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CONTENTS.



### Atlantic City Convention

The Atlantic City convention of 1910 has now passed into history. To those who attended this year it would be almost a truism to say that the convention was the most successful in the history of the association and that the results reflect great credit upon everyone who had anything to do with the arrangements. This includes the executive committee and secretary of each of the associations, and also the entertainment committee, the exhibit committee and the other committees of the Manufacturers' Association whose work was so much in evidence at Atlantic City. The thanks of the association are also due to the weather man, whose good behavior on this occasion, in spite of the prevalent drought in the East, added so much to the enjoyment of those in attendance at the convention. Through our daily issues published at Atlantic City those who were not able to be at the convention have been able to read the papers and reports presented at the meetings of the different associations and follow their proceedings, at least in outline. This issue contains a report of the meetings on Friday of the Engineering Association, the only association which met yesterday, and also one or two of the papers whose length or lateness of presentation precluded their inclusion in the daily issues.

### The Coming Year

The association begins its new year under the most favorable auspices. The membership is the largest in the history of the association, and the reorganized association, which has done such excellent work during the past five years, is now old enough to demonstrate its ability to be of great help to its members and a vital force in the field. The selection of Mr. Brady for president places in direction of the affairs of the association an executive who has had long experience in association affairs and one who has the confidence of the industry. He will be supported in his new work by a strong executive committee. The election of W. G. Ross, of Montreal, to the vacant place in the list of officers was a very fitting one. Mr. Ross has long taken an active interest in the association work, first with the Accountants' Association, of which he was president in 1904-05, and later with the American Association. His ability as a manager is recognized on both sides of the boundary line. He represents, geographically, a nation which has many loyal members of the association. No better choice could have been made. The healthy and virile condition of the American Association is duplicated in each of the affiliated associations. Expressions of satisfaction over the work accomplished during the year and at Atlantic City from members of each of the affiliated associations and the main association were heard on every side. The general opinion was undoubtedly that the organization as a whole, under its new name, commences the second half decade of its existence with every indication that it will be of even greater benefit to its members than ever before.

### Pay-Day Economies

Loss of time and therefore of productive capacity almost universally accompanies the arrival of pay day in large repair shops and factories. The larger the number of employees to be reimbursed for their labor, the more expensive the process of paying off tends to become, because the retardation in the rate of output and the actual stoppage of production run to a higher average. The efforts of one large street railway company to reduce the cost of paying its repair shop forces are worth considering elsewhere. The company's officials have been striving for several years to pare down operating costs to the quick, in the effort to offset in some measure the constant increase in the cost of labor and materials and the insistent tendency toward a longer haul which it, in common with other systems, has had to face. It was found perfectly feasible to pay off even the employees of a single department in five groups, each man having a number and taking his place in his group at the sound of a bell signal. With a maximum of 20 men in a group the time each employee was away from his work on pay day varied from perhaps 20 seconds to four minutes. The men were numbered about the shop with reference to their locations, so as to interrupt scattered classes of work as little as possible, and each filed past the paymaster in numerical order to save time at the table. The few women employed, by being assigned to the last group, were paid separately and without confusion or intercourse with the preceding groups. There is little doubt that sectionalizing the paying-off process in ways like this may be the means of saving a large company a good many hundred dollars a year.

### Electric Traffic Signs

With the advent of the electric sign into the field of traffic promotion it is important to recognize that central station experience with publicity illumination offers something of value to the railway company. In view of the growing public sentiment against crudely designed or poorly built signs it will pay to spend some little time upon the selection of the type of sign best suited to a particular location. In general, electric signs are of two types, one in which the sign proper is illuminated by a reflector or transparency arrangement of lamps and wording, and the other in which the publicity work is performed by the lamps themselves. It is important to avoid deflecting the attention of the reader from the message of the sign, no matter which type be used. In a park sign recently noted the proper lighting effect was largely spoiled by the use of frosted incandescent lamps of relatively large size around the border of a frame without reflectors, the attention of the passer-by being attracted to the lamps more than to the wording of the advertisement. Since the advent of the low candle power tungsten lamp the cost of electric sign lighting upon company current has dropped to a pretty low point, and there should be a wider use of signs in which the lamps form the letters. Central stations use low-powered carbon lamps very largely for this class of service, but the tungsten lamp for fixed locations is so much more efficient and its maintained candle power so much better that the carbon lamp has but little place where the best results are desired. If alternating current is available, low-voltage tungsten lamps can be used with remakable life results, judging by records obtained by central stations in certain classes of residence service. As in the car sign, a short, pithy message is generally most desirable. Experience has shown that fully as good results can be obtained on close letter spacing with 2-cp tungsten lamps as with lamps of double that power.

## ENGINE AND GENERATOR CAPACITY

The relation between generator and engine capacity in direct-connected units is one of the most interesting ratios with which the modern power plant designer has to deal. It is principally affected by the efficiency of the generator and by the losses in the engine mechanism between the cylinder and the revolving shaft carrying the armature or the field as the case may be. While the term "engine horsepower" is somewhat elastic, the commonly accepted meaning as applied to an engine of the reciprocating type is the cylinder power at which the most economical steam consumption is maintained. If we allow 5 per cent for frictional losses in the engine mechanism and say 5 per cent more for the losses in the generator at full load, it will be necessary to rate the engine at about 10 per cent more than the generator in order to assemble a set which shall be a proper unit from the standpoint of the normal capacity of its component parts. Overloads will be handled by using steam in reciprocating engines less and less expansively, so that when the engine is giving out its maximum power the cut-off in the valve motion comes so late that efficiency is a secondary consideration. It is clearly desirable that the maximum power that the engine shall be capable of giving out shall be equal to the task of operating the generator at normal speed at the maximum overload consistent with the sparking and heating limits. If the steam pressure is properly maintained, it is generally the case that an engine capable of handling the normal output of a generator at the point of minimum steam consumption will be equal to at least a 75 per cent to a 100 per cent generator overload for a period in which efficiency is less important than capacity.

In a total of 10 railway power plants recently examined the ratio between the rating of the generators and that of all the steam-driven prime movers in the different stations was 91 per cent. The plants included both modern and older installations, but the stations of larger capacity were characterized in the main by the use of direct-connected units, consisting of horizontal or vertical cross-compound engines driving 600-volt direct-current generators. In the oldest plant examined there were some 12 generators belt-driven by four engines, and here the ratio was 119 per cent, there being an excess in generator over engine capacity. The five principal and most modern stations disclosed the following ratios: 97, 86.5, 90, 88 and 89 per cent, all of these being steam plants, with but one turbo-unit in the group. Among the stations covered were two gas engine plants with direct-connected machinery. Here the generator ratings were 87 and 78.5 per cent of the engine ratings, the difference between gas and steam presumably being due to the necessity of rating the gas engine much nearer the maximum instead of the normal capacity of the corresponding generator. Again, gas engines are rated at brake hp instead of indicated hp, which tends to reduce the ratio.

In the selection of an engine to drive a generator of predetermined size, it is apparent that considerations of available speed, cost, delivery and other factors must be taken into account and that an absolute percentage cannot be followed invariably with the best results. Among a series of competitive bids it may easily happen that one manufacturer will offer a

slightly larger engine of a given speed for the service than is submitted by his rivals. Questions of price may determine its choice as against an engine more closely rated to the generator, or again, the demands for power may be so insistent that a guaranteed short delivery may justify the selection of a machine with a small percentage of excess capacity. The ratios of the different units suggested in any given case, however, are worth calculating, for comparisons with practice elsewhere.

## POWER DISTRIBUTION IN THE REPAIR SHOP

In the ordinary repair shop the distribution of power to motors driving miscellaneous tools is a very simple matter. The available supply is generally 600-volt direct-current service, the wiring runs are short, the control at the tools of the simplest character, the use of the machinery largely intermittent, and the lighting maintained on the time-honored basis of five lamps in series per circuit. As the demand for additional facilities increases, however, it becomes of much consequence to adopt the principles of centralization which have been found so beneficial in the field of commercial electrical supply. Improvements may be effected by bringing all the power and lighting leads to a common point of control and metering; by replacing open runs of cable with conduit construction; by going over the fuse installation with a view toward securing better protection of the sections of the plant from shut-downs and at the same time insuring ample protection against fire; by making a few simple tests upon the more important distribution circuits to determine if the drop in voltage is such that the full capacity of the motors cannot be properly utilized, and by testing the energy demands of individual tools for the double purpose of checking the motor rating and analyzing the cost of operation in connection with the larger repetitive processes. It is a good rainy-day task to make a study of the loading of different shop feeders. Conditions may be gradually changing in the utilization of power.

The old central station practice of substituting a few large transformers for many smaller units may well be followed in the railway repair shop which is lighted by alternating current. In a recent installation it was noted that the various shop buildings were served by individual transformers separated by only a few bays of the walls. As the service was continuous the core and resistance losses were of considerable magnitude. Modern methods of regulation at the power plant or substation switchboard permit the operation of lighting and power services without difficulty on the same bus. Nothing is wanting on the score of reliability, and the extension of secondary circuits is seldom great enough to overcome the advantages of reduced energy losses secured by the centralization of transformer equipment.

Another desirable improvement is the housing of lighting and power transformers in suitable quarters. For a few hundred dollars a reinforced concrete shelter can be built which will house several hundred kilowatts in transformer equipment, enable the consumption of different departments to be separately metered if desired, and assemble in a convenient and safe place all the lighting, protective and circuit opening devices, preferably under lock and key. Alternating-current motors have as yet not attained much vogue in electric railway shops, but their reliability of service is so marked where variable speed work is not required that in some of the larger work of the future it is probable that group driving by induction motors will come into favor, particularly in shops where the areas served are large. Their effect on the power factor is negligible if rotaries are in regular service on the same high-tension supply lines, and they permit economical supply from the standpoint of copper investment when the tools are considerably scattered.

## THE GROWTH OF CITIES

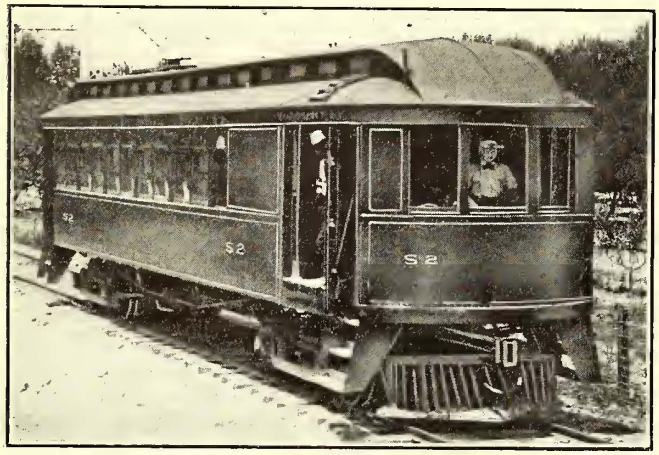
A recent publication gives an interesting view of the growth of large cities and its relation to traffic as shown at the international exhibition of last summer in Berlin. The figures referred to 1907, but the data show astonishingly close estimates for the population of American cities at that epoch and are specially interesting in that the cities are considered with their environments. Greater London is, of course, incomparably the largest city in the world, and it is interesting to note that its rate of growth is second only to that of Greater New York for the periods since 1890, Berlin following as a good third.

The process of aggregation by which cities have been growing within the last quarter century enormously transcends any general growth by natural increase of the population or by immigration. One may guess at the future population, but the accuracy of the guess would seem to be almost a pure matter of chance without extremely close attention to the local conditions which govern the aggregation of population in each particular city. The problem of transportation, which requires almost prophetic foresight as to the future conditions, is most intimately bound up with such facts as these, and it would be well worth the while for some investigator to make a special study, district by district, of the sources and causes of the huge increase in population that comes from the tendency of the modern city to sweep clean the rural districts and draw to itself their population as a magnet collects iron filings.

Of the great cities under comparison it is worth noting that four American cities—Boston, Philadelphia, New York and Chicago—in the order mentioned, showed greater amount of travel per capita than London, Berlin and Paris, but that the total figures in rides per capita annually varied only from 268 to 500 in spite of the diverse conditions existing in the several cities and countries. For any given city it seems to be pretty well determined that the amount of riding per capita tends to increase with the population, as is natural considering the fact that the area also tends to increase so that the distances become longer. There are two factors, therefore, working to produce extraordinary conditions which must be met by any scheme for rapid transit. Ordinary estimates based on population go awry and their result has been often seen in the overcrowding of new lines, in many cases, from the moment of their opening. Estimates of the growth in the population of different cities are also apt to be wrong, as the recent census statistics for city populations in 1910 prove. As practically all calculations of future traffic are based on the population of the city to which they refer, they are liable to error with any variation in the fundamental factor assumed. Nevertheless, such calculations are important, not to say necessary, not only with reference to the possibilities of rapid transit, but because they open an important field of sociological study in connection with the housing and distribution of population.

## NOTES ON THE GRAND JUNCTION & GRAND RIVER VALLEY RAILWAY

The Grand Junction & Grand River Valley Railway Company was organized in the year 1908 by Colorado parties, to build and operate city and interurban lines in the famous fruit growing section of the western slope of Colorado called "The Grand Valley." The completion of some 3.5 miles of line within the corporate limits of the city of Grand Junction, Col.,



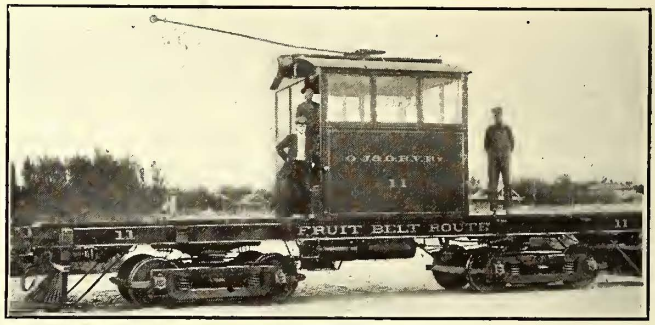

Grand Junction & Grand River Valley Railway—Standard Combination Car

was celebrated May 22, 1909. The first of this company's interurban lines, and the second one in the State, that from Grand Junction to Fruita, was opened to the public July 14, 1910. It is 16.02 miles long, running for the entire distance through the intensely cultivated orchard lands which are expected to yield its greatest revenue. This road was built with the special object of handling fruit in refrigerator cars direct from the orchards to the steam railroad yards at its terminals. The construction of the railway through a district where irrigation is universally practised made it necessary for the company to install on its 16 miles of railway no less than 8000 ft. of culverts and inverted syphons, which are of Watson corrugated culvert pipe.

### POWER AND LINE

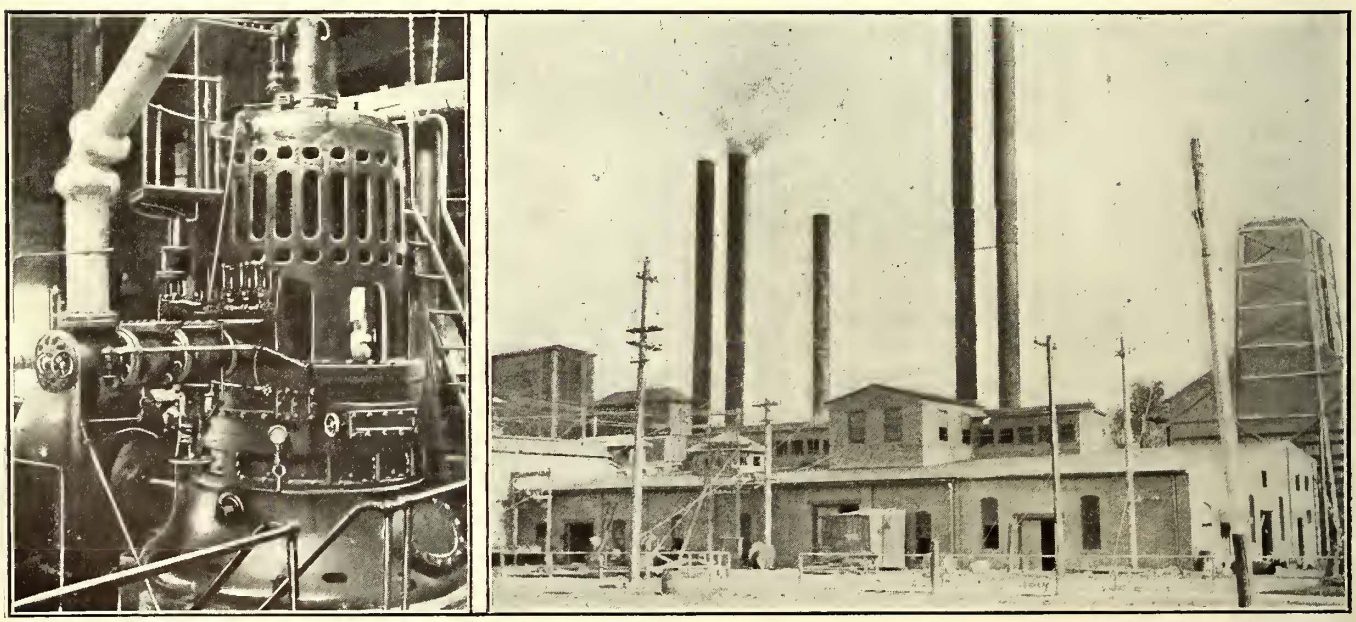
Both the city and interurban lines are operated at 600 volts direct current, and obtain power from an affiliated corporation, the Grand Junction Electric, Gas & Manufacturing Company, which has the control of the power, gas and artificial ice utilities in Grand Junction. Power is transmitted to the Fruita terminal at 11,000 volts, three phase, where a 200-kw rotary substation feeds the trolley, and also a No. 0000 bare feeder which is tapped into the trolley at the quarter point; a similar substation equipment of 300-kw capacity is to be installed in the central plant at Grand Junction, with an auxiliary 150-kw belt-driven, 600-volt Westinghouse generator which is now feeding the line at that point. This generator is at present driven by a 200-hp Ideal high-speed engine.

