that it would sell at par before Christmas. Since the industrial revival in the country has been in full swing, there has apparently been heavy buying of stocks for investment. There is also much speculative buying, a fact that is clearly shown by the periodic liquidation at high levels. Traction stocks show very little activity, but have generally been firm.

Money continues to be plentiful and rates are practically unchanged. Quotations to-day: Call, 2½ to 3 per cent; 90 days, 3¼ to 4 per cent.

Other Markets

Subway stock continues to be the feature of the Chicago market. On one day during the week it sold as low as 8½ and closed to-day at 8½. Sales have been very heavy, and it is still insisted that large holders are liquidating. Other traction issues are practically out of the market.

In the Philadelphia market during the past week there has been some trading in Rapid Transit and Union Traction. There were but few sales, with prices steady.

In Boston, Massachusetts Electric preferred has been the most active among the traction issues. The price has steadily been around 79, and there is not apparent any anxiety either to sell or to buy. There has been some sale for the common stock, but it is less active than the preferred.

Both the stock and the bonds of the United Railways Company have been somewhat in evidence in the Baltimore market during the past week. The 4s have sold at 87¾, the incomes at 58½, the funding 5s at 85¼ and the stock about 14.

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

	Sept. 21.	Sept. 28.
American Railways Company	446	46
Aurora, Elgin & Chicago Railroad (common)	*50	*50
Aurora, Elgin & Chicago Railroad (preferred)	*95	*95
Boston Elevated Railway	129	129
Boston & Suburban Electric Companies	*18	*17
Boston & Suburban Electric Companies (preferred)	73	*74
Boston & Worcester Electric Companies (common)	a13	a12
Boston & Worcester Electric Companies (preferred)	a54	a51
Brooklyn Rapid Transit Company	80½	80
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	87¾	88½
Capital Traction Company, Washington	a137	a140
Chicago City Railway	a190	a190
Chicago & Oak Park Elevated Railroad (common)	2	*3
Chicago & Oak Park Elevated Railroad (preferred)	7	*10
Chicago Railways, pteptg. ctf. 1	a110	108
Chicago Railways, pteptg. ctf. 2	a37	36½
Chicago Railways, pteptg. ctf. 3	a25	24
Chicago Railways, pteptg. ctf. 4s	a10	9
Cleveland Railways	*78	*78
Consolidated Traction of New Jersey	77½	76½
Consolidated Traction of N. J., 5 per cent bonds	a100½	105½
Detroit United Railway	a75	a72
General Electric Company	167	168
Georgia Railway & Electric Company (common)	94	95
Georgia Railway & Electric Company (preferred)	a90	a90
Interborough-Metropolitan Company (common)	14½	15
Interborough-Metropolitan Company (preferred)	47¾	48¾
Interborough-Metropolitan Company (4½s)	82¾	82¾
Kansas City Railway & Light Company (common)	45¾	a45
Kansas City Railway & Light Company (preferred)	82	a81
Manhattan Railway	143	142½
Massachusetts Electric Companies (common)	a17	16¾
Massachusetts Electric Companies (preferred)	79½	79½
Metropolitan West Side, Chicago (common)	17¾	15
Metropolitan West Side, Chicago (preferred)	a50	50
Metropolitan Street Railway	a24	a22
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	83	a82½
Northwestern Elevated Railroad (common)	a20	18
Northwestern Elevated Railroad (preferred)	a71	68
Philadelphia Company, Pittsburg (common)	48¾	48
Philadelphia Company, Pittsburg (preferred)	44	a44½
Philadelphia Rapid Transit Company	28	a28¾
Philadelphia Traction Company	a89	a90
Public Service Corporation, 5 per cent col. notes	a100¾	a100¾
Public Service Corporation, ctf.	a95½	a95½
Seattle Electric Company (common)	*114	114
Seattle Electric Company (preferred)	105	105
South Side Elevated Railroad (Chicago)	a54	a55
Toledo Railways & Light Company	a10	a10
Third Avenue Railroad, New York	22½	22
Twin City Rapid Transit, Minneapolis (common)	110	110½
Union Traction Company, Philadelphia	53½	53¾
United Railways & Electric Company, Baltimore	14	13¾
United Railways Inv. Co., San Francisco (common)	45½	45½
United Railways Inv. Co., San Francisco (preferred)	74¾	76
Washington Railway & Electric Company (common)	a48	a47½
Washington Railway & Electric Company (preferred)	a94	a94¾
West End Street Railway, Boston (common)	*98	a94
West End Street Railway, Boston (preferred)	*109	107¾
Westinghouse Elec. & Manufacturing Company	86	88½
Westinghouse Elec. & Mfg. Co. (1st pref.)	130	130

*Asked.
*Last sale.

Annual Report of Philadelphia Rapid Transit Company

Gross passenger earnings of the Philadelphia Rapid Transit Company during the year ended June 30, 1909, increased \$17,450 over the record of the preceding year. Owing to a decrease in operating expenses of \$429,770, net earnings increased \$447,220. The operations for three years compare as follows:

	1909	1908	1907
Number of passengers carried	464,264,656	512,869,023	492,137,038
Receipts from passengers	\$18,317,530	\$18,300,080	\$18,095,503
Operating expenses	9,364,738	9,794,508	10,095,098
Miscellaneous receipts, interest, etc.	\$8,952,792	\$8,505,572	\$8,000,405
Taxes and licenses, paid and accrued	480,403	257,422	245,187
Fixed charges, paid and accrued	\$9,433,255	\$8,762,994	\$8,245,592
Deficit	1,464,953	1,394,127	1,120,683
	\$7,968,302	\$7,368,867	\$7,124,909
	8,192,976	7,400,976	7,488,958
	\$224,271	\$92,049	\$364,049

It will be observed that a large reduction took place in the total number of passengers carried. This is due to the abolition of the sale of tickets. The following analysis of passenger traffic is contained in the report:

	1909	1908
Total passengers carried	464,264,656	512,869,023
Package tickets used, per cent	41.6830	53.9107
Cash fares paid, per cent	37.3059	14.8210
Exchange tickets purchased, per cent	4.2041	7.2284
Exchange tickets used (received), per cent	4.2125	7.2270
Transfer tickets used, per cent	11.9828	16.2710
Carried free, per cent	.5517	.5329
	100.0000	100.0000
Receipts per passenger, cents	3.9432+	3.5659+

Of the total passenger earnings of \$18,317,530 the sum of \$10,567 was received from chartered cars. The operating expenses aggregated 51.12 per cent of the gross earnings, and were divided as follows:

	1909	1908	1907
Maintenance of way & bldgs	\$880,778	\$1,060,425	\$1,360,735
Maintenance of equipment	938,758	915,287	1,006,587
Transportation	4,413,417	4,822,472	4,749,107
Power	1,445,077	1,280,213	1,034,824
General expenses	1,677,708	1,716,111	1,943,845
Total	\$9,364,738	\$9,794,508	\$10,095,098

The total expenditures for maintenance of way and buildings and maintenance of equipment were \$1,828,536, or 10 per cent of gross passenger receipts. This is very slightly under the percentage expended for the same purposes during the preceding year. Another material decrease in the general expense is indicated by the figures.

The statement to stockholders, signed by John B. Parsons, president, says in part:

"The increase in fixed charge item is the increased rental to the Union Traction Company, interest on Market Street Elevated Passenger Railway bonds and interest on a portion of the Philadelphia Rapid Transit Company \$5,000,000 5 per cent collateral loan.

"The accident department was operated during the year for 5.80 per cent of the receipts, as against 5.88 per cent last year; this meant a saving of \$36,055.

"During the year 35 miles of track were rebuilt with the 147-lb. rail, making a total of 195 miles of your system now built with this heavy rail.

"On Nov. 29, 1908, five of your cars (semi-convertible double-truck cars) were destroyed at the fire which took place at the car works of The J. G. Brill Company; your fire insurance fund has paid for the loss of the cars.

"During the year 306 cars have been changed over to the "pay-within" type of cars, and are in operation, and other cars are being changed as rapidly as possible to the same type of car.

"The directors ordered the closing into profit and loss account all debit balances in accrued accounts at the end of the fiscal year."

A table showing the gross earnings by months indicates that the most satisfactory record was attained during October, 1908, when the total was \$1,700,709.

Hearing on Boston Elevated Railway's Petition to Acquire Other Properties

A hearing was held by the Massachusetts Railroad and the Boston Transit Commissions sitting as a joint board at the State House, Boston, on Sept. 27, in regard to the question of permitting the Boston Elevated Railway to acquire the securities of other railways and on the expediency of permitting a distribution of the assets of the West End Street Railway among its stockholders, and also to change the terms and conditions under which the second

preferred stock of the West End Street Railway is to be issued for the Boston Elevated Railway in payment for the property of the West End Street Railway.