The transmission line at 11,000 volts, the No. 0000 grooved trolley, the telephone dispatching circuit and (for about 4 miles at each end of the line) a No. 0000 bare copper feeder




Grand Junction & Grand River Valley Railway—Electric Locomotive

are all mounted upon 35-ft. Idaho cedar poles. These poles have tarred butts, and are set 5 ft. 6 in. in the ground and cemented. The span on tangents is 100 ft. and on curves 80 ft. About 13.7 miles of the line consists of iron bracket suspension for the trolley, with iron insulator pins on the bracket arm for the feeder. The remainder of the line is cross-suspended over streets with the feeder on iron side brackets. The telephone line, of No. 12 copper-clad wire, is hung from wooden side brackets and transposed at every fifth pole. This telephone circuit is given very thorough protection, for G.E. telephone transformers are used at all sidings and terminal points where there are installed fused carbon gap lightning arresters; both wall and desk sets are heavily insulated. Each car carries a portable telephone set containing a repeating coil and the jacks for the portable sets are placed at every fruit loading spur. Drainage coils also have been placed every 3 miles. The No. 4 hard-drawn copper transmission is protected at each end by

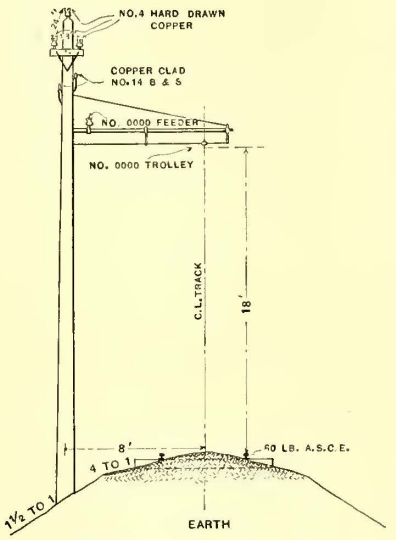


Grand Junction & Grand River Valley Railway—Power Plant, Showing Cooling Towers at the Right; Also 500-kw Turbine, Looking Toward Condenser Pit

electrolytic cell arresters, and the trolley by automatic fusible arresters placed 8000 ft. apart.

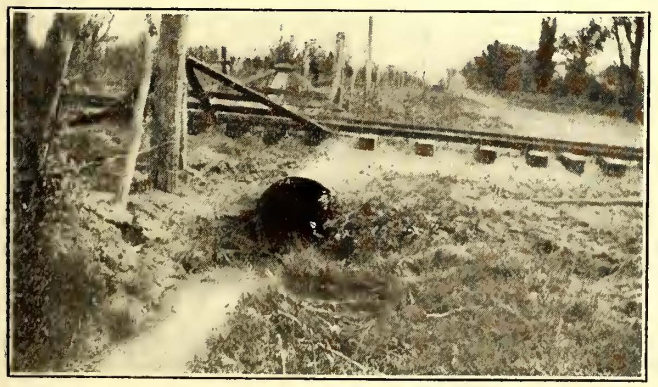
POWER PLANT ADDITIONS.

To meet the needs of a growing business and also to furnish power for the railway the electric plant of the Grand Junction Electric, Gas & Manufacturing Company has been completely rebuilt under the supervision of the Stearns-Roger Manufacturing Company, Denver Col. The boiler room now contains two new 500-hp Heine water-tube boilers and two old batteries of two 350-hp boilers, each of the same make. The feed-water and hot-well pumps are also installed in the boiler room. The generating equipment includes a 500-kw Curtis turbine and three 150-kw belted generators, the latter being driven by single-cylinder Hamilton-Corliss engines. These machines are 60-cycle, three-phase, 2300 volts. They are run in parallel with the 800-kw water power station of the Redlands Power & Irrigation Company, located 3 miles south of Grand Junction, to which they are connected by a 2300-volt line of No. 00 hard-drawn copper.




Elevation of Pole and Line

The steam engines and the turbine exhaust into two Wheeler surface condensers fitted with Edwards dry-air pumps, and so arranged that one condenser and pump set may be held in reserve. The cooling water is circulated by low-speed centrifugal pumps through two cooling towers capable of cooling 36,000 gallons of water each per minute. These towers were especially designed by Henry Schwartz, of the Stearns-Roger Company. They are composed of frames spaced 4 ft. apart vertically, which support baffle strips laid flat and separated by wire netting of 2-in. mesh running vertically from the top of the towers to the bottom. The water is distributed at the top by small wooden troughs having serrated edges fed from the discharge pipe.



**Grand Junction & Grand River Valley Railway—One of the Corrugated Culverts**

The boiler feed water is heated in Wainwright feed-water heaters, and both live steam and exhaust lines are equipped with Crane oil separators.

The switchboard has one exciter panel for a 25-kw steam-driven exciter; a 25-kw induction motor set; one incoming feeder panel from the Redlands plant; four machine panels; one feeder panel for the Fruita substation; two feeder panels for the Grand Junction load and one arc panel. This board, of General Electric manufacture, replaces an old board on which duplicate machine switches were used to divide the circuits. The old equipment was a relic of the days when alternators were not run in parallel.

ROLLING STOCK, ETC.

The passenger equipment of the railway consists of three interurban cars with bodies built by the Woeber Carriage Company, Denver, Col. These cars are mounted on Brill 27-E2 trucks, each carrying two 50-hp G.E.-219A motors. The trucks have 33-in. American steel wheels. The gear ratio is 19:71. Two of the cars are operated single-ended and have baggage compartments, while the third is a double-end car with a smoking compartment. A 30-ton locomotive, also of 200-hp capacity, but geared only 15:69, will be used in local freight and fruit gathering service. All cars are equipped with both straight and automatic air brakes, and they are strictly standard in all minor details.

The car house is located at the steam railway transfer. It is a steel building containing five tracks on 11-ft. centers and 150 ft. long, together with a brick bay containing the offices of the superintendent and dispatcher, locker rooms and shops. The pit track is equipped with a 20-ton hand-operated crane.

Owing to the fact that fruit shipments originating on this railway are consigned to all parts of the United States its business is being conducted under the classifications of the Interstate Commerce Commission, and its passenger, freight and express tariffs are on file with that body.

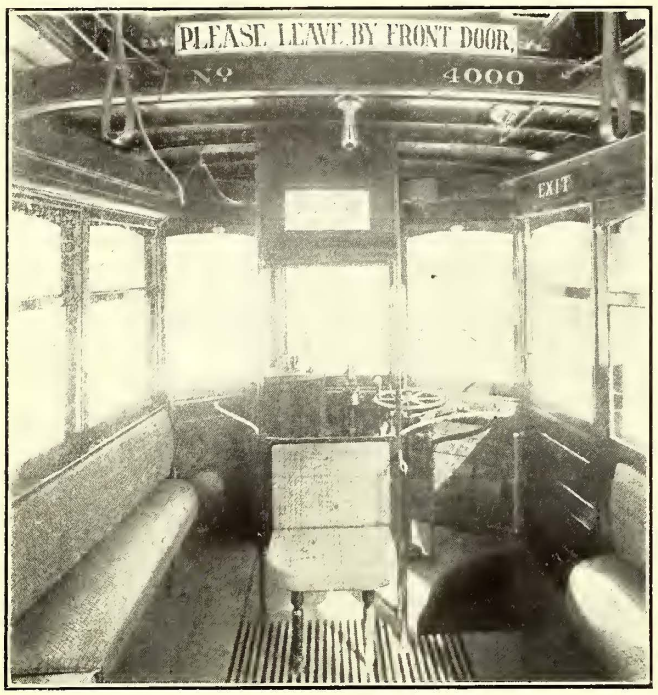
## SINGLE-PHASE TRACTION IN FRANCE

One of the latest French electrifications is that which the Midi Railway will make in connection with the Montrejeau-Pau portion of the Toulouse-Bayonne Line. The portion to be electrified has a length of some 70 miles; the country is very hilly and the line has a number of grades, one of 3½ per cent being about 7 miles long. This is the largest scale upon which electrification of existing lines has been attempted in France. Later the electrification is to be extended to the entire Toulouse-Bayonne Line, a distance of 200 miles. The Midi Railway has ordered from the French Westinghouse Company the equipments for 30 double-truck electric-motor cars for the passenger service and one electric locomotive for the freight service of this line. The mechanical part of the locomotive will be built by the Italian Westinghouse Company. The design and construction is based on the results obtained in connection with the electrification by the Italian Westinghouse Company of the Giovi tunnel section of the Italian State Railways on the dense traffic line between Genoa and Milan. Each of the motor coaches, seating about 50 passengers, will be equipped with four 125-hp, single-phase motors, 16 2/3 cycles, 285 volts, and with multiple control. These motor coaches will be able to haul trains weighing 100 metric tons—including the motor itself—at a speed of 45 m.p.h. on level track. The weight of a motor coach in running order will be about 56 metric tons. The Midi locomotive will have five axles, three of which will be driven by the motors through jack shafts and connecting rods. The locomotive will have two 600-hp, single-phase motors, will weigh 80 metric tons, and will be able to haul trains weighing 400 metric tons, inclusive of the locomotive. With a haulage load of 280 metric tons the speed will be 25 m.p.h., and with 100 metric tons about 38 m.p.h. The current will be supplied from a 12,000-volt overhead catenary line through pantograph collectors.

The Illinois Traction System proposes to exhibit at the Real Estate and Building Show, to be held at the Coliseum, St. Louis, Mo., from Oct. 24 to 31, a reproduction of the McKinley Bridge across the Mississippi River at St. Louis, which will extend entirely across the front of the booth and be outlined in miniature electric lights. It is proposed to make the booth a headquarters during the show for excursionists from the cities along the lines of the Illinois Traction System. Attendants will be in charge of the booth to give information to visitors and to distribute souvenirs.

## STEEL CARS FOR PITTSBURGH RAILWAYS COMPANY

The Pittsburgh Railways Company has had in use for more than four months 50 double-truck steel cars with completely enclosed prepayment platforms. A remarkable operating record has been made with these cars since they were put in service. Only nine accidents occurred on them in spite of the fact that they are being run on the lines of heaviest traffic and during the rush hours are operated in express service. The total cost



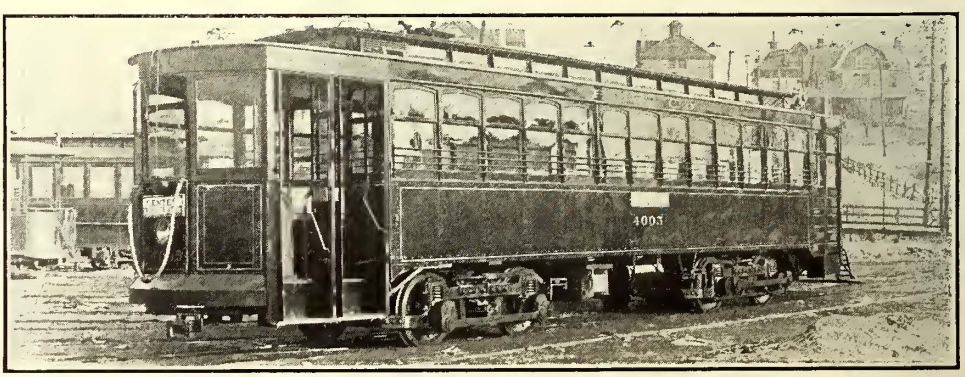

**Pittsburgh Railways Steel Car—Interior View, Looking Toward Front Exit**

of settlement of claims arising from these accidents was less than $20. Aside from the interesting constructive details, their light weight and large seating capacity, the principal novel features are the doors which close the openings above the front and rear platform steps. To the fact that the platforms and steps are entirely enclosed while the cars are running is attributed the small number of accidents.

The accompanying engravings illustrate the general appearance of the exterior and interior of the cars and the seating arrangement. As will be seen from the floor plan, the cars are arranged for single-end prepayment operation, with a wide entrance and exit on the rear platform and a single exit door and step on the right-hand side of the front end. The rear platform is 10 in. below the floor of the car body and is separated from the body by an end bulkhead with an opening 45 in. wide. No bulkhead doors are used. The front platform is not separated from the car body by any bulkhead and the floor is on the same level. Opposite the exit door, however, the floor is cut out in the shape of a quadrant of a circle to form one step down and the second step is dropped down inside the line of the vestibule side. It is covered by a sloping sheet-steel fender secured to the bottom of the sliding door which closes the slip opening and slides back under the seat when the door is opened. The motorman is surrounded with a pipe railing which forms a convenient handhold for alighting passengers. Back of the motorman this railing is supported by two pipe stanchions extending from the floor up to the roof. These stanchions also support a single seat facing to the rear of the car and serve as guides for a vestibule curtain to shield the motorman from the light in the interior of the car. Above the single seat is mounted a switch cabinet.

The seating arrangement is a combination of cross and longitudinal seats. Owing to the limited clearances the cars are only 8 ft. 2 in. wide over all and if cross seats had been used on both sides a narrow aisle would have been required which would interfere with rapid loading and unloading and reduce the total carrying capacity. The cross seats, of which there are 11, provide comfortable accommodations for long-distance passengers and the wide aisle provides a large amount of standing room and permits free movement toward the front exit door. Including the folding seat on the rear platform the cars have a total seating capacity for 61 passengers. The weight of the body, trucks and equipment is but 46,000 lb., so that the weight per seated passenger is only 754 lb. All seats are upholstered with rattan.

The rear platform is 6 ft. long inside and has a step opening 4 ft. 8 in. wide which is divided by a vertical post into entrance and exit passageways of equal width. Each passageway is closed with a double folding door, the two halves of which move together in opening and closing. Each half of the door is hung at the top by a pivot in the center of the top rail, which runs in a slotted track parallel with the door opening, and also by a swiveling sheave at one end of the top rail, which runs on a track at right angles to the slotted track. A toggle arm attached to a sliding block above the door opening is fastened to the other end of the top door rail. When the sliding block is pushed outward the two toggle arms attached to it spread out and force the two halves of the door apart. The sliding blocks to which the toggle arms are fastened move on horizontal pipes and are pushed outward by the rotation of a crank arm and connecting rod. At the angle of the pipe railing surrounding the fare box is a vertical pipe containing within it a solid rod. An operating handle for one set of doors is clamped on the pipe and another handle is clamped to the enclosed rod. The crank arm for moving the entrance doors is clamped on the top of the pipe and a sprocket wheel is keyed on the top of the rod. A piece of bicycle chain connects this sprocket with another mounted on a vertical shaft nearer the bulkhead. On this shaft is clamped the crank arm for moving the exit doors. Both sets of doors may be opened or closed simultaneously or independently of each other by moving either or both of the operating handles. When closed the doors extend down to the outside edge of the step tread, leaving no foothold. Inclined grab handles are fastened to the inside of the doors and when the doors open they can be grasped to aid in boarding and alighting. Owing to the toggle joint connections the doors are self-locking in the open and closed positions.

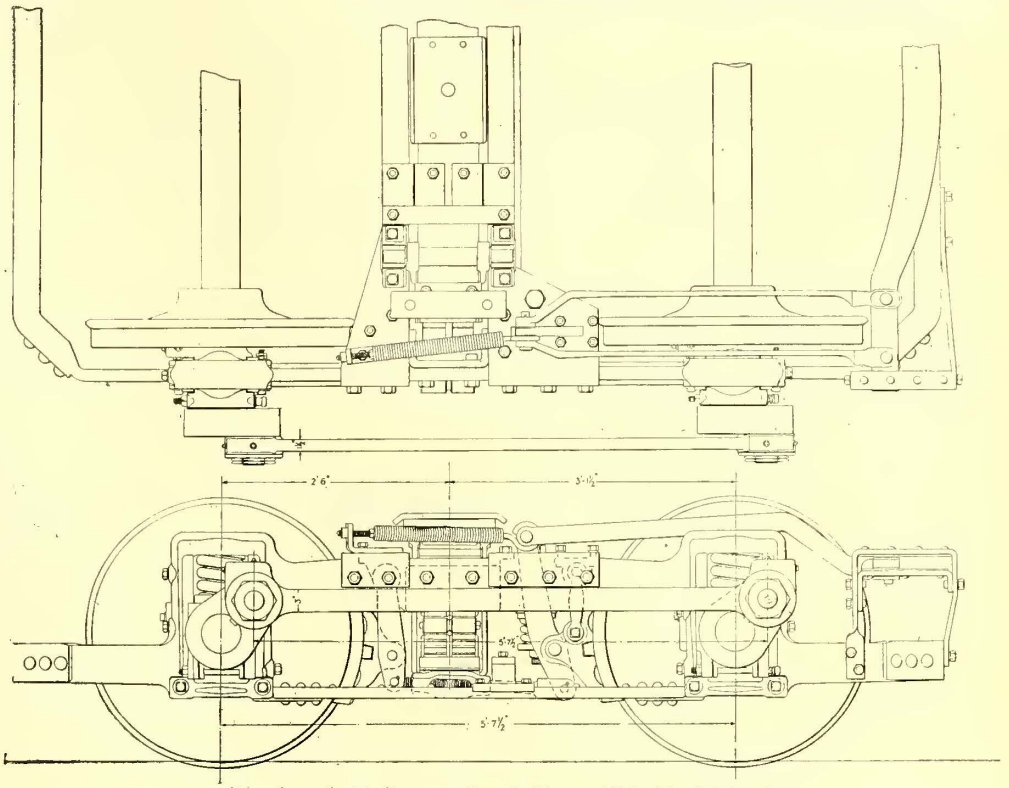



**Pittsburgh Railways Steel Car—Side View**

The exit door on the front platform slides back into a pocket in the side of the vestibule in opening. It is opened by a pneumatic cylinder and piston mounted above the door and is closed by the tension of a long, spiral spring which opposes the pressure of the pneumatic cylinder. A valve mounted on the front of

the vestibule beside the brake valve is used to admit and release the air in the cylinder to open and close the door. Patents have been granted to P. N. Jones, general superintendent of the Pittsburgh Railways Company, on the front and rear platform door operating mechanisms and on the rear platform arrangement whereby an entrance and exit passageway into the car body is formed by a railing without the use of doors or a dividing stanchion in the end bulkhead.

The car bodies are built entirely of steel below the windows, but wooden posts and roof framing are employed. The principal members of the underframe are the plate girder sides, 2 ft. 11 7/16 in. deep. These are made up of a top flange which is a special flat bar section weighing 6.7 lb. per foot, a ⅛-in. web plate and a 4-in. x 4-in. Tee forming the bottom flange. These girders are stiffened at each post by two 2-in. x 1½-in. x 3/16-in. angles riveted on the inside between which the posts are set and bolted. The center sills are 4-in., 5.25-lb. channels which extend to the end sills. At intervals of 39 in. between the bolsters cross braces formed of 4-in. channels trussed with a ⅜-in. x 4-in. bar are put in. The bolsters are built up of a 9-in x ⅞-in. top plate and a 9-in. x 1-in. bottom plate with a heavy filler casting in the center. Wooden diagonal braces 4 in. x 1¼ in. are built in between the side sills and the trap-door beams on each side of the bolsters to stiffen the ends of the underframe. The outside platform knees are built up of two 4-in. channels, with webs placed back to back and riveted together through the bottom flange of the side girders just inside the end sills. The top channel is bent down only slightly, but the bottom channel has a drop of 10 in. below the top channel under the end sill. The two channels are separated by I-beam fillers, and at their outer ends are again brought together and riveted. The two side knees are bent in from the end sills and at their outer ends are only 28 in. apart. In addition to these main supports two 4-in. channels, which are riveted to the center sills, are dropped down under the end sill and terminate in an anchorage for a Van Dorn No. 27 coupler. The weight of the car body alone is 18,300 lb.



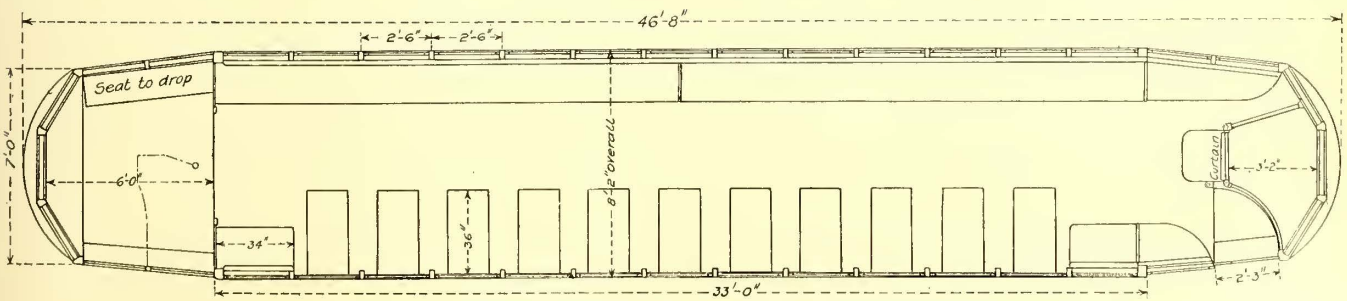
Pittsburgh Railways Steel Cars—Side-Rod Truck

The cars are mounted on Brill trucks of a special pattern with the bolsters offset 3¾ in. from the center line to accommodate the large Westinghouse No. 303 interpole motor of 100 hp which is geared to one axle. The driving and trailing axles are connected on each side with 1½-in. x 3-in. side rods and quartered cranks. A drawing of the truck is reproduced. Counterbalance weights of 54 lb. each are riveted on the web plates of the forged steel wheels opposite to the cranks. Westinghouse semi-automatic air brakes with hose connections for trailer operation are used on the cars. The car bodies and trucks were built by the J. G. Brill Company.

A hearing was held by the joint board on metropolitan improvements at Boston on Oct. 6 upon the proposed tunnel between the North and South Stations. The board is composed of the Massachusetts Railroad, Boston Transit, Harbor and Land, and Metropolitan Park Commissions. Chairman George G. Crocker presided. W. Rodman Peabody, Boston, appeared on behalf of the Boston Chamber of Commerce, which believes that the tunnel should be built by the New York, New Haven & Hartford Railroad Company and not by the city of Boston; also that it should be held by the railroad on terms which would give a fair compensation to the city for its use, with the ultimate right of the city to purchase the tunnel if deemed desirable.

The tunnel would be operated by electricity, and according to the plans already outlined by the New Haven company would afford large economies in the operation of suburban service by the elimination of much of the present shuttle-train movements which are a handicap to the traffic at the great terminal stations. A feature of the ultimate scheme would be the electrification of much of the nearer suburban service outside Boston, on the north, south and west.

The board continued the hearing for two weeks to receive further evidence.




Pittsburgh Railways Steel Cars—Floor Plan

## REPORT OF COMMITTEE ON STANDARDS *

BY PAUL WINSOR, CHAIRMAN; H. H. ADAMS, E. O. ACKERMAN, W. S. MURRAY, JOHN LINDALL, J. H. HANNA, G. W. PALMER, JR., AND MARTIN SCHREIBER.

The various standing committees last year made certain recommendations regarding proposed standards and recommended practices, which the executive committee turned over to this committee for action and report. These matters are, severally, as follows:

FROM COMMITTEE ON EQUIPMENT

(*a*) Rolled steel wheels—sizes proposed for adoption as standard (page 162, 1909 Proceedings).

FROM COMMITTEE ON WAY MATTERS

(*b*) Rail sections—girder and T-rail sections proposed for adoption as standard by 1907 and 1909 committees respectively (pages 110-111, 1909 Proceedings).

FROM COMMITTEE ON POWER DISTRIBUTION

(*c*) No. 0000 grooved trolley wire—section proposed for adoption as standard (pages 354, 355 and 366, 1909 Proceedings).

(*d*) Copper wire table—proposed for adoption as standard (pages 366 and 396, 1909 Proceedings).

REPORTED ON BY 1909 COMMITTEE ON STANDARDS

(*e*) Specifications for wrought-iron bars and limit gages for round iron. Recommended for adoption as standard and recommended practice respectively (pages 299, 300 and 301, 1909 Proceedings).

(*f*) Specifications for steel axles. Recommended for adoption as recommended practice (pages 302 and 303, 1909 Proceedings).

ROLLED STEEL WHEELS

The chairman received from the Carnegie Steel Company a letter calling attention to a comparison of the proposed standard sizes and those of that company, and asking that the proposed standards be revised by the use of a thinner rim. This matter and the question of lighter webs have been considered by the committee on equipment.

RAIL SECTIONS

The recommendations of the 1909 committee on way matters regarding proposed standard sections of T and girder rail as embodied in sections a, b, c and d of their conclusions were considered and approved by this committee, and they are hereby recommended for adoption as "recommended practice" of the association.

The advisability of having a wide-head T-rail for use in cities and towns where interurban service requires the use of wide-tread wheels was suggested, and it was decided to make the suggestion that the committee on way matters be asked to give consideration to the design of such a rail. The committee would recommend that this suggestion be carried out.

NO. 0000 GROOVED TROLLEY WIRE

The committee recommends that the section of No. 0000 grooved trolley wire recommended by the 1909 committee on power distribution be adopted as a standard.

It would further recommend that the committee on power distribution consider the design of standard sections for other sizes of grooved trolley wire, all to have, if possible, the same contour of groove so that one hanger may be used for all sizes.

COPPER WIRE TABLE

The copper wire table recommended by the committee on power distribution was voted for approval when checked. This has been done, and we recommend the table for adoption as a standard.

The committee also recommends for adoption as "recommended practice" the following procedure in ordering cables:

"In ordering cables specify by circular millage instead of by gage number. In ordering cables of sizes larger than the existing gage numbers discontinue the present practice of ordering by a round number of circular mils, and order by specifying a standard number of wires of a standard diameter, expressed in thousandths of an inch."

The committee would also ask that the committee on power distribution be requested to prepare a stranding table; and also to define the difference between a "strand" and a "cable."

SPECIFICATIONS FOR WROUGHT-IRON BARS AND LIMIT GAGES FOR ROUND IRON

The recommendations of the 1909 committee on standards in this connection were considered, and it was decided to ask the executive committee to refer these specifications to the committee on equipment for consideration in connection with specifications for grade A wrought iron, adopted by the American Society for Testing Materials, Aug. 12, 1901, and report further on them to the association. The committee on equipment has taken this matter, together with the question of limit gages for round iron, under consideration.

SPECIFICATIONS FOR STEEL AXLES

The recommendations of the 1909 committee on standards in this respect this committee approves and recommends for adoption as "recommended practice" as covering untreated axles. It is understood that the committee on heavy electric traction is giving consideration to the question of specifications for heat-treated steel axles.

*Abstract of report read before the American Street & Interurban Railway Engineering Association at Atlantic City, N. J., Oct. 10-14.

## REPORT OF THE COMMITTEE ON BUILDINGS AND STRUCTURES *

BY MARTIN SCHREIBER, CHAIRMAN; G. H. PEGRAM, F. F. LOW, C. H. CLARK, T. K. BELL AND M. H. BRONSDON

The executive committee assigned two subjects: (1) Urban and interurban passenger terminals, and (2) economical maintenance. The committee decided to consider only the first subject this year.

Your committee has included in the report as an appendix a paper on urban and interurban passenger terminals, and has decided on the following conclusions and recommendations.

CONCLUSIONS

The location of a terminal is not generally determined by conditions, such as the presence of other railway buildings at a certain point, but is the result of the natural growth of traffic.

In determining the real estate necessary for a particular terminal it is well to take into consideration future requirements as well as economical construction and the present needs. A common error is not to allow for reasonable expansion of business.

TRACK LAYOUT

The track layout is the controlling element in the design and subsequent success and efficiency of the terminal, and demands thorough and careful analysis of present and future requirements both by the engineer in charge of construction and the operating man. Generally, loop tracks providing for the separation of arriving and departing passengers are preferable to stub-tracks and crossovers.

In order to guard against interruptions to traffic and provide for low cost of maintenance, all the straight rail should be of open-hearth steel of at least 0.75 carbon, and the special work and curves of solid manganese steel.

No switch should be less than 100 ft. radius, and curves for single cars not less than 38 ft. center radii. Proper drainage of switches should be provided to prevent splashing.

For the simplest layout with hand-thrown switches, facing point switches should be equipped with spring lock boxes to guard against the splitting of switches and derailments.

The ordinary terminal requires that switches controlling movement of cars to loading and unloading platforms be operated from a central position, or be operated electrically by motormen.

*Abstract of report read before the American Street & Interurban Railway Engineering Association at Atlantic City, N. J., Oct. 10-14.

If traffic justifies it, an interlocking system of signals and switches should be installed. Often the capacity of an old terminal may be increased by such an improvement.

The trolley wire for a station should not be less than 00, and preferably of No. 0000 special high tensile strength copper or steel, to give a maximum life, and be supported by barn hangers every 8 ft., that are in turn bolted to a wooden trough. Metal troughing at curves causes excessive sparking and unnecessary noise.

BUILDING CONSTRUCTION

Generally the terminal should be of fireproof construction and of low roof and post type for train shed. The high roof and long span are expensive to construct and maintain. Extra precautions should be taken to embody in the design enough glass surface in walls and roof, or both, to get a liberal lighting effect. Copper and wire glass make satisfactory and permanent construction for light side walls.

Entrances to the station should be large enough to take care of the greatest number of people that may wish to transfer there. The smallest number of entrances that is practical should be provided to give the lowest cost of operating. Stairways should be wide and so constructed as to reduce burden on public to minimum. Climbs of 22 ft. or more with heavy traffic require escalators.

Ticket offices should be grouped so that one office may take care of business during light hours and others be opened gradually as the rush hours approach. The combination ticket booth and automatic register or turnstile is gaining favor on account of low cost of operation. Yet the ticket office and chopping box are still used where there are many people to be handled in comparison with the number of openings or entrances.

A large central exit is desirable. Distributed exits are convenient, but require turnstiles, which are an annoyance; or entrances must be policed, which is expensive.

A terminal for cars of short headway requires only a small retiring room. Lines of long headways, as interurbans, should have a roomy and comfortable waiting room. Toilets at terminals are generally abused, but the public requires more accommodations each year, and such facilities are necessary.

A portion of the toilet facilities may be reserved, which is a source of income and will pay porter's salary and increase value of privileges.

All stations should be thoroughly equipped with signs and the designer should place himself in the position of a total stranger. Entrance and exit signs should be conspicuous and illuminated at night. Loading platforms should have designation signs visible from any part of them. Numerous other signs must be considered. All doors should be clearly labeled; also ticket booths, and there should be signs prohibiting loitering, smoking and the crossing of tracks at improper places.

Ordinarily, only the waiting room and offices require heat. For the small terminal, an attendant who has the privileges may furnish the heat. A larger station requires a low-pressure gravity return or vacuum steam system, or a hot-water heating system.

Light wiring should be done in open conduit, except in an ornamental waiting room and offices, where concealed wiring may be necessary. For low roofs over platforms incandescent lights are easier to maintain than arcs and more satisfactory. Light circuits should be divided to feed from independent sources, so that in the case of more important stations the terminal is not thrown in darkness should one source fail.

Ample fire protection is necessary for terminal buildings. Hand chemical fire extinguishers are essential for protecting not only the stations, but also the cars.