At the outset, the board postponed until Oct. 8 consideration of the question of the distribution among its stockholders of the assets of the West End Street Railway. It then took up that portion of the Legislative resolve of 1909 relating to the holdings of other street railways by the Boston Elevated Railway. Frederic E. Snow acted as counsel for the Boston Elevated Railway. Col. Charles A. Williams represented the West End Street Railway; H. H. Newton, the stockholders of the West End Street Railway, and Robert Luce, the Public Franchise League. Roscoe Walsworth was present on behalf of the Metropolitan Transit Association, and was heard first. He advocated the operation of the Boston, Revere Beach & Lynn Railroad by the Boston Elevated Railway, and said that the transportation service at the north of Boston would thereby be greatly improved. The most important remarks were contributed by Mr. Snow, who stated that he hoped the joint board would recommend legislation permitting the Boston Elevated Railway to acquire the securities and control of other street railways in the interest of improved transportation facilities. He referred particularly to the present systems which connect with the Boston Elevated Railway, namely, the Boston & Northern Street Railway, operating 512 miles of main track; the Old Colony Street Railway, 354 miles; the Boston & Worcester Street Railway, 80 miles; the Blue Hill Street Railway, 19 miles; the Lexington & Boston Street Railway, 30 miles, and the Middlesex & Boston Street Railway, about 70 miles. The Boston Elevated Railway operates about 409 miles of track, and the total trackage of the system, if the control through security purchases were allowed, would be about 1500 miles. The operating economies and service possibilities on such a centralized organization would be very attractive. Actual consolidation with the Boston Elevated Railway would be impracticable on account of the provision in the charter of the company which forbids charging more than a 5-cent fare, but if the controlling interest were lodged with the Boston Elevated Railway, the benefits of centralized operation would be noteworthy. The hearing was adjourned until Sept. 28.

Brooklyn (N. Y.) Rapid Transit Company.—The Nassau Electric Railroad, a subsidiary of the Brooklyn Rapid Transit Company, has applied to the Public Service Commission of the First District of New York for permission to issue \$730,000 of bonds to retire an equal amount of first consolidated mortgage bonds of the Atlantic Avenue Railroad maturing on Oct. 1, 1909, the Atlantic Avenue Railroad having been absorbed by the Nassau Electric Railroad. The Public Service Commission has ordered a hearing on the application on Oct. 6.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission of the Second District of New York has authorized the Elmira Water, Light & Railroad Company to issue its first consolidated 5 per cent, 50-year gold bonds to the amount of \$196,000 to be sold at not less than 85. Of the proceeds, \$59,874.17 are to be used for the payment and discharge of indebtedness incurred in constructing additions and betterments to its property and the balance for future additions and betterments.

New York, New Haven & Hartford Railroad, New Haven, Conn.—A special meeting of the stockholders of the New York, New Haven & Hartford Railroad has been called for Oct. 27, at which the question of increasing the capital stock of the company by \$40,000,000 will be submitted. The new stock is to be offered to stockholders and convertible bondholders at \$125, and will be issued in blocks from time to time over the next two years to retire about \$14,000,000 of maturing notes and bonds to provide funds for improvements. The annual report of C. S. Melten, president of the company, was made public on Sept. 27. The total earnings from all sources during the fiscal year were \$54,347,630, as compared with \$53,050,147 in 1908. Freight earnings increased from \$25,281,434 to \$26,595,969; passenger earnings decreased from \$23,003,115 to \$22,852,741, and other revenue from transportation decreased from \$3,506,133 to \$3,713,867. In expenses, general transportation decreased from \$23,625,503 to \$22,491,376; maintenance of way and structures increased from \$5,983,825 to \$6,130,606, and maintenance of equipment decreased from \$6,913,160 to \$5,906,350. The total fixed charges increased from \$14,550,387 to \$16,843,079. On the other hand, income from other sources increased from \$3,862,151 to \$4,593,488. The final net income applicable to dividends increased from \$5,266,569 in 1908 to \$7,430,228 in 1909. The net earnings of the Connecticut Company show an increase from \$2,745,758 to \$3,644,314, while the net income of the Rhode Island

Company increased from \$178,420 to \$469,206. The Connecticut Company earned \$224,294 from its express business.

Northampton (Mass.) Street Railway.—In reply to a letter addressed to him about the reported sale of a controlling interest in the Northampton Street Railway to interests identified with the New York, New Haven & Hartford Railroad, J. C. Hammond, president of the Northampton Street Railway, replied: "I wish to say that no negotiations whatever with reference to the sale of stock of the Northampton Street Railway to the New York, New Haven & Hartford Railroad have been entered into or talked about, directly or indirectly, since the stock of the Springfield Street Railway was purchased. There have been no transfers of stock except those incident to the settling of estates, for months."

Ocean Shore Railway, San Francisco, Cal.—A circular letter sent to the bondholders of the Ocean Shore Railway says with reference to the proposed new bond issue: "The time for depositing your bonds with the Mercantile Trust Company, San Francisco, has been extended until Oct. 14; \$2,650,000 worth of the bonds have been deposited, and we have assurance that about \$2,000,000 more will be deposited within the next 30 days. The people who stand ready to advance \$2,000,000 to complete, equip and put the railway in first-class condition are well pleased at the excellent showing which has been made through the co-operation and courtesy of our bondholders, but they cannot do anything for us, nor can we help ourselves out of our present difficulties until all of the bonds are deposited. The interest on our bonds will be due on Nov. 1, and cannot be paid unless the reorganization plan is perfected before that time."

Pittsburgh, McKeesport & Westmoreland Railway, Pittsburgh, Pa.—A meeting of the stockholders of the Pittsburgh, McKeesport & Westmoreland Street Railway has been called for Nov. 22 to vote to spend \$2,000,000 on extensions and improvements next spring. George D. Cook, 25 Broad Street, New York, is offering for sale at 95 and interest \$1,000,000 of 5 per cent gold bonds of the company. The Pittsburgh, McKeesport & Westmoreland Railway has a line in operation from McKeesport, on the Ohio River, to Irwin, Pa., in the heart of the coal and gas belt, 11 miles long.

Snohomish Valley Railway, Snohomish, Wash.—A statement sworn to before a notary public has been issued by the Snohomish Valley Railway saying that the company "has no railroad built, no tangible assets of any value to any bondholder, whether innocent purchaser or not; the company has abandoned its undertaking and does not intend to ever build a railroad or create any property value of any nature whatsoever to be taken by said stolen bonds." The statement is sworn to by the following: G. M. Cochran, president; E. L. Colburn, secretary; E. Wright, treasurer; Chas. A. Barron, general manager. The statement, which is addressed to whom it may concern, charges that unauthorized possession was obtained of \$500,000 par value of 5 per cent bonds of the company, that the company has never received one cent on the bonds and that it has spent much money and more than 10 months trying to recover the bonds and prosecute those responsible.

Southwestern Street Railway, Philadelphia, Pa.—The sale of the property of the Southwestern Street Railway under foreclosure, which was to have taken place on Sept. 21, has been postponed until Dec. 8.

Third Avenue Railroad, New York, N. Y.—The Public Service Commission of the First District of New York has denied the application of the bondholders' committee for approval of the proposed reorganization of the Third Avenue Railroad. The opinion was written by Chairman Willcox and Commissioner Maltbie. Among the reasons given for refusing to sanction this reorganization plan are that the assets of the property are not of sufficient value to justify the proposed capitalization of \$68,516,000; that the present company is overcapitalized, and the outstanding stocks and bonds are not represented by actual property; that the net earnings will probably be less than the estimate given by the receiver; that there is no evidence that the company would earn a sufficient net income to pay the interest on the adjustment bonds, amounting to \$32,000,000; that there is no likelihood that there would ever be any dividend earned on the \$20,000,000 of proposed common stock; that it is unwise to issue securities on probable earnings; that such overcapitalization would lead to inferior service and unwarranted exactions; that the control of the corporation would pass from the stockholders to the bondholders, and that the reorganization plan involved the capitalization of taxes, unpaid interest, repairs, renewals and other improper capital charges. The sale of the property of the company has been postponed from Oct. 27 to Nov. 30.

Traffic and Transportation

Indiana Railroad Commission Lacks Power to Compel Separation of Grade Crossing

The Railroad Commission of Indiana in the case of the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad versus the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., has expressed the opinion that it cannot compel the separation of grade crossings by steam and electric railroads. The Pittsburgh, Cincinnati, Chicago & St. Louis Railroad asked the Railroad Commission to require the separation of the grades by the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad and the Indianapolis, Columbus & Southern Traction Company four miles south of Indianapolis under the provisions of the Railroad Act of 1907.

The Indianapolis, Columbus & Southern Traction Company filed a special answer in which it alleged that the Pittsburgh, Cincinnati, Columbus & St. Louis Railroad had prosecuted a suit in the courts under the law of 1903, relating to the crossing of street and interurban railroads and that the Supreme Court had decided against the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad on the ground that it was not practicable to separate the grades of the railroads at the crossing in question. The Pittsburgh, Cincinnati, Chicago & St. Louis Railroad moved to strike out the special answer of the Indianapolis, Columbus & Southern Traction Company, alleging former adjudication, and the commission reviewed the provisions of the law of 1903 and the provisions of the Railroad Commission Act of 1907 relating to the separation of grade crossings and held that the sections of the two laws relating to grade crossing separation must be construed together and that the commission must perform the duty as prescribed in the Act of 1903. Under the Act of 1903, however, the court or the Railroad Commission must find that it is commercially practicable to abolish the grade crossing and cannot order a grade heavier than 2 per cent on the interurban railway, nor the existing maximum grade on the steam railroad. Under the Act of 1907, it appears that proceedings for the separation of grade crossings should be tried before the Railroad Commission first and then review by the courts, and the commission realized that the issues in the case under review had been tried under the limitations of the Act of 1903 and adjudicated and settled by the courts, and that it would be useless for the commission to try the case again and then have it reviewed by the court which had already pronounced final judgment thereon. For this reason an order was entered dismissing the petition.

In a dissenting opinion Commissioner Dowling held that the former adjudication does not apply in matters of this character; that the question of commercial practicability in separating grades is purely legislative and administrative and that readjudication has no application where new matter has come into the case. A separation of grades may not have been commercially practicable three or four years ago, but the same may be commercially practicable at present and the case should have been decided on its present merits, according to Mr. Dowling.

In concluding its opinion the commission said:

"We find that as a matter of fact, respondent (electric line) was incorporated under the General Railroad Law of 1852, as a railroad corporation, and while so incorporated that its manner of operation is an electric or interurban railway, and not a steam railroad; that the petition for separation of grade crossing filed by petitioner (steam road) against respondent in the Marion Superior Court, alleged that respondent is an incorporation organized and existing under and pursuant to the laws of Indiana, and owns and operates an interurban and suburban street railway extending from Indianapolis to Columbus, Ind., using electricity for the propulsion of its cars.

"It appears that there is no escape from the conclusion that the Legislature has enacted that proceedings for the separation of grades between a steam railroad and an interurban railway shall take place by virtue of and under the provisions of Sec. 5 of the Act of 1903, which refers to the same subject matter as the grade provisions of the Railroad Commission Act of 1907, but by the very terms of the last act, the 1903 Act, is made a part of the Act of 1907, and must be read with it, as if it had been one of its sections. The commission, therefore, in the exercise of the powers of grade separation, must perform the duty as prescribed in the Act of 1903.

"Now, the powers conferred by the Act of 1903 are different, less in degree, more limited than those conferred in Sec. 19 of the Act of 1907. The latter act gave power to determine whether or not such grades shall be separated, in what manner, and by which corporation said work shall

be done, and to apportion all expenses of construction and maintenance. But under the Act of 1903, the court or the Railroad Commission must find that it is commercially practicable to abolish the grade crossings. Pittsburgh, Cincinnati & St. Louis Railroad vs. Indianapolis, Columbus & Southern Traction Company (169 Ind. 634) and may not order a heavier than 2 per cent grade on the interurban railway nor the existing maximum grade on the steam railroads.

"As stated above, this issue under the limitations of the Act of 1903 has been adjudicated and settled; not only in the Circuit Court, but in the Supreme Court of the State. It would seem to be a useless waste of time and money and energy for this commission to try over again the same contention, on the same facts, subject to review in the same courts, which have given a final judgment thereon.

"It may be true, as petitioner contends, this is a legislative matter, administrative in its nature, and that the doctrine of res judicata cannot be applied to or involved in such proceedings. (140 Ind. 604). However this may be, it is certain that if this commission should come to a conclusion different from that announced by the courts in the determination of the very same case here presented, the order of the commission would be set aside.

"Apprehensive of the dangers of such crossings and while we commend the efforts of the petitioner to abolish any of its grade crossings with other railroads, nevertheless, we must decline to act where it appears to us that we are without authority and nothing would be accomplished. The commission will be glad if the petitioner will proceed to have its conclusions reviewed by the courts, and an authoritative conclusion made of its powers and duties with reference to railroad crossings. For the reasons set out above, an order will be entered dismissing the petition."

Officials of Ohio Roads Confer with Commission Regarding Operating Rules

A conference of officials of electric railways operating in Ohio was held in the office of the Railroad Commission of Ohio at Columbus on Sept. 21 for the purpose of discussing standard rules for the operation of trains in Ohio. Twenty representatives of the companies were in attendance. A committee of six railway men was appointed to draft a set of rules as a basis upon which to work and a report will be made at a meeting to be held with the Railroad Commission on Oct. 13. The members of this committee are: F. A. Davis, chairman, Scioto Valley Traction Company, Columbus; F. W. Coen, general manager, Lake Shore Electric Railway, Sandusky; Charles Currie, general manager, Northern Ohio Traction & Light Company, Akron; B. J. Jones, Ohio Electric Railway, Cincinnati; C. F. Franklin, Toledo & Western Railway, Toledo, and C. M. Paxton, Dayton & Troy Electric Railway, Dayton.

At the meeting on Oct. 13 the rules formulated by the committee will be discussed, and the members of the commission will make such suggestions as they feel should be incorporated in the new code. The code of operating rules prepared for discussion at the annual meeting of the American Street & Interurban Railway Association will be studied carefully by both the operating managers and the members of the commission with the idea of adopting those rules recommended by the national association which appear to be best adapted to conditions which govern in Ohio.

It was brought out at the meeting that some roads in Ohio are operated without train orders, the trains running on single tracks depending entirely upon the block signals for the right to proceed. The opinion was expressed that the double order system is the safest for all roads and a clause covering this subject may be incorporated in the new code. Members of the commission desire that their inspectors be allowed to ride in the motormen's vestibules when making inspections and a rule to this effect may be adopted. At present the rules of several companies state that only certain specified officers of the company shall be permitted to ride in the vestibule.

Changes Made in Transportation Department of Pittsburgh Railways

The Pittsburgh (Pa.) Railways has decided to reorganize its transportation department by sub-dividing the system into six divisions, each to be in charge of a superintendent to be appointed by the superintendent of transportation of the company, with the approval of the general superintendent. The names of the men selected for the new positions had not been announced up to Sept. 25. The announcement of the change was conveyed to the employees in a circular signed by James D. Callery, president of the company, and

P. N. Jones, general superintendent. The contents of this circular follow:

"On Oct. 1, 1909, the transportation department of the Pittsburgh Railways will be reorganized by subdividing the system into the following divisions:

First, the Allegheny Division—Including the operation of all cars and crews from the following barns: Manchester, Taggart Street, Chestnut Street and Emsworth.

"Second, the Southern Division—Including the operation of all cars and crews from the following barns: West End, Carnegie and West Park.

"Third, the Birmingham Division—Including the operation of all cars and crews from the following barns: Tunnel, Thirtieth Street and Suburban.

"Fourth, the Monongahela Division—Including the operation of all cars and crews from the following barns: Glenwood, McKeesport and Rankin.

"Fifth, the Consolidated Division—Including the operation of all cars and crews from the following barns: Oakland, Homewood, Ardmore, Highland, Herron Hill and Butler Street. The Consolidated Division will also have charge of the cars and crews of the Monongahela Division from Craig Street to the city.

"Sixth, the Interurban Division—Including the operation of all cars and crews on the Washington and Canonsburg and Charleroi routes.

"Six superintendents for these divisions will be appointed by the superintendent of transportation, with the approval of the general superintendent, such appointments being made, as far as possible, from our transportation employees. The standing of the men so appointed thereafter will depend upon the net results of the traction business in each respective district, the courtesy of employees to the public, the number of accidents, the amount of repairs necessary to the equipment and the amount of power consumed, being considered in arriving at a conclusion."

Accidents in New York During August

The Public Service Commission of the First District of New York has issued the following comparative summary of accidents for August, 1909, and August, 1908, on the street railways within its jurisdiction:

Car collisions.....	1909. 137	1908. 122
Persons and vehicles struck by cars.....	976	896
Boarding.....	662	655
Alighting.....	1,173	1,238
Contact electricity.....	45	41
Other accidents.....	2,056	2,362
Total.....	5,049	5,314
INJURIES.		
Passengers.....	2,310	2,261
Not passengers.....	523	534
Employees.....	494	544
Total.....	3,327	3,339
SERIOUS.		
(Included in above.)		
Killed.....	31	44
Fractured skulls.....	8	15
Amputated limbs.....	2	4
Broken limbs.....	41	35
Other serious.....	122	138
Total.....	204	236

Philadelphia & West Chester Traction Company Increases Fare.—The Philadelphia & West Chester Traction Company, operating 33 miles of line out of Philadelphia, increased the fare on its line between Sixty-third Street and Market Street, Philadelphia, and West Chester on Sept. 27 from 25 cents to 30 cents.

Central Electric Accounting Conference Publication.—The Central Electric Accounting Conference has issued under date of Oct. 1, 1909, a publication of 20 pages in which are contained a list of officers and members of the conference, the constitution and by-laws of the body and the rules and recommendations adopted from the first meeting to the tenth meeting, inclusive.

Denver & Interurban Railroad to Suspend Operation For a Month.—The Denver & Interurban Railroad, operating between Denver and Boulder, a distance of 46 miles, will suspend operations for 30 days or more, owing to the necessity for replacing the viaduct out of Denver to the north with a new steel structure. Hourly train service is to be provided by the Colorado & Southern Railway, which controls the Denver & Interurban Railroad.

Accident on Elevated Railroad in Brooklyn.—The rear truck of the rear car of a train on an elevated line of the Brooklyn (N. Y.) Rapid Transit Company which was being returned to the East New York sheds of the company empty, except for the crew, after the morning rush on Sept. 24 jumped the track and fell to the street, leaving the

car suspended over the side of the elevated structure. A guard who was on the car was slightly injured by being thrown against a gate of the car.