The privileges for booths, news stand and advertising should be considered in the design of the building, and the necessary accommodations, present and anticipated, so far as practicable should be incorporated in the construction.

RECOMMENDATIONS FOR REPORT OF 1911

(1) Economical maintenance.

(2) Proper facilities for employees in connection with operating and storage car house design.

# URBAN AND INTERURBAN TERMINALS*

BY MARTIN SCHREIBER AND F. F. LOW

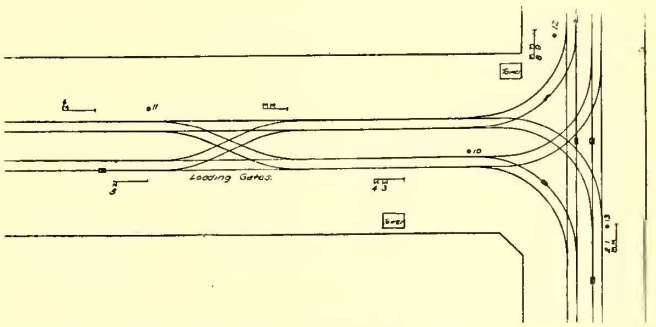
The location of an urban or interurban railway terminal is more or less predetermined by the traffic conditions or by the obligations of the company to the patrons and the public. Before a location is finally decided on the engineer in charge of the design should make a careful study of the operating situation, consulting freely with the transportation department. He should plan for growth not only in one direction but in every phase of the problem. In short, thorough analysis of future as well as present requirements is of the utmost importance before the site is determined upon and construction work commenced.

ECONOMY OF CONSTRUCTION.

It is well to keep the idea of economical construction in mind. Additional ground may mean a cheaper building. A slight shifting of position may mean earth instead of rock excavation, better sewer and drainage facilities, cheaper foundations or less waterproofing. Money and time should not be spared for accurately preliminary surveys, and all possible data that have any bearing on the physical or constructional phases of the problem should be got together.

TRACK LAYOUT

The track layout and car operating arrangements are probably the most important considerations of all. The arrangement demands the co-operation of all the various departments




**Urban and Interurban Terminals—Fig. 1—Interurban Terminal with Stub End Tracks**

to get the best scheme from a railway standpoint. Generally, it may be said that a loop at a terminal is superior to any other track layout for the handling of people. There may be a number of loading tracks branching from the main tracks, so that cars bound for different localities will have their own loading space in the station or there may be a number of loops. The spacing between the tracks should be as large as the lot will permit. The width of the platforms should be considered with the length in order to give plenty of opportunity for passengers to reach the car they may wish to take. There should be ample clearance around all posts or other obstructions adjacent to tracks. Numerous entrances to the interior of the terminal should be avoided. All loops should be on private land, if possible, so that they may be entirely fenced in.

It was thought best not to attempt to point out the best arrangement for varying conditions, without having concrete cases and particular conditions, but rather to include, as exhibits for discussion and information, various types of some of the most modern surface, elevated and subway terminals that have been constructed, and which represent solutions of actual practical problems.

Fig. 1 is an interurban terminal with stub end tracks for double-end cars—a very simple layout that may handle only a few cars per day, if no signal or interlocking switch arrangement be provided. It may be of interest to state, however, that this layout with automatic signals and interlocking switches

*Abstract of paper presented as a part of the report of the committee on buildings and structures of the American Street & Interurban Railway Engineering Association, Atlantic City, N. J., Oct. 10-14, 1910.

may be arranged to handle several hundred cars per day, and cars may be entering while others are leaving the station. The loading platform is on one side of the station and the unloading platform on the opposite side. The method of handling the cars with signals will be considered under the heading of "Signals and Interlocking."

In Fig. 2 a layout for a surface car terminal is shown that handles 75 cars per hour during the rush period, and where one loop is utilized. The layout is capable of handling 200 cars per hour. Incoming and outgoing passengers are kept entirely separate. Where three loading tracks are provided to separate the cars of the different lines, the plan allows prepayment of fare. A minimum amount of real estate is necessary, as the street and sidewalk are included in the layout. The single unloading platform is approximately 200 ft. long. The loading platforms are about 100 ft. long.

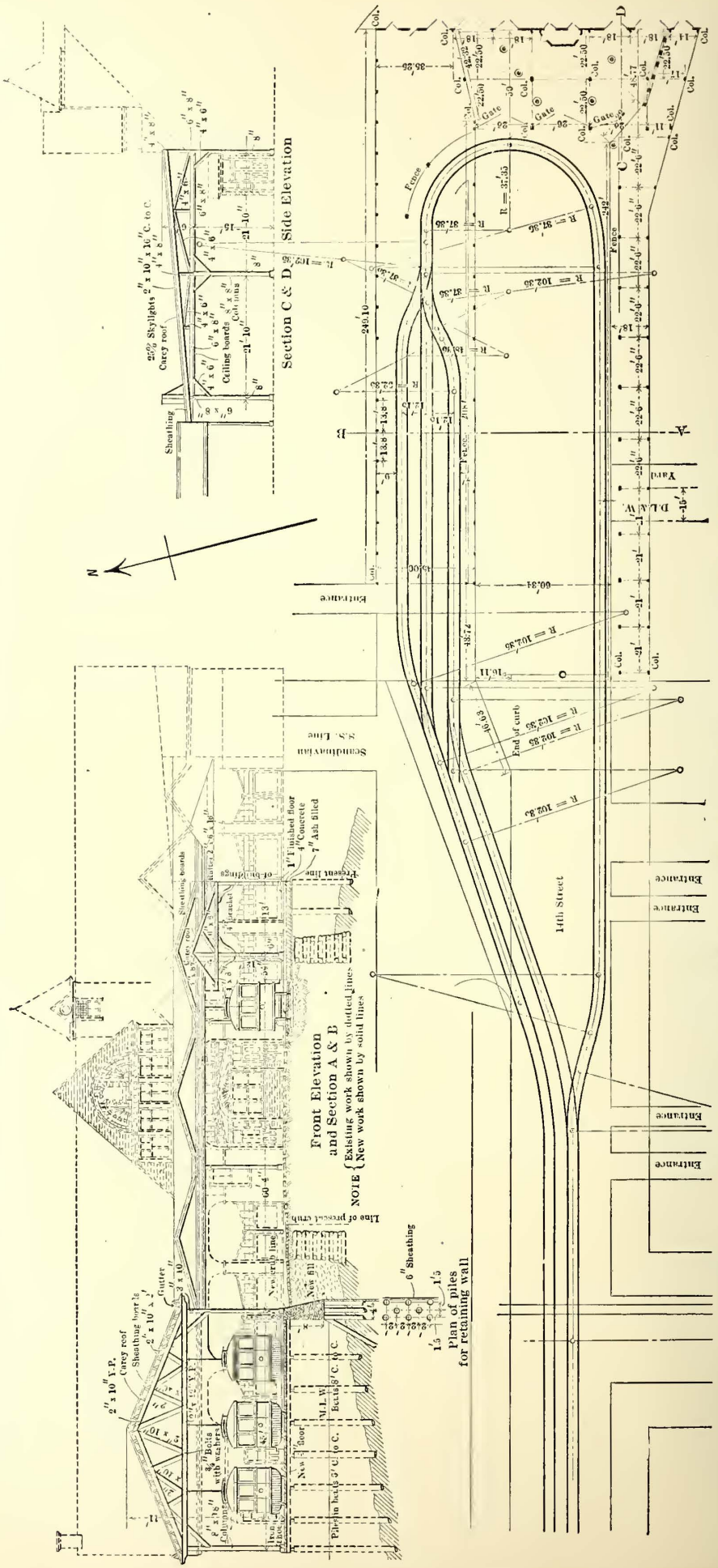
### TRACK AND SPECIAL WORK

Tracks and special work should be so laid in all terminals that water will run away from the station and the roadbed. The platforms between the tracks should be laid with a liberal pitch, ¾ in. to the foot, where possible. Rolled crushed stone laid on a compressed sub-grade makes a substantial substructure for the track, using concrete between wood ties to support the granolithic pavement for the platforms and pavement between ties, if any. In an open terminal, without shelter, where passengers cross the tracks, the grooved rail makes the neatest and safest track. If it is practicable to omit the paving between rails, the T-rail is always desirable; often the space between rails is hollowed out and lined with concrete and cement and utilized for a drain.

In no case should the radii of switches be less than 100 ft. or the center radius of the loop be less than 38 ft. Of course, even the 38-ft. center loop radius is impracticable for cars in trains. If conditions warrant the adoption of a high T or girder rail, the section should conform to the recommended standards of the American Street & Interurban Railway Engineering Association. If ordinary T-rail be used, it should weigh from 80 lb. to 100 lb. per yard. All rails on tangents should be of open-hearth steel. All special work, including curves of less than 100 ft. radius, should be of solid manganese steel. A careful study should be made so that a most suitable guard rail may be installed. If the guard rails are to be made of T-rails bolted together, with filler blocks, then the inside rail should be at least ⅜ in. above the running rail and preferably ½ in. higher.

### SIGNALS AND INTERLOCKING

Few interurban terminals with long headways require automatic signals, but the more extensive urban layouts demand it.




Urban and Interurban Terminals—Fig. 2—Layout of Terminal for Surface Cars

It may be of interest to refer here to the interlocking and signal plant in the Hudson Terminal Station at New York as being a most improved arrangement for trains under short headway. It is of the electro-pneumatic type, manufactured by the Union Switch & Signal Company. All the switches and station signals are controlled from one machine. The principal signals in the station are starting signals, mounted on the end of each platform, and the route signals at the end of the entrance to the station loop tracks from the inbound main track. Along with the starting signals similar signals are mounted on one end of the platforms for emergency use in case it is necessary to reverse the traffic. The signal tower, which contains the interlocking machine, is also equipped with an illuminated track diagram, showing by lights whether any section of the station tracks is occupied or unoccupied. An important feature of this installation is the use of alternating current for the track circuits, signal relays and lamps.

Referring to Fig. 1, page 837, showing track layout of the terminal of the Pacific Electric Railway Company, Los Angeles, Cal., the operation of the signals and interlocking switches is as follows: A car coming from the south with a "clear" signal, lower arm No. 9, takes the branch-off into the house; and with a "clear" signal of the upper arm of No. 7 crosses over to the north track. Then when signal No. 5 is set for the straight track the cars stop at loading gate. From loading gate with a "clear" signal at No. 10 the car gooes south on the main line. Similarly a car from the north with signal No. 2 takes the south track at the terminal and with upper arm of signal No. 7 "clear," proceeds to the rear of the station, and with No. 6 signal "clear," takes the crossover to the loading gate on the opposite side. After the car is loaded and signal No. 3 is "clear," it moves out to the northbound main line track.

With the above arrangement and an automatic turning device that is provided for the trolley, four-car trains are handled very rapidly. It is understood that clearance is provided so that cars may be entering while others are leaving the station; also that the signals and switches are interlocked against conflicting movements, and a signal giving a car a "clear" movement is tripped after the car passes, which prevents any following car entering the same block.

### POWER DISTRIBUTION

Where overhead trolley is used a No. 0000 grooved copper wire of high tensile strength or a steel wire probably will give the best satisfaction when fastened to barn hangers 6 ft. or 8 ft. on centers that are likewise attached to a wooden troughing suspended from the building. Steel troughing is sometimes used on curves instead of a trolley wire, but the troughs are very noisy and are productive of constant sparking on account of the contact of trolley wheel bearing on the flanges. In the larger terminals the trolley wire should be fed so that it may be cut out in sections, or entirely, in case of emergency.

### BUILDING CONSTRUCTION

Regarding the design of a building it is rather difficult to properly outline all the features, as conditions met vary within a wide range. Generally, it may be stated that the old type of long-span building or shed is passing, and it is preferable to use posts and short spans. This simplifies and cheapens the construction, as well as the maintenance. Natural lighting facilities should be given special attention. Do not hesitate to put sufficient glass in the side walls and roof to get the terminal building bright and well lighted; also remember that simplicity should be the first consideration, a smooth wall surface being in many cases cheaper and more sanitary. Interior pilasters that go down to the floor should be avoided, as they create sharp corners, which generally will be filled with dirt.

As regards floors, granolithic is often used, but it becomes slippery and is not always desirable. If it is adopted, the sand surface is preferable to a smooth finish. Tar concrete is considerably used by the steam railroads for platform floors, and has given good satisfaction. Of all the wood floors, a rock maple is best for wearing purposes.

Where there is a light wall, copper enclosing wire glass makes an excellent material for covering in, because of its lightness and because it will permit the movement of the steel work. It requires minimum maintenance.

### ENTRANCES, EXITS AND TICKET OFFICES

The entrances to the station should be large enough to take care of the sudden unloading of a large number of people who wish to transfer at the station. After passing through the entrances the people should not be landed too near the tracks, but should have ample space, so that they can stop and determine just the proper location at which to take their cars, and also read easily the signs provided to guide them. If practicable only one entrance should be provided, to give the lowest expense of operating. Ticket offices should be grouped, so that one office may take care of the business during light hours, and others be opened up gradually to accommodate the increased number of persons at the rush hours. Ticket sellers and automatic turnstiles will probably be used more and more on account of the saving in operating expense. However, the separate ticket booth and chopper has the advantage of being able to quickly handle the people.

A large central exit is desirable. This may be provided with a gate controlled by a platform man. One large road has tried the experiment of having no attendant; the only check to prevent persons entering is the presence of the ticket seller, a girl in a ticket office, who is in plain view of the exit. A mechanically controlled gong is provided in the passageway which she can ring to call the attention of the absent-minded passenger who may try to enter the exit.

### SIGNS

In order to design the proper signs for a station the designer should place himself in the position of a total stranger. Entrance signs should be conspicuous and illuminated at night. It is better, too, to have them visible for some distance from


**Urban and Interurban Terminals—Fig. 3—Illuminated Destination Sign**

the station. Exits should also be well marked on the outside to prevent people from attempting to enter at the wrong place. Inside the station all exits should be plainly marked and signs should be so placed as to be visible from all parts of the platform. At such places signs reading "Out to Street," "Out to Ferry," "Out to Railroad Station," with the "Out" well defined, prove very satisfactory.

A plain sign reading "In" may be made conspicuous and answers the purpose for entrances. Platform signs showing destinations of cars are necessary. A single conspicuous sign, properly illuminated, directly opposite the track, clearly defining the destination of the cars from the track, is often used. Fig. 3 shows a sign that may be illuminated or not. It consists of ground ruby glass backed with opaque glass. Ticket booths should be conspicuously labeled where used, and often are fitted with signs reading "Pay Here."

### LIGHTING AND HEATING

Ordinarily, the terminal proper does not require heat, the shelter that protects the public and the employees from the elements being sufficient. However, it is necessary to keep the waiting room and offices comfortable in cold weather. For the small terminal a stove is sufficient and may be cared for by some one enjoying a privilege—a news stand or the like. For the larger structure a hot-water or steam system is required. A gravity low-pressure steam system does well, provided it is

convenient to get the water line of the boiler below the lowest radiator; otherwise a vacuum return steam system or a hot-water system is to be preferred. The steam system requires less attention than the hot-water layout in very cold weather. With the hot-water system there is often danger of having pipes frozen if the outfit is not properly watched.

For lighting the ordinary terminal of the low-roof construction the incandescent lamp is probably to be favored, as it requires less maintenance than the arc light. If the ceilings are high, of course, the arc light is best and will be cheapest for power consumption. On low ceilings for waiting rooms, offices and the like, incandescent ceiling clusters in ground glass bowls make a very ornamental and satisfactory lighting arrangement. In terminals of importance it is probably well to have separate sources of current supply. For example, if the main train shed lights are supplied from the trolley or direct current of the third rail, the lights in the ticket booth and offices may be supplied by the commercial alternating circuit. A few alternating-current lamps located about the loading and unloading platforms are to be recommended, so that in case the current fails from one source the terminal will not be in total darkness. Another plan would be to have an automatic double-throw main switch where current could be cut in any time from storage batteries or other independent sources.

The exposed conduit wiring makes a neat appearing arrangement, and is desirable on account of being always open to inspection and easy to install; it is also satisfactory in offices and in the waiting room of the ordinary terminal. For the more elaborate layouts concealed wiring may be necessary.