Strike in Omaha.—Scenes of wild disorder have marked the progress of the strike of the employees of the Omaha & Council Bluffs Street Railway, and on this account the company has purposely delayed operating the full complement of cars, suspending service on most of the lines at night. A conference was held on Sept. 22 between the Mayor of Omaha, officers of the company and representatives of the men, but the company is said to have refused to recognize the union, a demand which the men insisted upon. Seventy-five former employees of the company applied for reinstatement between Sept. 24 and Sept. 27.

Terre Haute Franchise Suit Being Heard.—The final argument in the injunction suit of the City of Terre Haute against the Terre Haute, Indianapolis & Eastern Traction Company will be heard in Indianapolis on Oct. 7. The evidence was taken at Rockville on change of venue during the week ended Sept. 25 by Judge J. C. Robinson. The suit was begun in February, 1908, as the result of a petition filed by Hugh J. McGowan, president of the company, for an amended contract, supplemented with a promise to build a modern interurban station and make other improvements. Mr. McGowan went to Europe, and the city decided to ask for an injunction to stop work on the streets, contending that the old franchise provided for carrying "passengers and baggage," whereas the amended franchise reads "passengers and property." The company contends that an act of the Legislature in 1901 giving electric railways permission to carry freight covers the right to do freight business in the streets of the city. The city contends that the act of 1901 extends to electric roads the right to carry freight only in the country.

Indiana Tax Commission to Inspect Electric Railways.—About Oct. 15 the members of the Indiana Tax Commission will start on a 40-day tour of the electric railways and the steam railroads in Indiana to inspect their physical condition. A trip of this kind is made by the commissioners every four or five years. The property of the following electric railways will be inspected: Indiana Union Traction Company, Indianapolis & Cincinnati Traction Company, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Columbus & Southern Traction Company, Fort Wayne & Wabash Valley Traction Company, Chicago, Lake Shore & South Bend Railway, Indianapolis & Martinsville Traction Company, Cincinnati, Lawrenceburg & Aurora Railway, Evansville & Eastern Traction Company, Evansville & Mount Vernon Railway, Fort Wayne & Springfield Railway, Chicago, South Bend & Northern Indiana Railway, Indianapolis & Louisville Traction Company, Kokomo, Marion & Western Traction Company, Lebanon-Thorntown Traction Company, Evansville & Southern Indiana Traction Company, Marion, Bluffton & Eastern Traction Company, Muncie & Portland Traction Company, Southern Michigan Railway and Winona Interurban Railway. A careful inspection will also be made of the city properties in Indianapolis, Evansville, Terre Haute, South Bend, Fort Wayne, Richmond, Anderson, Muncie and Elwood.

Changes in Surface Car Routes in Brooklyn.—The Brooklyn (N. Y.) Rapid Transit Company has announced that on Oct. 25 it will put into effect a number of changes in the routes of its surface lines, due to the redistribution of traffic as a result of the operation of trains under the East River by the Interborough Rapid Transit Company through Fulton Street to Flatbush and Atlantic Avenues, Brooklyn. A new loop for surface cars has been constructed at Fulton Street and Flatbush Avenue, and it will be used in the rush hours for short line service for cars of the Greene-Gates, Putnam-Halsey and Fluton Street lines. The company will also operate a new Fulton Ferry-Wall Street Ferry surface service, which will improve transit in the Brooklyn Heights District. Transfers will be issued at the Borough Hall between the new Fulton Ferry-Wall Street Ferry lines and all surface car lines of the company operating over Fulton street. Cars of the Wyckoff Avenue line of the company which have been operated from the discontinued ferries at the foot of Grand Street, Brooklyn, will, after Oct. 25, be run across the Williamsburg Bridge to Delancey Street, New York. A shuttle car service will be established between the plaza of the Delancey Street Bridge at Broadway and Marcy Avenue, Brooklyn, and the ferries at the foot of Broadway, Brooklyn. The subway having greatly relieved the surface cars operating across the Brooklyn Bridge in the non-rush hours, it has been decided to discontinue the operation of Seventh, Flushing and Park Avenue cars over the structure during the non-rush hours. This change will also become effective on Oct. 25.

Personal Mention

Mr. Harry Fraser has resigned as superintendent of the Toledo & Chicago Interurban Railway, Kendallville, Ind., and the position has been abolished.

Mr. A. J. Dies has been appointed auditor of disbursements of the Delaware & Hudson Company, Albany, N. Y. Mr. Dies was formerly auditor of the United Traction Company, Albany.

Mr. George W. Ogsbury has been appointed auditor of the United Traction Company, Albany, N. Y. Mr. Ogsbury was formerly auditor of disbursements of the Delaware & Hudson Company, Albany, N. Y.

Mr. Edward Herd has resigned as secretary and general manager of the Morgantown & Southern Railway, Morgantown, W. Va., to become secretary and general manager of the Herd Plumbing Company, Morgantown, which proposes to extend its business to the electrical field.

Mr. D. H. Brown has resigned as chief engineer of the Lehigh Valley Transit Company, Allentown, Pa., and is succeeded by Mr. W. W. Wysor. Mr. Brown has accepted the position of chief engineer of the Diamond Water Company, Hazleton, Pa., which is constructing a storage reservoir, dam, pipe lines and pumping stations at Hazleton at a cost of approximately \$200,000.

Mr. Samuel McRoberts has been elected a vice-president of the National City Bank, New York. Mr. McRoberts is chairman of the board of directors of the Kansas City Railway & Light Company, Kansas City, Mo., and for several years was treasurer of Armour & Company. Mr. McRoberts is a lawyer by profession and has represented the Armour interests as counsel for some time.

Mr. W. E. Wickenden has been appointed assistant professor of electrical engineering at the Massachusetts Institute of Technology to assume the duties vacated by Prof. George C. Shaad, who has gone to the University of Kansas to take charge of the department at that institution. Mr. Wickenden is a graduate of Dennison University, and later took a year of graduate study in physics at the University of Wisconsin. He is now on the electrical engineering staff of the University of Wisconsin. He is author of a book on photometry and illumination, now on the press.

Mr. W. W. Wysor has been appointed chief engineer of the Lehigh Valley Transit Company, Allentown, Pa., to succeed Mr. D. H. Brown. Previous to his appointment to the Lehigh Valley Transit Company, Mr. Wysor was chief engineer for the Chattanooga (Tenn.) Railways, and previous to January, 1908, was connected with the Norfolk & Western Railway as assistant engineer in charge of location and construction work for a period of about seven years. Mr. Wysor also served for a short while as a mining engineer in the Pocahontas coal fields of West Virginia.

Mr. Walter Silvus has been appointed master mechanic of the Chicago & Milwaukee Electric Railroad, Highwood, Ill., to succeed Mr. L. L. Smith, resigned. Mr. Silvus began his railroad career with the Baltimore & Ohio Railroad in April, 1893, and remained in the employ of that company for 10 years. During seven years of his service with the Baltimore & Ohio Railroad Mr. Silvus was a foreman for the company. In 1903 he accepted a position with the Chicago, Lake Shore & Eastern Railroad at Chicago as shop foreman, but resigned from that company in January, 1904, to become general inspector of the Twin City Rapid Transit Company, Minneapolis, Minn. He resigned from the Twin City Rapid Transit Company on Sept. 15, 1909, to enter the employ of the Chicago & Milwaukee Electric Railroad.

Mr. L. L. Smith, whose resignation as master mechanic of the Chicago & Milwaukee Electric Railroad, Highwood, Ill., effective on Sept. 21, was noted on page 486 of the *ELECTRIC RAILWAY JOURNAL* of Sept. 25, has been master mechanic of the Chicago & Milwaukee Electric Railroad for the last 2½ years. Previously he held a similar position with the Schenectady (N. Y.) Railway. Before entering electric railway service Mr. Smith had extended experience in the mechanical department of steam railroads. Since he has been connected with the electric railways Mr. Smith has been actively identified with the work of the American Street & Interurban Railway Engineering Association, serving last year as chairman of the committee on maintenance and inspection of electrical equipment and being at present a member of the executive committee, chairman of the equipment committee and member of the committee on standards of the association.

Mr. E. S. Vollick has recently had assigned to him the duties of trainmaster and car house foreman of the Toledo & Chicago Interurban Railway, Kendallville, Ind. Mr. Vollick succeeds Mr. J. Hanff as car house foreman, and as

trainmaster succeeds to the duties of the office of superintendent, which position was abolished following the resignation of Mr. Harry Fraser, noted elsewhere in this column. For five years Mr. Vollick was engaged as section hand on the Michigan Central Railroad at Ceresco, Mich., and for three years was connected with the construction and maintenance of way department of the Jackson & Battle Creek Traction Company. For a year he was an extra gang foreman with the Toledo & Chicago Interurban Railway and for two years and three months had charge of the maintenance of way line department of the Toledo & Chicago Interurban Railway, during which time the road was extended from Auburn to Waterloo and from Garrett to Kendallville, and placed in operation between these cities.

Mr. Robert I. Todd, whose election as general manager of the Terre Haute, Indianapolis & Eastern Traction Company, Richmond, Ind., to succeed the late C. C. Reynolds was noted in the *ELECTRIC RAILWAY JOURNAL* of Sept. 25,



R. I. Todd

1909, page 487, has been connected with street and electric railway work for 16 years. Soon after he was graduated from Johns Hopkins University Mr. Todd became connected with the Eckington & Soldiers' Home Railway and the Belt Railway, Washington, D. C., operating underground conduit roads, and was subsequently connected with the Consolidated Traction Company, Pittsburgh; the Cincinnati (Ohio) Traction Company; the United Gas Improvement Company, Philadelphia; and the Rhode Island Company, Providence, R. I. He was also at one time identified with the development of compressed air for street railway service in New York, and for a time had charge of the experimental work of the Compressed Air Company in connection with this development. As vice-president and general manager of the Indianapolis Traction & Terminal Company, Mr. Todd is responsible for the operation of 158 miles of city and suburban lines over which 650 cars are run, and as general manager of the Terre Haute, Indianapolis & Eastern Traction Company he will be responsible for the operation of 70 miles of interurban electric railway over which 20 cars are run. For some time past Mr. Todd has been active in the affairs of the American Street & Interurban Railway Association, and at this time is first vice-president of the American Street & Interurban Railway Transportation & Traffic Association.

OBITUARY

Ros Marquis, chief engineer of the power station of the Citizens' Railway, Waco, Tex., who was shot by a striking employee of the company, is dead.

H. B. Smith, president of the Evansville & Southern Indiana Traction Company, Evansville, Ind., died at Ft. Wayne, Ind., on Sept. 25. Mr. Smith was president of the Citizens' National Bank, Hartford City, Ind., and a stockholder in several interurban lines beside the Evansville & Southern Indiana Traction Company.

A ruling of the Public Service Commission, Second District, New York, refusing the Delaware & Hudson Company permission to issue \$13,000,000 bonds to purchase the Hudson Valley Railway securities and coal lands in Pennsylvania, was annulled in a decision handed down on Sept. 25 by the Appellate Division of the Supreme Court of New York, Third Judicial Department. The court directs that the matter be remitted to the Public Service Commission for further consideration. The Delaware & Hudson Company some time ago applied to the commission for permission to issue a mortgage on its property to cover an issue of bonds for certain expenditures. The commission gave its authorization for the bond issue, except for that portion relating to the purchase of the coal lands and the property of the Hudson Valley Railway. From this portion of the decision the Delaware & Hudson Company appealed. The refusal of the commission to authorize that part of the bond issue which was to cover the purchase of coal lands and traction securities was based upon the commission's report that such properties were not essential to the conduct of a railroad proper, and could not therefore be included in its capitalization.

Construction News

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

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

RECENT INCORPORATIONS

St. Louis County Belt Railroad, St. Louis, Mo.—Incorporated to build an electric belt railway through St. Louis County from North to South, and circling St. Louis. The railway will be 30 miles long, extending from Jefferson Barracks on the south to O'Neil on the north, circling St. Louis at an average distance of 3 miles from the city limits, and passing through Webster Groves, Maplewood, University City, Wellston and Ferguson, and the unincorporated towns of Affton, Clayton, Wheaton, Carsonville and Spanish Lake. The cost will be approximately \$2,000,000. Headquarters, 414 Roe Building, St. Louis. Capital stock, \$200,000. Incorporators: Jas. D. Houseman, Clayton; Thos. M. Gallagher, Webster Groves; Jas. E. Hereford, Ferguson; Edw. W. Rannels, Maplewood; Geo. B. Bowles, Affton; Chas. A. Autenrieth, Clayton; Albert Wehmeyer. [E. R. J., Sept. 11, '09.]

***Bedford, Fulton & Franklin Street Railway, Bedford, Pa.**—Application has been made by this company to the Governor of Pennsylvania for a charter to build a double-track street railway from Bedford to Chambersburg. Incorporators: M. J. Murphy, H. D. Tate, George W. Rook, John F. Fay, M. H. Sheats and I. Y. Daly.

***Center County Traction Company, Bellefonte, Pa.**—Application was made to the Governor of Pennsylvania on Sept. 21 by this company for a charter to build a street railway from Bellefonte to State College. Incorporators: W. C. Hagan, Wm. H. Furey and L. T. Munson.

El Paso & Fort Hancock Railway, El Paso, Tex.—Incorporated to build an electric railway to connect El Paso, Ysleta, Socorro, San Elizario, Clint and Fabens. Headquarters, Plaza Block, El Paso. Capital stock, \$100,000. Incorporators: C. E. Kelly, Richard Caples, W. B. Latta, Felix Martinez, Thomas O'Keeffe and Richard F. Burgess, El Paso. [E. R. J., Aug. 21, '09.]

Fort Worth, Mineral Wells & Western Railroad, Fort Worth, Tex.—Incorporated to build an electric railway from Fort Worth to Mineral Wells via Weatherford, a distance of 54 miles, and later to Roswell, N. Mex. Capital stock, \$100,000. Incorporators: L. C. Cole, Fort Worth; N. M. James, and J. S. Hanford, Beaumont, Tex. [E. R. J., Sept. 18, '09.]

FRANCHISES

San José, Cal.—The Board of Supervisors has determined to grant the franchise for the right to build an electric railway along the county highway between Palo Alto and Mayfield, applied for by the Peninsular Railway. Bids will be opened Oct. 18, and the franchise sold to the highest bidder. The successful bidder will be required to put up two securities in the penal sum of \$1,000. [E. R. J., Sept. 11, '09.]

Moline, Ill.—The Board of Supervisors has granted a 20-year franchise to the Tri-City & Northeastern Interurban Railway, Port Byron, to build an electric railway from Port Byron to Rapids City. The franchise provides that the railway must be in operation within three years. The company is to build an electric railway from Watertown to Albany. J. W. Simonson, Port Byron, president. [E. R. J., Sept. 18, '09.]

***Paoli, Ind.**—The Board of Commissioners of Orange County has granted a franchise to Charles D. Kelso and J. H. Fawcett to build an interurban electric railway over the county turnpike from Paoli to New Albany. The franchise provides that the railway must be completed by Dec. 15, 1910. An effort will be made to obtain a right-of-way from Paoli to French Lick.

Juarez, Mexico.—The State Government has granted to the El Paso (Tex.) Electric Railway the right to extend its electric railway in Juarez to the race track projected by Col. M. J. Winn, Louisville, Ky. H. S. Potter, general manager.

New York, N. Y.—W. O. Wood, president of the New York & Queens County Railway, has sent a communication to the Board of Estimate and Apportionment asking permission to operate cars over the Queensboro Bridge pending the application which is before the Board for a permanent franchise.

Chesapeake, Ohio.—The Town Board has granted a 25-year franchise to A. E. Cox and associates, Huntington, to build an electric railway through Chesapeake. The proposed railway will extend from Ironton to Gallipolis on the

Ohio side of the Ohio River and from Point Pleasant to Guyandotte on the West Virginia side. [E. R. J., Aug. 14, '09.]

Mansfield, Ohio.—The City Council has extended the franchise under which the Mansfield Railway, Light & Power Company has the right to construct a single-track street railway over certain streets of Mansfield. The extension provides that the railway shall be completed before Dec. 1, 1910.

Stuebenville, Ohio.—The County Commissioners of Jefferson County have granted a perpetual franchise to the Wheeling (W. Va.) Traction Company to operate its electric railway over the highway from Mingo to Brilliant.

Oregon City, Ore.—The City Council has granted a franchise to the Oregon City, Beaver Creek & Molalla Railway to operate its proposed electric railway on Main Street, instead of along the Molalla River. F. M. Swift is said to be interested. [E. R. J., Aug. 14, '09.]

Richmond, Va.—The amended franchise, recently granted by the City Council to the Richmond & Henrico Railway extending the time for the construction of its proposed railway and viaduct one year from June 30, 1909, has become void, as the company failed to start work within 90 days after the passage. [E. R. J., Sept. 18, 1909.]

TRACK AND ROADWAY

Phoenix (Ariz.) Railway.—This company has started surveys for the 6-mile extension of its street railway. Samuel H. Mitchell, general manager.

British Columbia Electric Railway, Vancouver, B. C.—This company is said to be running cars on the Chilliwack branch between New Westminster and Cloverdale, a distance of 12 miles. A regular service between these points will be begun about Oct. 1. The company's extension to Eburne, B. C., was placed in operation on Sept. 15.

Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga.—It is announced that this company has awarded the contract for 2 miles, of its electric railway, from Stonewall to Fairburn, Ga., to John Wright & Company. W. T. Roberts, Fairburn, president. [E. R. J., June 5, '09.]

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—This company expects to build a double 9 ft. x 9 ft. box culvert with reinforced concrete about 2 miles south of Milwaukee, Wis. The company will also build a 40-ft. through girder span, steel bridge with concrete abutments at Willow Street, Winnetka, Ill.

Chicago (Ill.) Railways.—This company has let the contract for the second section of the Washington Street tunnel, under the Chicago River, to George W. Jackson, Inc., Chicago, which will cost \$590,000, and is to be completed in 490 days. The Van Buren Street tunnel is nearly completed, and the La Salle Street tunnel and first section of the Washington Street tunnel have been started.

Wichita Railroad & Light Company, Wichita, Kan.—W. R. Morrison, superintendent, writes that this company expects to place contracts within two months for constructing 2 miles of track in pavement.