#### FIRE PROTECTION

Ample fire protection is necessary for the protection of terminal buildings. Water plugs should be in close proximity convenient to the use of the regular fire department. A main fire alarm box should be placed near the terminal, or at least a placard posted stating where the nearest box may be found, and if the terminal is large, auxiliary fire alarm boxes should be distributed on the loading and unloading platforms, waiting room and offices. In heated portions of the building hand chemical fire extinguishers are indispensable. They are very convenient in case of fire in any car. In the sheds and unloading platform tanks with non-freezing mixture and buckets are recommended.

#### PRIVILEGES

Privileges, such as lunch room, bootblack stands, news stand, florist's stand, advertising signs, and with larger terminals a barber shop and other similar privileges, are not only a convenience to the traveling public, but a source of revenue to the company, and should all be considered in the preliminary design.

## SOUVENIR PUBLICATION OF BRITISH COLUMBIA RAILWAY AND POWER COMPANIES

As a souvenir of the visit of the Canadian Manufacturers' Association to Vancouver last September a finely illustrated paper-bound album was prepared by the British Columbia Electric Railway Company, Limited; the Vancouver Power Company, and the Vancouver Island Power Company. The introduction contains a review of the electrical developments in Vancouver, from which it appears that in 1904 the street railway work of Vancouver City was handled by one 500-kw rotary converter while to-day the various substations alone have a total capacity of over 7000 kw and new machines are being installed for over 2000 kw more. The railway system comprises 200 miles of track on the mainland and 25 miles in Victoria and the suburbs. The routes system are shown in an excellent map. The illustrations not only present the principal features of the railway and power companies' constructions, but also many interesting views of scenes along the lines of road operated by the companies, and many diverse applications of electric power.

## CAUSE OF COLLISION ON ILLINOIS TRACTION SYSTEM

The following is an official statement of the circumstances surrounding the collision between two interurban cars on the Illinois Traction System near Staunton, Ill., on the afternoon of October 4, in which 36 passengers were killed and 27 were injured:

"By overrunning a meeting point at Wall's Siding, one mile north of Staunton, Motorman John Lierman caused a head-on collision which resulted in the death of 36 passengers, serious injury to 12 and minor injury to 15. The accident occurred on a curve at the foot of a grade two miles north of Staunton and one mile north of meeting place at 3:38 p. m. Oct. 4. The motorman whose failure to obey orders caused the wreck admitted that he alone was responsible.

"Among the dead were five of the company's employees—John E. Berry, land commissioner; D. E. Black, assistant superintendent of motive power and equipment; W. W. Street, assistant trainmaster at Staunton; A. A. Price, auditor of disbursements, and Herman Bauer, of the bridges and buildings department.

"Local No. 14 left East St. Louis at 1.30, heavily loaded, northbound. The southbound train, No. 73, which was in two sections, was crowded with visitors returning from the State Fair at Springfield and others going to the Veiled Prophet celebration at St. Louis.

"At Staunton station No. 14 received a new crew, who had just secured their orders from the dispatcher, the first meeting point being at Wall's Siding, one mile north, with the second section of train 73. This meeting never occurred, but No. 14, evidently without checking speed, passed the meeting point and entered a curve one mile north of Wall's, there to crash into the oncoming section. When the retiring crew of No. 14 turned it over to the new crew at Staunton, the incoming motorman, Lierman, was asked what his orders were, replying, 'I meet second 73 at Wall Siding.' This was at 3.25 p. m. As soon as the accident occurred Lierman called up the Staunton dispatcher, informing him of what had happened and hung up the receiver without waiting for reply. He rushed to his locker at the Staunton station, changed his clothes and hurried to the bank, where he drew out his balance. According to the cashier, he seemed frantic with grief, and informed him that he alone was responsible for the terrible catastrophe and would have to go away.

"Lierman was known as one of the oldest, most efficient, sober and careful employees in the service. He was noted for the care with which he executed train orders, and there seems no tangible reason for his fatal, if not criminal, absent-mindedness. Inquiry among trainmen associated with Lierman, to discover whether any trouble was weighing upon his mind, was answered by statements that he seemed unusually happy over the recent birth of a child and that nothing in his actions or demeanor indicated any affection of his mind.

"Mr. Handshy holds in his possession the train orders of second No. 73 and of train No. 14. Both orders are absolutely clear to the minutest detail, showing the dispatching to be blameless. Conductor Leonard of the northbound car is among the injured and has been unable to make a statement.

"The northbound car telescoped car No. 239, which was running as train No. 73, demolishing the front portion. Most of those in train No. 73 were killed or injured. No one was killed in northbound 14. Mr. Handshy, on receipt of report of the accident, ordered a special to the scene, where he assumed charge of caring for the injured and removing the dead. The dead were taken to Staunton and Carlinville and the injured hurried to the hospital at Granite City. Physicians were summoned and every possible means was taken for their comfort. Traffic was delayed but a few hours. Although the accident occurred in the midst of the heavy rush incident to the Veiled Prophet celebration at St. Louis and the State Fair at Springfield, there was no disorganization and cars all over the system were handled with the usual dispatch."

## SOME ACCOUNTING FEATURES OF THE CLEVELAND RAILWAY COMPANY'S FRANCHISE

Henry J. Davies, secretary of the Cleveland Railway Company, presented a paper before the American Street & Interurban Railway Accountants' Association at its convention at Atlantic City, Oct. 10-14, on the subject, "Some Accounting Features of the Cleveland Railway Company's Franchise." He gave in detail the principal accounting provisions of the franchise ordinance of the company, drawing attention to the fact that accounting is to be a very important and prominent part of the business of operating the road.

In introducing his paper Mr. Davies said:

"The franchise granted by the City Council of Cleveland, Ohio, to the Cleveland Railway Company in December, 1909, contains several unique provisions interesting to accountants.

"The laws of Ohio do not permit street-railway grants of greater duration than 25 years. This grant runs to May 1, 1934.

"Within the period of the grant the company may pay from its earnings interest upon its bonds and floating debt and 6 per cent per annum (and no more) upon its capital stock."

Continuing, Mr. Davies showed that the accounts are to be kept in the manner prescribed by the American Street & Interurban Railway Accountants' Association or as may be provided by law.

Taking up the capital accounts the paper gives the capital value of the property, stating:

"The bonds, the floating debt and the stock are said to constitute 'the capital value of all the property of the company.'

"The value of the property was fixed by arbitration, the sole arbitrator being R. W. Tayler, judge of the United States District Court for the Cleveland district, who, in this work acted, not as judge of the United States Court, but as a citizen. His decision as to values was conclusive because the city and the company had agreed to be bound by it, and not by reason of any decree or order of court.

"The ordinance states the value of the property of the company to be $22,933,300, including unexpired franchises, valued by Judge Tayler at $3,615,843.89, and physical property valued at $19,317,456.11. This value was assumed and stated to be 70 per cent of the cost of reproducing the entire property new. On this basis the cost of reproducing the entire physical property would be substantially $27,600,000. The property so appraised consisted of about 245 miles of track in streets, with pavement; about 15 miles of yard tracks, 948 revenue cars, 150 miscellaneous cars, four power stations of an aggregate capacity of 25,178 kw, five storage batteries of a combined capacity of 9340 amp-hours, together with land, buildings, stores and the other things necessary for the operation of a street railway."

The paper then gives the provisions of the ordinance which relate to additions to the capital value and quotes the definition of extensions, betterments and permanent improvements in contradistinction from repairs, maintenance, renewals and replacements of property, together with other provisions which relate to the protection of the capital value and the return of the rate of interest agreed upon.

Mr. Davies in describing the earnings accounts refers to the sliding scale of fares with nine steps, the maximum rate being 4 cents cash fare, seven tickets for 25 cents, 1 cent transfer, no rebate. The initial rate, which is now in effect, is 3 cents for a single continuous ride within the city limits, with an additional cent for a transfer. This rate must continue until about Dec. 1. If the company has been unable then to earn expenses, taxes and interest it "shall install the next higher rate . . . unless, in the opinion of the company, a rate of fare higher than the next higher to the rate in force during the said initial period shall be necessary to restore the balance in the interest fund, and to provide for current disbursements therefrom, in which event, with the consent of the city, the company may install any rate of fare not higher than the maximum." In the event of failure to agree arbitration shall follow.

Mr. Davies quotes the section of the ordinance which provides for the operation of surface cars, transportation of mail and operation of special cars for passengers, or of special cars for exclusively municipal purposes.

The paper gives the section relating to the terms on which new grants for the operation of suburban lines or renewals of existing grants may be accepted. The car-mile allowance for expenses of operation and maintenance within the city provided by the ordinance shall not be increased on account of any deficiency arising from the operation of suburban lines. All earnings above operating expenses and maintenance, depreciation and renewal allowances shall go into the interest fund. This fund it is intended shall be maintained at $500,000. According as it is greater or less than that sum the rate of fare shall be regulated.

In regard to the subject of the maintenance accounts, Mr. Davies says:

"It is important, of course, that the property of the company be properly maintained, in the interest both of the city and of the company; in that of the city because, first, the ordinance gives the city the right to purchase the railway system, if it shall obtain the right so to do, at the capital value plus 10 per cent of the par value of the capital stock, and it should receive a full equivalent for its money; and because, secondly, a good road is essential to good service; in the interest of the company because the ordinance contains a reservation of right to the city to purchase the road at the termination of the grant at a value to be fixed by agreement or by arbitration, and the property ought then to be in such condition that the stockholders may receive a sum equal to the amount of their stock.

"With these objects in view the ordinance provides for the establishment and maintenance of a fund or reserve, amounting to substantially 5 cents per revenue car-mile, to provide for keeping the property up to 70 per cent of its value."

Following this introduction are the provisions respecting this allowance. Mr. Davies adds that "there has been no investment of maintenance funds in bonds or otherwise, the fund having been overdrawn to the amount of $231,000 during the first six months of operation under the grant."

After referring to the provision that a value of 70 per cent of the reproduction value is assumed to be standard condition, Mr. Davies adds:

"The allowance per car-mile for maintenance may be increased or decreased from time to time by agreement between the city and the company, or by arbitration.

"This allowance is meant to provide not only for repairs, but for depreciation from every cause—from wear and tear, from rust, from obsolescence due to changes in design of machinery or in methods of operation, and from all other causes."

Provisions governing expenses of operation, taxes and interest are quoted pretty fully in the paper. The extensive provisions relating to the supervision of accounts of the company by the city are also given.

In relation to the other reserve accounts carried by the company Mr. Davies says:

"The company is carrying several reserve accounts besides its maintenance and depreciation reserve and the reserve of 11½ cents per car-mile for operating expenses.

"It charges to expense and credits to an insurance reserve account $3,000 per month, from which it pays the cost of fire and boiler insurance, the wages of night watchmen, etc.

"It charges to expense and credits to an accident reserve account 0.8 cent per revenue car-mile, for the settlement of claims for damages for personal injuries, including attorneys' fees, doctors' bills, etc.

"It charges to expense and credits to a legal expense reserve $2,000 per month for fees and expenses of attorneys engaged on matters other than personal-injury claims."

Taking up next the cost of operation in the first six months of the new ordinance and comparing results with previous years, Mr. Davies states:

"A few figures, without argument or comment, may be interesting.

"The amount allowed by the ordinance for maintenance of

the company's property aggregated, in the first six months of operation, $672,447.04. The amount expended for maintenance within the same six months was $903,941.94. The expenditures, therefore, exceeded the amount allowed by $231,494.90.

"Much the larger part of the maintenance expenditure was for repair and renewal of tracks.

"The 11½ cents per car-mile allowed by the ordinance for operating expenses other than maintenance amounted, in the past six months, to $1,529,117.52; the actual expenditures were $1,506,823.46; leaving a surplus of $22,294.06.

"The tables that are published herewith show the earnings and the cost of operation—in amount, in cents per car-mile, and in cents per fare—in the first six months of operation under the 'Tayler plan,' namely, from March 1 to Aug. 31, 1910, and in the corresponding six months of the four years next previous under several managements, and under very varying conditions as to rates, routes and service. It is impracticable to state here all the variations. They are indicated to some extent in the figures showing the average fare and the number of passengers carried per car-mile. There have been changes in the style of cars, in the method of collecting fares, and in wages.

"In 1906 and 1907 the road was operated by the Cleveland Electric Railway Company, and the figures for those years show the operations of that company only and not the operations of the Forest City Railway Company, which was absorbed by the Cleveland Electric Railway Company in April, 1908. In 1908 the road was operated by the Municipal Traction Company under lease during the six months included in the tables, and in 1909 by the receiver of that company. On March 1, 1910, the property was returned to the Cleveland Railway Company and has since been managed by it. The figures for 1908, 1909 and 1910 include the earnings and the cost of operation of the 16 miles of track acquired from the Forest City Railway Company.

"In 1908 and 1909 the car-miles run by trailers were calcu-

OPERATIONS OF THE CLEVELAND RAILWAY SYSTEM

| August | 1906 | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|---|
| | AMOUNTS. | | | | |
| Revenue passengers | 11,058,499 | 11,723,872 | 12,391,090 | 12,608,643 | 15,597,858 |
| Transfers collected | 4,622,896 | 5,051,079 | 4,003,686 | 4,764,927 | 5,628,496 |
| Total rides | 15,681,395 | 16,774,951 | 16,394,776 | 17,375,570 | 21,226,354 |
| Per cent transfers to revenue passengers | 41.80 | 43.08 | 32.31 | 37.79 | 36.09 |
| Passenger car-miles | 2,079,016 | 2,221,416 | 1,849,454 | 2,101,874 | 2,389,191 |
| Other revenue car-miles | 18,290 | 21,169 | 20,536 | 24,961 | 26,961 |
| Total revenue car-miles | 2,097,306 | 2,242,585 | 1,869,990 | 2,126,835 | 2,416,152 |
| Fares per passenger car-mile | 5,319 | 5,278 | 6,700 | 5,999 | 6,529 |
| Transfers collected per passenger car-mile | 2,224 | 2,274 | 2,165 | 2,267 | 2,356 |
| Total rides | 7,543 | 7,552 | 8,865 | 8,266 | 8,885 |
| Passenger earnings | $523,954.23 | $553,393.82 | $409,261.99 | $554,178.57 | $536,400.96 |
| Gross earnings from operation | $536,257.56 | $566,005.00 | $419,083.75 | $571,942.55 | $554,055.04 |
| Miscellaneous income | 3,073.42 | 3,543.02 | 3,726.67 | 3,065.23 | 3,190.47 |
| Total | $539,330.98 | $569,548.02 | $422,810.42 | $575,007.78 | $557,245.51 |
| Operation of power plant | $27,717.63 | $34,219.84 | $28,885.97 | $33,917.38 | $40,641.94 |
| Operation of cars | 125,931.23 | 135,648.95 | 134,203.14 | 144,853.27 | 195,077.49 |
| General expenses | 48,195.23 | 40,344.73 | 29,334.01 | 36,823.72 | 44,704.96 |
| Total | $201,844.09 | $210,213.52 | $192,423.12 | $215,594.37 | $280,424.39 |
| Maintenance (Reserve) | 143,400.58 | 142,845.91 | 93,872.30 | 112,228.67 | 144,969.12 |
| Total | $345,244.67 | $353,059.43 | $286,295.42 | $327,823.04 | $425,393.51 |
| Taxes | 21,351.08 | 23,585.49 | 22,525.03 | 24,778.08 | 28,259.65 |
| Total | $366,595.75 | $376,644.92 | $308,820.45 | $352,601.12 | $453,653.16 |
| Interest on bonds and floating debt | $39,296.82 | $40,091.67 | $40,046.67 | $38,589.22 | $43,195.99 |
| Wages of motormen and conductors | $104,204.95 | $113,836.95 | $96,658.42 | $115,939.00 | $158,380.65 |
| | CENTS PER CAR-MILE. | | | | |
| Passenger earnings | 25.20 | 24.91 | 22.13 | 26.37 | 22.45 |
| Gross earnings from operation | 25.57 | 25.24 | 22.41 | 26.89 | 22.93 |
| Operation of power plant | 1.32 | 1.52 | 1.54 | 1.59 | 1.68 |
| Operation of cars | 6.00 | 6.05 | 7.19 | 6.82 | 8.08 |
| General expenses | 2.30 | 1.80 | 1.56 | 1.73 | 1.85 |
| Total | 9.62 | 9.37 | 10.29 | 10.14 | 11.61 |
| Maintenance (reserve) | | | | | |
| Maintenance (expenditures) | 6.84 | 6.37 | 5.02 | 5.27 | 6.00 |
| Expenses (including maintenance reserve) | 16.46 | 15.74 | 15.31 | 15.41 | 17.61 |
| Taxes | 1.02 | 1.05 | 1.20 | 1.17 | 1.17 |
| Interest on bonds and floating debt | 1.87 | 1.79 | 2.14 | 1.81 | 1.58 |
| Wages of motormen and conductors | 4.97 | 5.08 | 5.17 | 5.45 | 6.56 |
| | CENTS PER REVENUE PASSENGER. | | | | |
| Passenger earnings | 4.73 | 4.72 | 3.30 | 4.40 | 3.46 |
| Gross earnings from operation | 4.85 | 4.83 | 3.38 | 4.54 | 3.57 |
| Operation of power plant | .25 | .29 | .23 | .27 | .26 |
| Operation of cars | 1.14 | 1.16 | 1.08 | 1.15 | 1.26 |
| General expenses | .44 | .34 | .24 | .29 | .29 |
| Total | 1.83 | 1.79 | 1.55 | 1.71 | 1.81 |
| Maintenance reserve | 1.29 | 1.22 | .76 | .89 | .93 |
| Total | 3.12 | 3.01 | 2.31 | 2.60 | 2.74 |
| Taxes | .19 | .20 | .18 | .20 | .18 |
| Total | 3.31 | 3.21 | 2.49 | 2.80 | 2.92 |
| Interest on bonds and floating debt | .36 | .34 | .32 | .31 | .73 |
| Wages of motormen and conductors | .94 | .97 | .78 | .92 | 1.02 |

lated at 50 per cent of the actual trailer-car-miles, in accordance with the provisions of an agreement of lease then in existence between the Cleveland Electric Railway Company and the Municipal Traction Company; in 1910 at 60 per cent of the actual miles, in accordance with the provisions of the ordinance; in 1906 and 1907 no trailers were run.

"The wages of conductors and motormen were raised in the second half of June, 1910, to 27 cents per hour during the first year of service, and 30 cents per hour during the second year and thereafter.

"In 1906, 1907 and the first four months of 1908 the wages of conductors and motormen were 21 cents per hour during the first year of service, 23 cents during the second year, and 24 cents thereafter. From May, 1908, to February, 1910, both inclusive, they were 23 cents per hour during the first year of service, 24 cents in the second and 25 cents in the third and subsequent years. From March 1 to June 15, 1910, they were 23 cents, 25 cents, and 26 cents per hour; and since the middle of June, 1910, they have been 27 cents per hour for first year men and 30 cents per hour for men who have been in the service more than a year.

"Earnings have been somewhat increased, though to what extent it is impossible to tell, by a change of more than half of the company's equipment to pay-as-you-enter cars.

"It is believed that the use of pay-as-you-enter cars has decreased the cost of accidents, but as expense has been charged a fixed amount per car-mile for this item this fact does not affect the figures here presented.

"The amounts set aside for maintenance in 1906 and 1907 greatly exceeded the expenditures of those years on maintenance and renewal accounts. The amount charged against maintenance reserve in 1908 and 1909 was about equal to the 5-cents-per-car-mile reserve of those years. The expenditures for maintenance in 1910 have largely exceeded the maintenance reserve—partly because of the smaller expenditures of the earlier years.

OPERATIONS OF THE CLEVELAND RAILWAY SYSTEM

AMOUNTS

| Six Months Ended August 31 | 1906 | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|---|
| Revenue passengers | 62,334,042 | 67,435,302 | 67,163,189 | 72,688,628 | 86,848,832 |
| Transfers collected | 24,009,806 | 27,260,725 | 18,649,110 | 25,467,137 | 29,108,231 |
| Total rides | 86,343,848 | 94,696,027 | 85,812,299 | 98,155,765 | 115,957,063 |
| Per cent transfers to revenue passengers | 38.52 | 40.42 | 27.77 | 35.04 | 33.52 |
| Passenger car-miles | 11,750,147 | 12,537,126 | 11,376,560 | 12,075,277 | 13,171,598 |
| Other revenue car-miles | 90,954 | 95,997 | 97,863 | 105,685 | 125,076 |
| Total revenue miles | 11,841,101 | 12,633,123 | 11,474,423 | 12,180,962 | 13,296,674 |
| Fares per passenger car-mile | 5,304 | 5,379 | 5,904 | 6,020 | 6,594 |
| Transfers collected per passenger car-mile | 2,044 | 2,174 | 1,639 | 2,109 | 2,210 |
| Total rides per passenger car-mile | 7,348 | 7,553 | 7,543 | 8,129 | 8,804 |
| Passenger earnings | $2,944,934.49 | $3,013,865.42 | $2,502,722.71 | $3,177,236.38 | $2,974,460.26 |
| Gross earnings from operation | $3,011,574.74 | $3,080,751.72 | $2,570,717.05 | $3,255,194.94 | $3,065,887.90 |
| Miscellaneous income | 18,313.64 | 21,232.79 | 24,240.59 | 19,932.17 | 17,729.96 |
| Total | $3,029,888.38 | $3,101,984.51 | $2,594,957.64 | $3,275,127.11 | $3,083,617.86 |
| Operation of power plant | $177,138.00 | $178,516.94 | $217,304.05 | $210,653.55 | $236,496.09 |
| Operation of cars | 722,059.77 | 780,309.62 | 778,805.23 | 846,340.61 | 1,010,827.45 |
| General expense | 223,923.44 | 238,066.32 | 178,813.30 | 223,789.22 | 259,499.92 |
| Total | $1,123,121.21 | $1,196,892.88 | $1,174,922.58 | $1,280,783.38 | $1,506,823.46 |
| Maintenance (Reserve) | 829,490.83 | 804,791.74 | 573,721.15 | 633,223.32 | 672,447.04 |
| Total | $1,952,612.04 | $2,001,684.62 | $1,748,643.73 | $1,914,006.70 | $2,179,270.50 |
| Taxes | 126,052.51 | 130,362.85 | 135,316.62 | 146,948.71 | 163,581.71 |
| Total | $2,078,664.62 | $2,132,047.47 | $1,883,960.35 | $2,060,955.41 | $2,342,852.21 |
| Interest on bonds and floating debt | $234,338.90 | $241,056.26 | $233,432.74 | $232,765.65 | $222,921.18 |
| Wages of conductors and motormen | $591,738.05 | $644,773.07 | $599,000.03 | $661,268.98 | $806,673.55 |

CENTS PER CAR-MILE

| Six Months Ended August 31 | 1906 | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|---|
| Passenger earnings | 25.06 | 24.04 | 22.00 | 26.31 | 22.58 |
| Gross earnings from operation | 25.43 | 24.39 | 22.40 | 26.72 | 23.06 |
| Operation of power plant | 1.50 | 1.41 | 1.89 | 1.73 | 1.78 |
| Operation of cars | 6.10 | 6.18 | 6.79 | 6.95 | 7.60 |
| General expense | 1.89 | 1.88 | 1.56 | 1.84 | 1.95 |
| Total | 9.49 | 9.47 | 10.24 | 10.52 | 11.33 |
| Maintenance (Reserve) | 7. | 6.37 | 5. | 5.20 | 5.06 |
| Expenses (Including maintenance reserve) | 16.49 | 15.84 | 15.24 | 15.72 | 16.39 |
| Interest on bonds and floating debt | 1.98 | 1.91 | 2.03 | 1.91 | 1.68 |
| Taxes | 1.06 | 1.03 | 1.18 | 1.21 | 1.23 |
| Wages of conductors and motormen | 5. | 5.10 | 5.22 | 5.43 | 6.07 |

CENTS PER PASSENGER

| Six Months Ended August 31 | 1906 | 1907 | 1908 | 1909 | 1910 |
|---|---|---|---|---|---|
| Passenger earnings | 4.72 | 4.47 | 3.73 | 4.37 | 3.44 |
| Gross earnings from operation | 4.83 | 4.57 | 3.83 | 4.48 | 3.55 |
| Operation of power plant | .28 | .26 | .32 | .29 | .27 |
| Operation of cars | 1.16 | 1.16 | 1.16 | 1.16 | 1.17 |
| General expense | .36 | .35 | .27 | .31 | .30 |
| Total | 1.80 | 1.77 | 1.75 | 1.76 | 1.74 |
| Maintenance (Reserve) | 1.33 | 1.20 | .85 | .87 | .78 |
| Total | 3.13 | 2.97 | 2.60 | 2.63 | 2.52 |
| Taxes | .20 | .19 | .20 | .20 | .19 |
| Total | 3.33 | 3.16 | 2.80 | 2.83 | 2.71 |
| Interest on bonds and floating debt | .38 | .36 | .35 | .32 | .26 |
| Wages of conductors and motormen | .95 | .96 | .89 | .91 | .93 |

"There was a strike of motormen and conductors in May, 1908, the effects of which were felt for some time after its settlement. For this reason the statistics as to earnings and expenses are not as valuable as they would be if no strike had occurred. Tables are appended for the month of August in each of the five years, the effects of the strike being imperceptible in the statistics for that month of 1908."

## TAXES AND LICENSES *

BY GUY E. TRIPP, STONE & WEBSTER, BOSTON.

The power of taxation is a sovereign power of the State. The State dictates to all citizens, within its jurisdiction, the method, form and extent of taxation, and assesses taxes with entire disregard of the consent of the taxpayer. The only barrier to the absolute authority of the Legislature is a Federal or State constitution.

Except that there shall be uniformity in the assessment of taxes on property or industries of the same class it is not a question of whether they are oppressive; an oppressive or unfair tax is not necessarily unconstitutional. This doctrine of sovereignty is distinct from voluntary contributions, and when carried to its logical conclusions naturally results in the imposition of those taxes which can be the most easily assessed and collected. The power to tax being the "power to destroy, or the power to keep alive," the State uses it to restrict or annihilate undesirable lines of activities—as for example, the manufacture and sale of intoxicating liquors, etc. It also uses its power, through the inheritance tax, for the purpose of retarding the accumulation of large fortunes. Hence it will be seen that the power of levying and collecting taxes is absolute.

Taxes may be generally classified as either "direct" or "indirect." "Direct" taxes always appear to be the more burdensome; and, to the individual, most burdensome of all appears the tax on real property, because it is impossible to conceal. This is also true of some classes of personal property, particularly that belonging to the farmer whose cattle and horses do not escape the eye of the assessor. Personal property in the form of securities—namely, stocks and bonds—generally escapes its just proportion of taxation, because it cannot be easily discovered.

A private corporation, being merely an individual created by the State, theoretically has no advantage or disadvantage over a private individual as regards its obligation to support the expenditures of the government.

It might well be argued that a street railway company should be relieved of all taxes for the reason that the balance, after the payment of a fair return on the capital invested, should reflect itself in the service given to the people. That is, the patrons of the street railway are entitled to all the vitality of the system in improvement of service or low fares, and they should not be indirectly assessed in their more modest mode of traveling in order to relieve from a portion of his taxes the owner of an automobile or a steam yacht. It would be very difficult to work out this theory convincingly so far as real and personal property is concerned, and as a practical matter the street railway company will probably continue to be assessed on that kind of property and on the same basis with other taxpayers.

An entirely different question is presented when we reach the franchise tax. On the theory that a street railway company can make an unusual profit out of its franchise the municipality places a value on the right it has given the company to use its streets. Obviously, if the investor receives no greater return from an investment in a street railway than he can make in any other business the franchise is worth nothing; and because the operation of the franchise tax itself causes his money to earn less than it can in other businesses he is not inclined to invest therein. Some courts have held that there can be no such thing as zero value of a franchise, but that it has some value whether it is profitable or not. However, from the standpoint of the patron of the street railway company any tax placed upon a franchise which is collected at the expense of the service, or of the rate of fare (and in the end it always must be), is collecting from him a sum of money which goes to reduce the taxes of the wealthier classes.

But no uniform theory for street railway taxation has been adopted. The States have used different methods of taxation in almost every locality until it may be fairly stated that there exists no rule or basis upon which the street railway industry is at the present time taxed.

It is quite probable that taxes are based more upon the general feeling among the people that the street railway business has been enormously profitable than upon any other basis and, therefore, some means must be devised by which the public can share in those profits. In no other way can some of the taxes now assessed be explained.

The census report for 1907 gives quite a summary of the different methods pursued in different localities.

The Metropolitan Street Railway Company in New York City pays a very large franchise tax, in addition to the State tax on gross earnings, while the Boston Elevated Railway Company pays none.

Methods vary from year to year in the imposition of taxes upon the same company in the same locality. There are five classes of taxes assessed upon the street railways in New York City. They are:

1. A State tax to which all railways in the State are liable to 1 per cent on the *gross* earnings.

2. Taxes imposed by the terms of the franchise granted, which are in the form of (a) car license fees, or (b) percentage payments of gross or net earnings.

3. Special franchise taxes. This tax has been in force only since 1900 and is practically a local tax. It is assessed by the State Board, but the proceeds go entirely to the city.

4. Capital stock tax. This is the tax on the corporations, as such, to which public service corporations, like other corporations, are subject.

5. Real estate taxes. These are local taxes paid to the city like taxes on all other real estate.

As to the last two (Nos. 4 and 5) there is not much to be said. These taxes are clearly defined and easily arrived at, and, from that standpoint, are as satisfactory as any tax can be.

The State tax (No. 1) is not in the nature of a franchise tax, but is a gross earnings tax, and is paid to the State in common with all other street railways in the State.

When we come to No. 2, car license fees, we find the matter very confusing. The Metropolitan Street Railway Company is composed of subsidiary companies existing under various licenses, some of which require a car license fee of $50; others require no car license fee, but do require payment of a gross earnings tax varying from 3 per cent to 5 per cent; one company has to pay a gross earnings tax of only 1 per cent, while others pay no gross earnings tax whatever.

The history of these companies shows that, in some way or other, the city forgot to collect any car license fees for a number of years and when it did collect them they were not assessed on the true basis required in the grants, namely, $50 per car used, but, instead, were assessed upon the basis of $50 per car for the gross number of cars in daily use at the busiest season of the year. Through the inertia of public officials came another period of non-collection of car license fees. Then, in 1899, the city started to collect the back fees. Its suit was met by the statute of limitations, and the defendants were relieved of paying these back taxes.

The city has been only slightly more successful in collecting the percentages of gross earnings. In many cases the companies made no reports whatever, and in consequence evaded the entire tax.

In 1900 the special franchise tax law was passed in New York, and every street railway company was thereby permitted to deduct from its special franchise tax the amount paid for car license fees and other taxes of that nature. This was the

*Abstract of paper presented at meeting of American Street and Interurban Railway Association, Oct. 10 to 14, 1910.

cause of a great deal of litigation, but it is now practically settled by the Jamaica water case that corporations are clearly entitled to their deductions. inasmuch as the special franchise tax in all these cases exceeds, by a large amount, the percentages of gross earnings and car license fees—that is, the special franchise tax is an additional burden. Even now, with the Jamaica water case settled, there is no clear rule by which a street railway company in New York can know what its tax is going to be, and the State Tax Board guesses at the taxes every year.

No further illustrations are needed, and the foregoing will indicate to anyone who is familiar with the street railway business that the forms, methods and amounts of taxes assessed upon street railway companies are based upon no theory and are not uniform as between companies in the same locality, still less in different localities.

But chaotic as these taxes are they form only a part of the real taxes paid by the ordinary street railway company. The burdens assessed on street railway companies in the way of paving streets, maintaining the paving thereafter, sprinkling streets, carrying city officials, police, firemen, etc., free, carrying school children for half fare, constitute a portion of the amount paid toward the support of the government.

In the case of the Boston Elevated Railway payments of a compensation tax for use of streets, for interest on cost of paving, for cost of maintaining paving, for subway rental, devoted to sinking fund, for removing snow from sidewalks and roofs, amounted, for the 12 months ending Sept. 30, 1909, to over $430,000. In addition to that amount the company paid other taxes amounting to $940,000, making a total amount paid to the account of the public of over $1,370,000, or almost 10 per cent of the gross earnings.

No general information is at hand concerning the expenditures of other street railway companies which would enable a calculation such as the Boston Elevated Railway Company has published in its annual report, but it is probably true that the average company of medium size pays about 10 per cent of its gross in the form of taxes and other burdens along the lines shown in the following table, this being a statement for the eight months ending Aug. 31, 1910, of the street railway company in the city of Dallas, Tex.:

| | |
|---|---|
| Interest at rate of 6 per cent on paving investment | $20,000.00 |
| Maintenance of paving | 4,600.00 |
| Interest at rate of 6 per cent on misc. apparatus investment | 540.00 |
| Sprinkling of streets (estimated) | 2,400.00 |
| Taxes charged on books | 28,700.00 |
| Total for eight months | $56,240.00 |

Per cent to gross earnings, 10.4%

The street railway industry probably pays a larger percentage of its gross earnings in the way of supporting public expenditures than is paid by any private corporation or individual, when, logically, it should pay less.