New Orleans & Seashore Railway, New Orleans, La.—This company has awarded the contract for the construction of its electric railway from New Orleans to Grand Isle, La., a distance of 50 miles, to Black & Laird, 303 Godchaux Building, New Orleans. It is the company's intention to commence work within the next 60 days. J. W. T. Stephens, 303 Cotton Exchange Building, New Orleans, chief engineer. [E. R. J., March 27, '09.]

Boston Transit Commission, Boston, Mass.—This company has begun the work of building the Boston section of the Cambridge subway on the westerly side of Beacon Hill at Grove Street. The work is in charge of Patrick McGovern, 6 Beacon Street, Boston.

Boston & Northern Street Railway, Boston, Mass.—This company has petitioned the Railroad Commissioners of Massachusetts asking approval of two locations desired by that company. The petition requests permission to lay tracks on Ocean Street, Lynn, and to extend the company tracks on Humphrey Street, Swampscott.

Michigan Central Railroad, Detroit, Mich.—It is understood that this company has arranged to use the right-of-way of the Detroit United Railways into Flint. The plan is to use the right of way from Oxford to Flint, a distance of 30 miles.

Michigan United Railways, Lansing, Mich.—This company has opened its extension from Jackson to Leslie. The railway is equipped with the third rail system for operation.

Vicksburg (Miss.) Traction Company.—This company expects to place the contract, within the next year, for 7500 ft. of track.

Interstate Railway, Kansas City, Mo.—The construction of this electric railway from Kansas City to St. Joseph has been placed in charge of the Electric Traction Company, Commerce Building, Kansas City, Mo. Bids for building the railway will be opened immediately. It is estimated that the cost of construction will be \$2,000,000. N. C. Van Natta, Corley Building, St. Joseph, has personal charge of the work. [E. R. J., July 17, '09.]

Yellowstone Valley Traction Company, Billings, Mont.—A. D. Bowen, Kansas City, Mo., representing this company, has matured his plans for the electric railway to extend from Billings to Laurel and eventually to other towns. The preliminary surveys have been completed and four routes have been located. The board of directors for the first three months are: J. B. Arnold, H. W. Rowley, Christian Yegen, P. B. Moss, I. D. O'Donnell, Joseph Zimmerman and R. E. Shepherd. [E. R. J., Oct. 31, '08.]

***Baker Construction Company, Fremont, Neb.**—This company has been organized to build an electric railway from Fremont to Omaha. Capital stock, \$100,000. Directors: E. L. Whitcomb, O. C. Phillips, C. W. Baker, Peter Mangold and John G. Huglin.

Second Avenue Railroad, New York, N. Y.—This company, which has recently been granted permission by the Public Service Commission of the First District to issue \$500,000 in bonds, announces that it will spend \$150,000 for electrifying several horse car lines in New York.

Goldsboro (N. C.) Traction Company.—This company, which is building a 2½-mile extension, has recently placed orders with the Indianapolis Switch & Frog Company, Springfield, Ohio, for 3 standard 3-rail type crossings, steam with electric railway, also a spring switch, mate and frog, necessary for a turnout for branch line.

Cincinnati (Ohio) Traction Company.—This company expects to build about 1 mile of track in Norwood, a suburb of Cincinnati.

Cincinnati, Dayton & Fort Wayne Railway, Dayton, Ohio.—It is announced that this company will be reorganized and will resume work on its proposed electric railway. Instead of extending into Indiana, as originally planned, it is the intention of the company to build the railway to Toledo, Ohio, with a branch to Detroit. The company intends to use the tracks of the Cincinnati & Westwood Railroad between Cincinnati and Dayton.

***Fostoria, Ohio.**—F. D. Carpenter, Lima, and J. D. McDonnell and L. H. McDonnell, Fostoria, are said to be interested in the revival of the project of building an electric railway between Fremont and Fostoria. Two years ago surveys were made and rights of way secured for this railway. It is stated that the parties interested have been negotiating with the Fremont Street Railway to purchase its property.

Nipissing Central Railway, North Cobalt, Ont.—This company will lay 6 miles of track on its proposed railway between Cobalt and Haileybury, Ont., the grading having been completed. Clarence B. Henry, North Cobalt, electrical and chief engineer. [E. R. J., July 31, '09.]

Bloomsburg & Millville Street Railway, Bloomsburg, Pa.—C. W. Miller, president, writes that work on this electric railway, which is being constructed from Bloomsburg to Millville, has been suspended for some time past. It is not definitely known when work will be resumed.

Montreal & Southern Counties Railway, Montreal, Que.—According to the contractors this system will be in operation between Montreal and St. Lambert, Que., about Oct. 15. Harold A. Richardson, 112 St. James Street, Montreal, president. [E. R. J., Sept. 18, '09.]

Corpus Christi, Tex.—Daniel Hewitt, Salina, Kan., who was recently granted a franchise to construct a street railway in Corpus Christi, has placed orders for the necessary ties, rails and equipment. Surveys will be started immediately and the railway completed within nine months. [E. R. J., Aug. 14, '09.]

Gainesville, Whitesboro & Sherman Railway, Gainesville, Tex.—This company has 13 miles of railway graded, and hopes to begin construction in a short time. The company desires to correspond with a construction or engineering company which would study local conditions with a view of completing the railway. Thos. M. Bosson, secretary.

San Antonio (Tex.) Traction Company.—This company has recently placed an order with the Lorain (Ohio) Steel Company for 90-lb. rails. This is to be used to replace 60-lb. T-rails in a mile extension of the paved district. The Fernando division of this railway extending into the irrigated garden district has been completed, and opened for traffic as far as Union Stock Yards. It is stated that the remainder will be completed and opened by Oct. 1. J. J. King, superintendent.

SHOPS AND BUILDINGS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company is said to have plans to erect a \$12,000 brick building on First Avenue. The new building will be used as a new headquarters and passenger station.

Pacific Electric Railway, Los Angeles, Cal.—This company is building an elevated platform from its passenger station at Sixth Street and Main Street across Los Angeles Street, which will cost \$68,000. The platform will be 420 ft. long with an elevation of 14 ft., and will be of steel built on a concrete foundation. The material has been ordered and the contracts for construction have been let. The platform will allow trains of four to six cars to enter the station over Main Street, and running through to the new tracks, can be switched and started out of the building again.

Wichita Railroad & Light Company, Wichita, Kan.—This company expects to place the contract during the next two months for the erection of a new car house.

Fargo & Moorhead Street Railway, Fargo, N. D.—This company is building a paint shop, 118 ft. x 36 ft., which will cost \$6,000. The plant will be heated by steam.

Cincinnati (Ohio) Traction Company.—This company expects to construct a new club house for employees at the Brighton car house.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—M. E. McCaskey, general manager, advises that this company has awarded the contract for the construction of a new car house adjacent to Idora Park.

Lake Shore Electric Railway, Cleveland, Ohio.—This company is moving the woodworking and drying machinery from its shops at Fremont to its new shops at Sandusky. It is announced that the Fremont shops will eventually be abandoned.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—This company is to begin work within a few days on the erection of a new headquarters and station in Willoughby, for which the company let the contract recently. Plans for the building have been completed by Franz C. Warner, Citizens' Building, Cleveland. The building will be 35 ft. x 61 ft., three stories high with a basement, and it will cost about \$20,000. The ground floor will be used for the general ticket office, waiting and baggage rooms and the employees' quarters. The second and third stories of the new building will be used as headquarters for the company and by the engineering department, respectively. [E. R. J., Sept. 25, '09.]

Vicksburg (Miss.) Traction Company.—This company advises that it expects to build a new car house during the next year.

POWER HOUSES AND SUBSTATIONS

Indiana Union Traction Company, Anderson, Ind.—It is stated that this company has purchased the dam and power property of the Noblesville (Ind.) Hydraulic Company, which is being completed on White River, 2 miles north of Noblesville. The plant is being built for electrical power and light purposes.

Boston (Mass.) Elevated Railway.—This company is planning to build a substation in the Forest Hills district, at the intersection of Washington Street and Bray Street, to be used in supplying power to the Forest Hills elevated railway extension.

Detroit (Mich.) United Railway.—This company is said to have plans for the erection of a substation at Milwaukee Avenue and Dubois Street. The feed wires leading from the main station near Riopelle Street and Atwater Street to the substation will be placed under ground. The improvements will cost about \$150,000.

Western Ohio Railway, Lima, Ohio.—This company is installing a 1000-kw turbine in its power house at St. Mary's in order to furnish additional power to its railway.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company has placed contracts for one 600-kw motor generator set with the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., and one 200-kw motor generator set with the General Electric Company, Schenectady, N. Y. It is stated that two additional boilers will be installed in the North Avenue power station about Nov. 1, which will mean an addition of 1000 hp.

Whatcom County Railway & Light Company, Bellingham, Wash.—This company plans to double the capacity of its York Street power station which will involve an expenditure of \$140,000. The company is installing a new water wheel to displace the turbine in use at the Nooksack Falls power station, at a total cost of \$35,000. The York Street station has at present a capacity of 2000 hp.

Manufactures & Supplies

ROLLING STOCK

Valdosta (Ga.) Street Railway is in the market for two closed cars with electric heaters and two 12-A Westinghouse motors.

Chicago (Ill.) City Railway has ordered the 50 pay-as-you-enter cars, mentioned in the *ELECTRIC RAILWAY JOURNAL* of Sept. 11, 1909, from The J. G. Brill Company.