As stated in the beginning of this paper there is no doubt as to the government's power to assess any tax it chooses against the street railway industry, however onerous the burden may be, but it must be assumed that it is the State's intention and desire to be just and fair. It has created boards of equalization for the very purpose of bringing about equity in tax matters. If the street railways are bearing a heavier burden than they should bear it is because the State does not fully realize the total amount of the taxes being paid; or, if it does realize it, has decided that it is not an excessive amount.

Because of the great diversity that exists in the methods of assessing and collecting street railway taxes there is a strong probability of a lack of appreciation of the total amount of the burden that the street railway industry bears. Therefore, it would seem that whatever efforts the street railway companies exert in the matter should be directed toward a more simplified form of taxation.

Outside of a tax upon the real property of the company there should be but one other tax, and that should include all the levies now made, directly and indirectly. In other words, efforts should be made to abolish car license fees, special franchise taxes, paving investments and maintenance, and all other unusual burdens, and a lump percentage sum should be assessed upon the gross earnings of the company. This would remove any opportunity for fraud, or corruption of the returns by the company, would be perfectly clear, and must always be accurate; and the amount paid out of each nickel received by the company could be clearly demonstrated to the public. Then it may be convinced that the tax is too high, but it never can be convinced under the present complicated system of taxation, for the street railway companies themselves do not know how much they may be called on to pay, especially as the principal tax—namely, the franchise tax—is almost entirely a pure guess and dependent upon the attitude of the mind of the assessors.

As a matter of fact, the ideal system of taxation for a street railway enterprise would be to place the entire levy in the form of a single percentage of the gross earnings from which might be deducted the amount paid on real and personal property. There could be no better way of bringing it home to those voters whose only means of transportation are the street cars that out of every dollar they pay in a large proportion goes to swell the general tax fund, thereby reducing the amount of taxes to be paid by the wealthier citizens.

There are many who believe that, inasmuch as the street railway fares and the service are under the jurisdiction of the power that collects the taxes, the amount so collected will come out of the investor and not out of the community.

This may have been so before the days of commissions when the street railway investor got as much return out of his property as business conditions and circumstances would permit, but under the existing conditions, where the aim of the State is to restrict the return to a fair rate of interest and where conversely the rates and service must ultimately be so adjusted as to yield a fair return, taxes, most assuredly, will be paid ultimately by the consumer.

It may be asked why the street railway investor feels such solicitude concerning taxes if they are to be paid ultimately by the consumer; the reply is that a reduction of taxes for the purpose of enabling the investor to have a fair return will be much more popular and more easily accomplished than raising fares will be.

## STANDARD SYSTEM OF ACCOUNTS AND CENSUS RETURNS

William M. Steuart, chief statistician for manufactures, United States census bureau, read a paper at the Atlantic City Convention of the American Street & Interurban Railway Accountants' Association, Oct. 10 to 14, on the subject, "The Electric Industries." The paper related principally to the statistics contained in the 1907 census of street and electric railways, which was made public recently. Mr. Steuart stated in reference to the standard system of accounts:

"The standard classification of accounts adopted by your association was used to collect the statistics for income and expenses, but the accounting methods of some companies differed in many important respects from the standard, for others there were slight differences that could be readily adjusted.

"There were only 693 operating companies engaged exclusively in the operation of roads and for practically all of these the accounts were in such shape that the census report could be readily prepared. Two hundred and forty-six operated the road in connection with some other enterprise, such as the sale of electricity, manufacture of gas, operation of steam railroad, water works, ferries, ice plants, purchase and sale of real estate, etc. It was difficult to prepare the reports for these roads, and some of the companies think it impossible to make their bookkeeping sufficiently flexible to fit the census requirements. Six companies operated in connection with steam railroads could not furnish the financial data for their electrical equipment. Fifty-five companies were in operation only a part of the year, but their income and expenses are necessarily combined with those operated for the 12 months."

## REPORT OF COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES *

BY G. O. NAGLE, CHAIRMAN; C. E. LEARNED, W. H. DOUGLASS, J. E. DUFFY, L. C. BRADLEY, C. N. WILCOXON

Your committees in previous years have considered particularly the selection, examination and acceptance of men for service, with the result that this association has now a standard method of procedure and set of forms to be used in this work. As these forms seem to be generally satisfactory to the member companies your committee has no alterations or changes to recommend in them. Its work during the past year has been devoted principally to the consideration of two subjects which it believes are especially important at this time, because the changing and more exacting operating conditions due to higher speeds, increasing length of lines, heavier trains, establishment of through service over connecting lines and greater frequency of service have occasioned a corresponding demand for higher individual efficiency in the ranks of the operating force. These subjects are:

1. The most effective methods of educating new men during the "breaking in" period to render them sufficiently familiar with the duties they will be called upon to perform to warrant their being entrusted with the operation of cars.

2. Ways and means, from an operating standpoint, to render employment on electric railways more inviting to a higher class of men and to induce the continuance of efficient men in the service.

Replies to the questions in the committee's data sheet with regard to the practice of educating new men during the "breaking in" period indicate that with few exceptions the same general methods prevail on all roads, though some companies do not provide a school of instruction, skeleton car demonstration, or shop instruction. Your committee respectfully recommends that the work of the committee for 1911 should include the consideration and development of a set of forms outlining a standard method of education during this "breaking in" period, these to be prepared and submitted to member companies for their approval and criticism some time in advance of the next convention.

Your committee recommends the following procedure in "breaking in" new men after they have been engaged by the company. If this course is approved by this association the blank forms just referred to can be prepared to accord with it. The motorman's course should include instruction in the rules of the company and in the actual operation of the car on the road, as well as a general knowledge of the characteristics of the electrical equipment, the latter to be taught either by the use of a skeleton car or by work in the shop or pit. The instruction in regard to the equipment should be sufficiently in detail to enable the prospective motorman to locate minor troubles and remedy them in accordance with the rules of the company. A very important feature in all of the educational work, but particularly that in connection with the equipment, is that it should extend over enough time to enable a man unfamiliar with the work to understand, master and retain the knowledge imparted to him. Too much haste in giving instructions tends to confuse and often to discourage a new employee. On roads where signal systems are in use the course would, of course, include instruction in the purpose and use of the signals.

The conductor's course should include instruction in the rules of the company and in the actual operation of the car on the road, and especially in the proper collection, registration and accounting of fares, and in the handling of tickets and transfers.

Both conductor and motorman, after the completion of their course as "students" and after being "O. K.'d" as capable of operating a car and as familiar with local conditions, should be further instructed as to the procedure to be followed in case of accidents. These instructions should set forth conditions under which telephone reports should be made, and should emphasize the necessity of making written reports in full detail, even of what might appear to be trivial accidents, as well as the importance of obtaining the names of witnesses in sufficient number to insure the obtaining of the fullest information.

These instructions should be followed by a short talk from the superintendent or other responsible official covering points of general guidance, such as courteous treatment of the public, promptness in reporting for duty, the necessity of obeying cheerfully all orders of superior officers and the necessity of co-operation in every possible way to render the service satisfactory to the patrons of the road.

Your committee recommends that after the termination of the period of instruction, as outlined above, the employee be assigned to duty on probation for a period of at least 30 days, and that at the end of this period he should be given a written examination on the rules in general. The committee believes that after the lapse of this short period it will be much more apparent whether the new employee has enough intelligence to warrant the company in continuing him in its service and what special or additional instruction he needs, if any, than if his examination was given earlier. The committee also believes that by withholding the final examination until a man has had at least 30 days' actual service he will understand that he must pass such an examination with a reasonable degree of proficiency, and this will be an incentive to him to pay particular attention to his work and the study of his duties. During this probation period particularly close attention should be given to the work and habits of the man by both superintendents and instructors, so that at the close of the period an intelligent opinion can be formed as to the man's probable worth.

Too much emphasis cannot be placed upon the importance of getting men started right. The first few months in the service are the foundation upon which each employee's record will eventually be formed. If this foundation is properly laid, his future service should be characterized by fewer accidents, fewer delays in operation, more courteous treatment of the public and a more naturally wholesome condition throughout. Men in all walks of life are better satisfied and do better work when they have a clear conception of the underlying reasons for the acts which they are called upon to perform. It is safe to say that no one who works blindly can do justice to himself or his employer; hence it is the duty of the latter to explain fully the whys and wherefores of his rules and orders.

The subject which seems to be of the greatest interest to railway companies at the present time is the problem of how to secure good men, and when once secured how to retain them in the service, and this committee believes that if the more careful training referred to in this report is carried out it will tend to accomplish the desired results.

*Abstract of report read before the American Street & Interurban Railway Transportation & Traffic Association, Atlantic City, N. J., Oct. 10 to 14.

## ANNUAL REPORT OF THE ALLGEMEINE ELEKTRICITATS GESELLSCHAFT

The annual report of the Allgemeine Elektricitäts-Gesellschaft, the largest electrical manufacturer in Europe, shows that the fiscal period ending June 30, 1910, was a prosperous year. A dividend of 14 per cent was declared on approximately $25,000,000 of stock, $187,500 was paid out for employees' welfare purposes and an equal amount for pensions. The total number of employees was 41,663. There were produced 72,460 machines and transformers, having a total rating of 1,476,623 hp; the corresponding figures for the preceding year were 47,351 and 1,239,639 hp. This difference in output represented an increase in orders valued at $7,500,000. The steam turbine business shows an excellent increase. There were built 174 turbines with a combined rating of 363,188 hp.; the corresponding figures for the preceding year were 152 and 226,507 hp. A large part of the increase in the turbine business was due to more orders for the exhaust, counter-pressure and tap types, some of which were built for a maximum output of 25,000 hp to 30,000 hp.

# ENGINEERING ASSOCIATION QUESTION BOX*

NUMERICAL INDEX OF ROADS ANSWERING QUESTIONS.

1. Atlanta, Ga., Georgia Railway & Electric Company; George B. Graves, purchasing agent.
2. Austin, Tex., Austin Electric Railway Company; W. J. Jones, president.
3. Baltimore, Md., United Railways & Electric Company; W. A. House, president.
4. Brooklyn, N. Y., Brooklyn Rapid Transit Company; C. L. Crabbs, engineer way and structures.
5. Brooklyn, N. Y., Brooklyn Rapid Transit Company; William G. Gove, superintendent of equipment.
6. Buffalo, N. Y., International Railway Company; Thomas Pumfrey, chief engineer.
7. Davenport, Ia., Iowa & Illinois Railway Company.
8. Duluth, Minn., Duluth Street Railway Company; Herbert Warren, general manager.
9. East St. Louis, Ill., East St. Louis & Suburban Railway Company; P. S. Tuncil, chief engineer.
10. East St. Louis, Ill., East St. Louis & Suburban Railway Company; M. M. Lloyd, master mechanic.
11. Ft. Wayne, Ind., Ft. Wayne & Wabash Valley Traction Company; L. W. Jacques, master mechanic.
12. Framingham, Mass., Boston & Worcester Street Railway Company; M. V. Ayres, electrical engineer.
13. Harrisburg, Pa., Central Pennsylvania Traction Company; D. B. Moist, engineer maintenance of way.
14. Huntington, W. Va., Ohio Valley Electric Railway Company; James Fagan, engineer.
15. Lemoyne, Pa., Valley Traction Company; C. H. Bishop, superintendent.
16. Little Rock, Ark., Little Rock Railway & Electric Company; D. A. Hegarty, general manager.
17. Los Angeles, Cal., Los Angeles Railway Company.
18. Los Angeles, Cal., Los Angeles Railway Company; E. L. Stephens, master mechanic.
19. Los Angeles, Cal., Los Angeles Railway Company; L. O. Lieber, electrical engineer.
20. Louisville, Ky., Louisville Railway Company; F. H. Miller, superintendent motive power.
21. Mobile, Ala., Mobile Light & Railroad Company; S. M. Coffin, master mechanic.
22. Mobile, Ala., Mobile Light & Railroad Company; J. H. Wilson, president.
23. Newark, N. J., Public Service Railway Company; F. P. Maize, general foreman.
24. Newark, N. J., Public Service Railway Company; Charles Remelius, superintendent rolling equipment.
25. Newark, N. J., Public Service Railway Company; Martin Schreiber, engineer maintenance of way.
26. Newark, N. J., Public Service Railway Company; Martin White, superintendent maintenance of way.
27. New Haven, Conn., New York, New Haven & Hartford Railway; H. Gilliam, electrical superintendent.
28. New Haven, Conn., New York, New Haven & Hartford Railway Company; W. S. Murray, electrical engineer.
29. New York, N. Y., Carbolineum Wood Preserving Company; Ernest F. Hartmann, president.
30. New York, N. Y., Interborough Rapid Transit Company; Norman Litchfield, engineer car equipment.
31. Philadelphia, Pa., Baldwin Locomotive Works; J. R. Dickey, manager electrical truck department.
32. Philadelphia, Pa., Independent Inspection Bureau; E. U. Crosby, manager.
33. Pittsburg, Pa., Standard Motor Truck Company; W. G. Price, mechanical engineer.
34. Portland, Ind., Muncie & Portland Traction Company; E. B. Lincoln, general manager.
35. Salt Lake City, Utah, Utah Light & Railroad Company.
36. Schenectady, N. Y., Schenectady Railway Company; B. Penoyer, engineer maintenance of way.
37. Schenectady, N. Y., Schenectady Railway Company; F. J. Doyle, master mechanic.
38. Seattle, Wash., Seattle Electric Company.
39. Syracuse, N. Y., Syracuse Rapid Transit Company; E. P. Roundey, engineer maintenance of way.
40. Utica, N. Y., Utica & Mohawk Valley Railway Company; W. J. Harvie, chief engineer.
41. Utica, N. Y., Utica & Mohawk Valley Railway Company; M. J. French, engineer maintenance of way.
42. Washington, D. C., Capitol Traction Company; J. H. Hanna, chief engineer.
43. Washington, D. C., Washington Railway & Electric Company; H. W. Fuller, general manager.
44. Anonymous.

## POWER STATIONS.

1. *What increase in fuel economy have you been able to accomplish under regular operating conditions? Upon what bonus or premium, if any, has this been based?*

Eight per cent by use of fine shaking grate. No bonus. (2.)

Very satisfactory with better grade coal, using highest grade boiler compound, cleaning boilers every two weeks, keeping tubes, etc., practically entirely free from scale, putting heavier covering (asbestos cement) on top of boilers, and seeing that all cracks and crevices in boiler walls are securely closed as soon as noticed. (34.)

Five per cent by improving boiler conditions. No bonus. (3.)

By increased temperature of feed water, increased vacuum and attention to methods of firing, partly accomplished by installing recording gages wherever possible. (20.)

By keeping the boiler tubes clean and free from soot. Also purchase our coal under specifications in which is inserted penalty for furnishing poor coal and bonus given for furnishing good coal. This specification is based on B. T. Units, percentage of ash, sulphur and moisture. (16.)

2. *Is the use of boiler compound to be avoided if possible? Why?*

Have not noticed any injurious effects. (13.)

I would use some compound, also a mechanical cleaner. (10.)

Should be avoided, because of its deteriorating effect on steel in the boilers. (7.)

Proper kind of boiler compound should give good results. (42.)

Yes. Because of expense and danger of foaming. Better purify the water. (14.)

Should be avoided if possible, on account of it pitting the tubes. (16.)

The use of boiler compound should be avoided if possible, but if necessary to use same care should be taken not to use any more than is absolutely necessary. Practically all boiler compounds will attack the packing in the stuffing boxes on the steam valves and joints on steam mains. In some plants where economizers are used they will attack the caps and joints. Where it is necessary to use compound in large quantities on account of the condition of the feed water, I have noticed that the compound has affected the walls and piston in the cylinders and caused what is commonly called "grooving." In a large number of plants the condition of the feed water is such that the use of compound cannot be avoided, as it will prevent the formation of scale in the boilers to a certain extent. (27.)

Yes, the boiler is no place in which to purify water, its function being to generate steam. All compounds will affect the steam more or less, doing damage to packing on flanges and rods, and having bad effect on rubbing surfaces to be lubricated. (20.)

We see no reason, other than of expense, why the use of boiler compound is to be avoided. (43.)