Pittsburgh (Pa.) Railways, reported in the *ELECTRIC RAILWAY JOURNAL* of Aug. 7, 1909, as having ordered 50 cars from the St. Louis Car Company, is having these 50 cars built by The J. G. Brill Company.

Muskogee (Okla.) Electric Traction Company has contracted with the Cincinnati Car Company for the construction of six pay-as-you-enter cars, to be built under license from the Pay-As-You-Enter Car Corporation.

Louisville (Ky.) Railway, which has ordered 33 city cars from the St. Louis Car Company, noted in the *ELECTRIC RAILWAY JOURNAL* of Sept. 25, 1909, has specified Baldwin 58-20 trucks for these cars instead of St. Louis trucks, as stated in the previous record of this order.

Indianapolis, Crawfordsville & Western Traction Company, Crawfordsville, Ind., has contracted with the Westinghouse Electric & Manufacturing Company for 10 four-motor equipments, consisting of Westinghouse 304 interpole motors and K-34-B controllers.

Edmonton Radial Railway, Edmonton, Alta, Can., has recently received from the Preston Car Company a sprinkler which is about to be placed in operation. The company expects to purchase eight four-motor passenger cars of the pay-as-you-enter type, equipped with electric heaters, automatic fenders and air-brake equipments.

TRADE NOTES

Perry Ventilator Corporation, New Bedford, Mass., has been awarded the order for ventilators for cars for the Syracuse Railroad Construction Company being built by the G. C. Kuhlman Car Company at its works at Collingwood, Ohio.

Queen & Company, Inc., Philadelphia, Pa., have furnished a Landgraf-Turner alternating impact testing machine to the Bureau of Standards, Washington, D. C., and have received an order from the Royal Italian Navy for a testing machine to go to Italy by the Italian cruiser now in New York Harbor.

Stuart-Howland Company, Boston, Mass., reports a very satisfactory condition of business. It now has 17 salesmen on the road, covering nearly the whole of the United States and Canada. Its export business is also extensive. During the recent period of business depression it steadily increased its business and sales in 1909 will be at least 30 per cent greater than in 1908. The company is agent for some of the best electric railway specialties and lighting equipment.

Harold P. Brown, New York, N. Y., is the manufacturer of the Brown plastic bonds used in Denver and described elsewhere in this issue, on a section of track which has been constructed 13 yeards. Recent tests made as to the conductivity of this track proved that the joints were in very good condition. Mr. Brown states that reports of a very similar character have recently been received from Scranton, Pa.; Newark, N. J., and Hingham, Mass. Mr. Brown has recently brought out, for the purpose of installing these bonds, an electro-pneumatic hammer of a very strong and light construction, by means of which a contact surface can be prepared on the rail in excellent manner in less than 30 seconds. The filelike surface which it produces on the rail metal has been found to be very advantageous for plastic bonds.

Dodge Manufacturing Company, Mishawaka, Ind., has recently made public some interesting facts regarding the extent of its plant at Mishawaka and its products. The buildings of the company cover nearly 40 acres in a 60-acre location on the Lake Shore & Michigan Southern Railway. There are annually consumed 20,000 tons of pig iron, 7,000,000 ft. of lumber, 900 tons of steel and structural iron, 6200 tons of steel shafting and 9000 tons of coal, and there are annually produced 250,000 Independence wood split pulleys, 100,000 Dodge Standard iron split pulleys, 90,000 solid iron pulleys, 95,000 hangers, 150,000 bearings of all types, 4000 friction clutches and more than 2,000,000 lb. of bearing metal. The boilers have a capacity of 1500 hp and the steam engines 1500 hp with electric generators of 250 kw. The steel shop in which the Eureka water softener and purifier is made, has a capacity for turning out 52 fully equipped machines per annum.

ADVERTISING LITERATURE

Keasbey & Mattison Company, Ambler, Pa., has prepared an illustrated booklet on its asbestos shingles, slates and sheathings, together with numerous views of their application.

Arthur S. Partridge, St. Louis, Mo., in Schedule No. 31, dated Sept. 20, 1909, lists for sale a number of street and interurban cars, motors and power house equipment of all sizes and types.

Westinghouse Machine Company, East Pittsburgh, Pa., has issued Circular W M 503, dated September, 1909. The subject of the publication is "Westinghouse Gas Producers for Bituminous Fuels."

MacGovern, Archer & Company, New York, N. Y., have issued a list of electrical and steam machinery, power house equipment, cars, etc., which they offer for sale, dated October, 1909. The list is somewhat larger than usual.

Duplex Metals Company, New York, N. Y., is distributing a blotter on which is reproduced a testimonial letter from the Dominion Power & Transmission Company, Ltd., regarding the Duplex Metals Company's coffer-clad steel wire.

American Ventilator Company, New York, N. Y., has just published an attractive pamphlet descriptive of its ventilating system for steam and electric railway cars. Views of a number of the cars of important electric railway companies using this system of ventilation are shown.

Alexander Milburn Company, Baltimore, Md., has issued a new catalog, in which its portable acetylene lights are described and illustrated. Milburn lights are especially adapted for use in railroad and building construction work, and a long list of users of the lights is given in the publication.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., has issued Bulletin No. 23, showing its present line of switches and switchboard appliances. Particular attention is given to 600-volt d. c. railway apparatus, including standard section switches, canopy switches and cab heater switches.

Goldschmidt Thermit Company, New York, N. Y., has printed in the third quarterly issue for 1909 of its publication, *Reactions*, two articles of particular electric railway interest. These articles are on electrolysis and track bonding in Winnipeg, and on the Clark modification of the thermit rail joint.

Jos. Dixon Crucible Company, Jersey City, N. J., has issued a 12-page booklet of envelope size describing the company's facings for various kinds of work. General information is given on the proper use of facings, the values of different kinds of facings, the working conditions met in foundry practice, etc.

Rooke Automatic Register Company, Providence, R. I., has just published a "paper" on the Rooke System of Fare Collection, giving the advantages of this register for prepaying cars. The Rooke portable register is a well-known device, and the manufacturers have recently applied the same principle to a stationary registry for use on pay-as-you-enter or other prepayment cars. The details of the register are fully described and illustrated.

Bausch & Lomb Optical Company, Rochester, N. Y., is distributing a leaflet entitled "Unique Features of Bausch & Lomb Engineering Instruments," in which some valuable suggestions are given concerning the testing of objectives to determine whether or not the full aperture is utilized, and many of the especially advantageous departures in construction are explained. The line of engineering instruments made by the Bausch & Lomb Optical Company is a comparatively new one.

NEW PUBLICATIONS

Lessons in Telegraphy. By Charles Henry Sewall. New York: D. Van Nostrand Company, 1909; 90 pages with index. Cloth, \$1.00 net.

This is a text-book for those desiring to become telegraph operators. It contains numerous exercises, including specimens of telegraphic train dispatching and the like.

Boys on the Railroad. New York: Harper & Brothers, 1909; 213 pages; eight full-page half-tone illustrations. Cloth, 60 cents.

Railroad life has furnished unnumbered tales of hair-raising adventures, and this collection of 13 stories by as many authors are typical of the best of this kind. The stories were carefully selected by the publishers for a volume suitable for the red-blooded American boy. "True to His Name" is the only tale which proves that street railway operation also has its exciting incidents, for it gives a veracious account of a runaway cable car in the good city of Philadelphia.

TABLE OF MONTHLY EARNINGS

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income	Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Aug. '09	231,062	115,724	115,338	43,703	71,634	JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., July '09	39,300	22,353	16,947	9,367	7,580
	1 " " '08	209,742	107,357	102,385	43,381	59,004		1 " " '08	35,559	20,691	14,868	9,303	5,565
	8 " " '09	1,432,015	784,740	647,276	350,414	296,861		8 " " '09	458,076	260,205	197,870	111,081	86,789
	8 " " '08	1,247,878	730,392	517,486	351,331	166,155		8 " " '08	411,650	252,096	159,555	105,293	54,262
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., July '09	34,485	18,363	16,121	8,061	8,060	MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Aug. '09	378,256	175,187	203,069	111,231	91,838
	1 " " '08	29,123	17,196	11,927	8,166	3,761		1 " " '08	343,511	160,889	182,622	101,155	81,467
	8 " " '09	383,394	220,297	163,096	101,815	61,281		8 " " '09	2,778,677	1,358,765	1,419,911	841,289	578,622
	12 " " '08	362,017	204,685	157,333	93,611	63,722		8 " " '08	2,570,819	1,326,537	1,244,281	792,860	451,421
BINGHAMTON, N.Y. Binghamton St. Ry. Co.	1m., Aug. '09	34,348	16,025	17,323	9,135	8,188	Milwaukee Lt., Ht. & Trac. Co.	1m., Aug. '09	152,102	37,331	114,771	70,786	43,986
	1 " " '08	32,892	18,518	14,374	8,517	5,857		1 " " '08	149,907	35,187	114,720	65,012	49,708
	8 " " '09	230,721	130,007	100,714	72,429	28,285		8 " " '09	967,265	254,226	713,039	511,698	201,341
	8 " " '08	211,134	125,002	86,132	65,803	20,329		8 " " '08	928,896	245,793	683,103	475,494	207,609
BIRMINGHAM, ALA. Birmingham Ry., Lt. & Power Co.	1m., Aug. '09	181,979	100,486	81,493	.....	.....	MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., July '09	640,094	277,571	362,523	140,251	222,273
	1 " " '08	172,068	105,630	66,438	.....	.....		1 " " '08	606,374	278,139	328,235	128,361	199,874
	8 " " '09	1,458,461	817,916	640,545	.....	.....		7 " " '09	3,890,160	1,900,053	1,990,107	968,009	1,022,099
	8 " " '08	1,404,375	820,582	583,793	.....	.....		7 " " '08	3,589,223	1,813,729	1,775,494	877,789	897,705
CHAMPAIGN, ILL. Illinois Tr. System.	1m., July '09	362,729	215,822	146,907	.....	.....	MONTREAL, CAN. Montreal St. Ry.	1m., Aug. '09	355,230	183,583	171,647	59,027	112,620
	1 " " '08	342,273	191,280	150,993	.....	.....		1 " " '08	329,772	164,262	165,510	54,113	111,398
	7 " " '09	2,416,947	1,453,337	963,610	.....	.....		11 " " '09	3,492,777	2,078,393	1,414,379	418,802	995,577
	7 " " '08	2,255,790	1,329,873	925,917	.....	.....		11 " " '08	3,329,060	1,973,659	1,350,401	423,021	927,380
CHARLESTON, S. C. Charleston Con. Ry. Gas & Elec. Co.	1m., Aug. '09	68,484	45,573	22,911	13,917	8,995	NASHVILLE, TENN. Nashville Railway & Light Co.	1m., Aug. '09	137,255	70,882	66,373	.....	.....
	1 " " '08	63,803	42,943	20,860	13,642	7,218		1 " " '08	126,946	66,416	60,530	.....	.....
	6 " " '09	391,418	243,292	148,126	83,500	64,626		8 " " '09	1,103,101	553,730	549,371	.....	.....
	6 " " '08	386,972	245,702	141,269	82,725	58,544		8 " " '08	1,008,528	527,653	480,875	.....	.....
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., July '09	167,614	77,895	89,719	28,899	60,820	NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Aug. '09	174,210	96,336	77,874	63,118	14,756
	1 " " '08	148,748	72,208	76,540	27,778	48,762		1 " " '08	156,509	86,535	69,974	61,574	8,400
CLEVELAND, O. Cleveland, Painesville & Eastern R. R.	1m., Aug. '09	36,389	*16,299	20,090	8,328	11,762	PADUCAH, KY. Paducah Traction & Light Co.	1m., July '09	19,152	11,592	7,560	6,624	936
	1 " " '08	33,137	*16,359	16,779	8,108	8,671		1 " " '08	18,776	11,403	7,374	6,844	530
	8 " " '09	210,845	*104,302	106,542	66,820	39,722		12 " " '09	222,910	130,749	92,162	82,161	10,000
	8 " " '08	197,258	*107,834	89,424	64,262	25,161		12 " " '08	235,493	141,615	93,878	83,209	10,668
Lake Shore El. Ry.	1m., July '09	121,185	55,650	65,534	33,786	31,748	PENSACOLA, FLA. Pensacola Electric Co.	1m., July '09	23,461	12,603	10,858	4,305	6,553
	1 " " '08	110,428	55,733	54,695	33,389	21,306		1 " " '08	19,630	12,058	7,571	4,269	3,302
DALLAS, TEX. Dallas Electric Corporation.	1m., July '09	103,340	68,107	35,233	28,404	6,830	PHILADELPHIA, PA. American Rys. Co.	1m., Aug. '09	284,487	.....	.....	.....	.....
	1 " " '08	101,397	71,130	30,268	29,830	437		1 " " '08	272,679	.....	.....	.....	.....
	12 " " '09	1,247,675	783,120	464,555	341,392	123,163		2 " " '09	571,930	.....	.....	.....	.....
	12 " " '08	1,144,447	769,959	374,488	352,586	21,902		2 " " '08	544,291	.....	.....	.....	.....
DETROIT, MICH. Detroit United Railway.	1m., July '09	784,123	466,319	317,804	*162,050	155,754	PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., July '09	18,022	9,090	8,932	1,675	7,257
	1 " " '08	685,908	*417,869	268,039	135,978	132,061		1 " " '08	15,956	9,278	6,678	2,274	4,403
	7 " " '09	4,494,262	2,717,679	1,776,583	*1,088,384	688,199		12 " " '09	128,337	86,334	42,003	23,514	18,489
	7 " " '08	3,999,946	*2,528,176	1,471,770	948,952	522,818		12 " " '08	120,545	91,578	28,967	27,689	1,278
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Aug. '09	177,210	90,954	86,256	.....	.....	PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Aug. '09	429,276	190,225	239,051	124,981	114,070
	1 " " '08	174,381	91,104	83,277	.....	.....		1 " " '08	365,849	174,040	191,809	114,191	77,618
	8 " " '09	1,304,676	730,681	573,995	.....	.....		8 " " '09	3,126,870	1,457,791	1,669,079	982,410	686,669
	8 " " '08	1,317,827	694,077	623,750	.....	.....		8 " " '08	2,848,823	1,423,787	1,425,036	924,228	500,808
EL PASO, TEX. El Paso Elec. Co.	1m., July '09	46,362	29,204	17,158	8,085	9,073	ST. JOSEPH, MO. St. Joseph Ry., Lt., Heat & Pwr. Co.	1m., Aug. '09	90,524	44,167	46,357	21,758	24,599
	1 " " '08	40,821	29,352	11,469	7,209	4,260		1 " " '08	83,444	39,970	43,474	20,837	22,637
	12 " " '09	562,858	371,885	190,973	92,143	98,830		8 " " '09	634,532	333,721	300,801	170,021	130,780
	12 " " '08	532,675	374,426	158,249	80,557	77,692		8 " " '08	577,251	302,873	274,368	164,174	110,194
FAIRMONT, W. VA. Fairmont & Clarksburg Tr. Co.	1m., July '09	39,899	13,356	26,543	.....	.....	ST. LOUIS, MO. United Railways Co. of St. Louis.	1m., Aug. '09	957,246	*599,645	357,601	232,420	125,181
	1 " " '08	35,462	12,315	23,147	.....	.....		1 " " '08	911,515	*572,879	338,636	234,551	104,085
	7 " " '09	231,048	90,242	140,806	.....	.....		8 " " '09	7,297,057	*4,628,348	2,668,709	1,869,499	799,210
	7 " " '08	210,081	83,136	126,945	.....	.....		8 " " '08	6,973,281	*4,518,905	2,454,376	1,862,952	591,424
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., July '09	123,547	72,385	51,162	.....	.....	SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., July '09	621,753	359,224	262,529	.....	.....
	1 " " '08	115,470	65,481	49,988	.....	.....		1 " " '08	568,759	.....	.....	.....	.....
	7 " " '09	772,202	463,220	308,982	.....	.....		7 " " '09	4,190,657	2,441,556	1,749,101	.....	.....
	7 " " '08	730,671	426,075	304,595	.....	.....		7 " " '08	3,910,212	.....	.....	.....	.....
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., July '09	109,212	59,835	49,378	17,190	32,188	SAVANNAH, GA. Savannah Elec. Co.	1m., July '09	55,112	38,246	17,565	17,444	121
	1 " " '08	98,983	58,787	40,196	18,033	22,163		1 " " '08	53,455	32,764	20,690	17,507	3,183
	12 " " '09	1,186,590	663,239	523,351	198,241	325,110		12 " " '09	608,333	381,517	226,817	209,314	17,503
	12 " " '08	1,063,627	618,576	445,052	179,518	265,534		12 " " '08	599,160	405,481	193,680	204,711	†11,031
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., July '09	109,747	62,070	47,678	21,596	26,082	SEATTLE, WASH. Seattle Elec. Co.	1m., July '09	592,587	305,028	287,559	108,702	178,857
	1 " " '08	93,375	52,005	41,370	20,085	21,285		1 " " '08	366,481	209,950	156,531	94,859	61,672
	12 " " '09	1,171,764	674,402	497,362	253,342	244,020		12 " " '09	5,181,859	3,050,470	2,131,389	1,193,445	937,944
	12 " " '08	1,063,623	624,497	439,126	239,368	199,758		12 " " '08	4,381,787	2,591,734	1,790,054	1,032,944	757,110
GRAND RAPIDS, MICH. Grand Rapids Railway.	1m., Aug. '09	99,838	42,456	57,382	19,035	38,347	TACOMA, WASH. Puget Sound Elec. Railway.	1m., July '09	184,531	106,044	78,487	48,508	29,979
	1 " " '08	91,289	41,549	49,740	18,819	30,921		1 " " '08	151,035	92,315	58,720	43,648	15,072
	8 " " '09	678,396	319,762	358,634	151,812	206,822		8 " " '09	1,749,826	1,172,759	577,067	542,220	34,848
	8 " " '08	618,670	302,302	316,368	147,490	154,812		12 " " '08	1,625,531	1,014,829	610,702	503,524	107,179
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Aug. '09	70,031	52,646	18,385	.....	.....	TAMPA, FLA. Tampa Elec. Co.	1m., July '09	47,172	30,403	16,769	4,700	12,069
	1 " " '08	68,836	49,481	19,355	.....	.....		1 " " '08	45,192	32,663	12,729	2,426	