Yes; unnecessary expense. (3.)

Yes; if water is such that you can do so. Otherwise, the very highest grade boiler compound should be used, because poor quality may cause steam pipes to eat through, and may damage cylinders. The greatest possible care in trying or using boiler compounds should be given. We have tried very many kinds, tested them thoroughly and have always returned to a certain brand which we have found meets our conditions and keeps boilers in good condition. (44.)

3. *What is the nature of tests commonly applied at the boiler-rooms of member companies by insurance inspectors as a basis for certificates guaranteeing safe working pressure on boilers?*

Hammer test. (13, 27, 9, 3, 16, 20.)

Inspector, about every other time, inspects the boiler under full operating conditions, as usually found in every-day operation. Every other time he inspects internally. (34.)

The usual test made by the Hartford Boiler Insurance Company. (7.)

No test; regular inspection made. (1.)

4. *Have you ever used lignite coal? If so, what is your opinion of it as a fuel?*

Compares favorably with any other kind of fuel. (2.)

5. *How can the air space between the bridge wall and grate bars of a chain grate stoker be automatically stopped or reduced in area?*

The incline type of stoker generally has a stationary dump grate attached to the back wall. The other type generally uses overhanging bridge walls. The area can be adjusted by moving the grates on their truck. (27.)

Adjust the distance between the rear end of stoker and bridge wall so that the required thickness of fire may be carried without allowing the ashes to bank up or fall off, leaving an open space. (3.)

6. *Can forced draft be used on a chain grate stoker? If so, how?*

Prefer the induced draft. (9, 14, 27.)

Not unless some method is devised for stopping air space at end of grate. (20.)

7. *Is it good practice to operate large fly-wheel engines of a reputable make without fly-wheel insurance?*

No. (9, 1, 40, 20.)

Yes. (12, 3, 16, 27.)

8. *What should be the cost per 100 kw hours for lubricating the high and low-pressure cylinders of a 1650 kw, vertical, cross-compound condensing engine operating at full load, 75 r.p.m., saturated steam, 150 lb. pressure and 25-in. vacuum?*

$0.0032. (9.)

$0.003, with oil at 30 cents per gallon. (3.)

Cost, based on 50-cent cylinder oil for high-pressure cylinder and 25-cent oil on low-pressure cylinder, should be 5 cents per 1000 kw-hours. (20.)

9. *Do you use a damper regulator? If so, is there any way to prevent smoke when damper is closed?*

The damper regulator should be so adjusted as to prevent closing the damper entirely at any time. (42, 3, 27.)

Yes. Pays for itself in three months' time. Damper regulator is kept adjusted by either shortening or lengthening chain, so as to avoid the smoke. (34.)

## TRACK.

10. *What kind of pavement has proved most satisfactory?*

Wood blocks. (13, 1.)

Vitrified brick on concrete foundation. (2, 8, 15, 14.)

Asphalt with block toothing. (35, 17.)

Granite block. (4, 26, 41, 36, 38, 3, 42, 43.)

Brick grouted with cement grout and Barrett paving pitch, and creosoted wooden blocks grouted with either cement grout or Barrett paving pitch. (16.)

Sandstone, especially under heavy wagon traffic. (39.)

11. *What is the most satisfactory practice in the construction of the foundation and sub-structure of a street railway track and loop?*

Concrete base with sand cushion under ties. (35.)

Concrete base. (14, 36, 38.)

Concrete floor with steel ties embedded in concrete. (41.)

Rolled cinder drainage, broken stone, 8-in. creosoted pine ties, filled between with concrete. (16.)

Crushed stone. (26, 42, 8, 3, 39.)

QUESTION 12 OMITTED.

13. *Is it necessary to use tie plates on yellow-pine ties in street railway tracks?*

Not considered entirely necessary with recommended broad rail base on long-leaf yellow-pine ties. (4.)

Yes; where track is open construction. (26, 14.)

I believe that nothing is to be gained from the use of tie plates on yellow-pine ties in street railway tracks. (29.)

Not necessary with 80-lb. T-rail and continuous joints on open track. (41.)

Do not consider tie plates necessary on yellow-pine heart ties where concrete is used between ties extending from bottom of tie to above base of rail. (39.)

We consider it good practice to use tie plates on yellow-pine ties. The necessity, however, depends upon the weight of the cars operated and the frequency of the service. (43, 16.)

Use tie plates on suburban tracks, but not as yet in paved city streets, as the foundation usually is more stable. (3.)

14. *Does it pay to use screw spikes? If so, why?*

Screw spikes, while the ideal form of rail fastenings, are too expensive for street railway companies to use. (29.)

*Presented before the American Street and Interurban Railway Engineering Association at Atlantic City, N. J., Oct. 14, 1910.

We have never been favorably impressed with screw spikes and have for the present discontinued their use, principally on account of the difficulty experienced in making track repairs where they have been employed. (3.)

15. *Taking maintenance of paving into consideration, is not the grooved rail as recommended by the Association more economical than T-rail laid in paved streets?*

Yes. (4, 26, 36, 15, 39.)

We have had little trouble with T-rail that it seems likely would be prevented by use of grooved rail. (8.)

T-rail track more durable and therefore pavement has longer life and less cost for maintenance. (41, 14, 35, 38, 16, 17, 3.)

16. *Would it be economy to install solid manganese special work in paved streets where 20-ton cars are run on 2½-minute headway?*

Yes. (26, 4, 8, 41, 7, 16, 17.)

No. (36, 1, 3, 39.)

17. *Would it be economy at the present price of manganese rails to install same on curves of 80-ft. radius or less?*

Yes. (26.)

No. (36, 43, 42, 3, 39.)

If life of supporting structure is twice that of rails, manganese would be economical. (41.)

18. *Does your experience prove that solid manganese steam-railroad crossings are more economical than three-rail, built-up crossings of latest designs? Give data.*

Two manganese crossings placed in 1904 have been overhauled once. One built-up crossing placed in 1903 has been overhauled every year, with rail and bolt renewals each year since 1905. (41.)

Our experience has proved that solid steam railroad crossings, either of the ordinary steel or solid manganese type, are more economical than the three-rail, built-up crossing of latest design. We have solid steam railroad crossings that were placed in service in 1897, and they are in good condition to-day, having outworn three different crossings of the three-rail, built-up type. (16.)

We have always used either the three-rail, built-up type of crossing or 9-in. hard center construction, and have found that uniformly satisfactory results can be obtained by a judicious selection of the above types with respect to the location. Such wear has been obtained from these types as would hardly seem to justify incurring the considerable additional initial expenditure of solid manganese crossings, especially in view of the present tendency to frequently change standards. (3.)

It does. We now have a crossing installed which has given twice the service that a built-up crossing had given, and from observation would say that it is equivalent to six times the life of a built-up crossing. This company makes a practice of installing nothing but manganese steam road crossings. (17.)

Yes. (1.)

We have a number of solid crossings in use at the present time. One solid crossing which has been under heavy traffic for two years is practically in perfect condition; cost for maintenance for two years, $144. Three-rail type crossings in this location cost $250 to $300 per year for maintenance. Under heavy traffic there is no doubt in my mind that the solid crossing is much the cheaper in the long run. (39.)

19.—*Does greater economy and stability result from filling joints of stone paving with Portland cement grout, pitch or hot quartz sand?*

Portland cement grout. (4, 42, 35, 8, 36, 41, 38, 1, 16, 39.)

Tar and pitch where cars operate while paving. (26, 43.)

We fill our joints with asphaltum. (17.)

20. *Are you obtaining more economical results from manganese center or solid manganese frogs under heavy urban traffic?*

Solid manganese for crossing frogs. (26, 4, 41, 17.)

Hardened center is most economical under average conditions. 8, 16, 3, 1.)

21. *What type of bolted or keyed-in hard center gives best results?*

Keyed-in most satisfactory. (4, 26, 8.)

All three of the types used by Lorain Steel Company, Wm. Wharton, Jr., & Company and Pennsylvania Steel Company will give satisfactory results. (43, 3.)

Good results from Wharton Renewable Center Construction. (35.)

Driven fit bolts through hard centers, best; keyed with steel wedges, good; speltered wedges or bolts, poorest. (41.)

Accompanying engravings show the types we consider most satisfactory. Manufactured in our own shops. (38.)

We are obtaining good results from both keyed-in and bolted work. (39).

Both keyed and bolted renewable hard centers have been in use in Buffalo for a number of years. The keyed centers have become loose in a great many places, requiring the service of a blacksmith's force of three men to reset, key and pour them with spelter. When keyed centers are to be renewed on account of wear, it is often very difficult to remove them if they have not previously become loose. The bolted-in centers have given practically no trouble, especially where the nuts on the bolts are so placed that they can be reset or tightened by an ordinary trackman. (6.)

22. *What is recommended as standard rail to be used in permanent paving—brick, asphalt, bitulithic?*

Grooved girder rail. (4.)

7-in., same as Sec. 393 L. S. (26.)

7-in., 80-lb. Lorain 335. (35.)

T-rail section, brick paving; grooved section, asphalt and bitulithic paving. (36.)

7-in. T-rail. (14, 41, 38.)

9-in. Girder rail. (15.)

P. S. Co. 277, 7-in. high T-rail weighing 80 lb. per yard, in outlying and suburban districts, and P. S. Co. 293 in congested vehicular trafficked streets. (3.)

We are using Lorain Steel Co. 97-420. (43.)

We use for the lighter traffic, 72-lb. T-rail, Penna. Steel Co. Section No. 274; heavier traffic, 87-lb. T-rail, Lorain Section No. 399. (17.)

23. *Has satisfactory service been obtained from patent joints designed for use on old rail where the rail is considerably worn?*

We have had very satisfactory results with cast weld joints on old girder rail and with continuous joints on old light T-rail. (42.)

Not satisfactory. (26, 13, 38.)

Yes. (36, 16.)

Yes, use Continuous joints. (15,14.)

Clark, Continuous and Atlas joints have prolonged life of worn rails. With Clark and Continuous joints turn rails to make receiving end high and grind down rail head. (41.)

No.

We have not obtained even reasonably satisfactory results from the use of patented joints under the conditions specified. In fact, we have had to remove these joints and replace them with electric welded bars on the web of the rail, from which uniformly satisfactory results have been obtained. (3.)

We have had satisfactory service from "Atlas" rail joints designed for use on our old rail. The end of this joint which takes the receiving rail is upset 1/16 in. and after the plates are in place and bolted up the joints are ground off smooth. (43.)

We are obtaining good results from the use of patent upset joint plates for repairing worn rail; however, the important point for the success of this work is to properly grind and file the rail ends to a perfectly even surface after the joints are bolted up. (39.)

## CAR HOUSES.

24. *What is the best system of fire protection for open railway yards?*

Fire hydrants and hose with proper regulations and inspection. (4, 3, 10.)

1. Auxiliary fire alarm stations. 2. Carey frost-proof fire hydrants with hose and nozzles in protected rack. 3. Non-freezing chemical fire extinguishers. An ordinary fire extinguisher in heated compartments. (25.)

Plenty of fire hydrants and hose houses with watchman's service. (11, 8, 14.)

Provided open railway yards cannot be roofed over and enclosed, thus constituting a relatively draft-free space in which automatic sprinklers operate with known success, probably the best developed fire protection consists of erecting non-flammable partitions at frequent intervals, and supplying adequate 2½-in. standard fire streams in connection therewith. The object of these partitions would be to interfere with the fire spreading laterally among the cars, particularly if impelled by a wind, and afford a barrier from behind which hose streams could be operated to advantage. The partitions could be made of 2-in. cement plaster occasionally pilastered, and extended above the roof of the cars a moderate distance, say 5 ft. A somewhat expensive development of the extinguishing facilities would be the frequent use of monitor nozzles, but in most cases frequent hose outlets, with means maintained for quickly carrying hose from one location to another wherever it might be needed, should answer every purpose. (32.)

No. 311.

The best system of fire protection for open railway yards we believe to be an installation of aisle sprinklers with the main pipes under ground and with automatic valves at the junction of the riser and main pipe so that normally the risers have no water in them. (30.)

Dry sprinkler systems, and hose plugs with pipe laid under ground, and hose box protected; also fire hose to be kept on reel in boxes to prevent freezing and deterioration on account of being exposed to the weather. (16.)

Hose houses so placed that at least two lines of hose can be brought to any one point in the yard. (40.)

Broad spaces should be left at intervals, so that city or local fire department may enter to fight a fire. Hydrants at intervals are necessary. (44.)

25. *Is there any automatic system for open yards?*

Yes, dry system sprinkling outfit. (25.)

Yes; dry sprinkler system manufactured by the General Fire Extinguisher Company. (16.)

System referred to in my answer to Question 24 is now being installed in one of our yards. (30.)

It does not seem practical to have anything more than aisle sprinklers in an open yard. These can be installed by erecting posts between every, or every other track, and connecting the tops with a timber construction under which a line of sprinkler heads can be placed. (44.)

## LINES OVERHEAD AND UNDERGROUND.

26. *What should be the transmision loss on a d-c. 600-volt line, provided proper amount of copper is put up?*

Three volts per 1000 ft. (8.)

Not over 10 per cent. (14, 13, 16, 3, 20.)

Twenty per cent at maximum load. (7, 40.)

In substation work, however, where the substations are located as in our case, a very economical way is by the use of comparatively small feeder and feed-in at different points; that is to say, by trunk feeders between the different substations. The loss in the transmission is governed to a great extent by the condition of the bonding and ground return, which in many cases the engineers have overlooked. For example, it would not, of course, be practical to provide, say, 500,000 c.m. feeder for the overhead when the capacity of the bonding or ground return would not be equivalent to this amount, as the feeder cable would suffer loss on the poor condition of the return or negative circuit. (19.)

27. *Have you used gasoline wagons for either emergency or regular city trolley repair work? If so, how long, how many, weight and horse-power of engines?*

No.

We use one gasoline and one electric emergency wagon; the electric wagon having been in service four years, the gasoline one year. The gasoline wagon has a capacity of 3000 lb. and a maximum speed of 20 m.p.h. (42.)

We use an electric wagon. (16.)

We are using one gasoline driven emergency tower doing combination of emergency and repair work on our city overhead. This truck has been in service now for approximately four months; is of the Frayer-Miller, four-cylinder blower-cooled type, 25-hp, 2-ton capacity and when fully equipped weighs 7310 lb. (19.)

28. *Do you recommend the use of gasoline trolley repair wagons in preference to animal wagons? What is the difference in cost of maintenance?*

We consider either a gasoline or electric motor wagon preferable to animals, especially for emergency work or 24-hour service. (42.)

Would not recommend depending entirely upon gasoline repair wagon, where only one emergency wagon is used. (36.)

We have obtained very good service from our electric wagon and prefer it to an animal wagon. The maintenance and charging cost of the electric wagon is about 2 cents per mile, whereas the animal wagon, counting the time the horses are out of service and all incidentals, amounts to 3 cents per mile. (16.)

I would recommend the use of gasoline-driven repair wagons in preference to animal-drawn wagons for several reasons: first, there is no comparison or limit to the amount of territory which can be covered by gasoline motor-driven wagon as compared with the animal-drawn wagon. In outside construction work, however, where there is open track it is best to use animal-drawn wagons and especially on new work where no car service has been installed; second, by using gasoline-driven wagons a great deal more attention and assistance can be given by the driver to the crew than can be given by the teamster driving horses, and especially so in city work where the horses are apt to become frightened. We have not been operating this gasoline truck long enough to fully determine a comparison in the cost of operating the gasoline tower as against the animal-drawn tower; however, for the four months we have been operating this gasoline truck we have figured it costs an average of 21.48 cents per hour against 13.76 cents per hour for the animal-drawn wagon. (19.)

## CAR BODIES.

29. *Has any one had any experience with the use of wood preservatives on car bodies?*

We use the wood preservative known as "Locustine" with good success on the woodwork of our car bodies, as we found that worms eat all kinds of wood that is used in the construction of car bodies, especially ash. For that reason we use the wood preservative and find it is economy to do so, as it not only preserves the wood from deterioration and the ravages of these worms and dry rot, but also against sudden collapse of any of the concealed woodwork, thereby preventing any serious accidents. (16.)

30. *What is the most economical color for use on cars in a hot, sunny climate?*

Light yellow. (23.)
Pullman green. (5.)
Yellow and French gray. (2.)
Orange, olive green or maroon red. (10.)
Chrome colors. (14, 18.)
We are now using Pennsylvania Tuscan red. (43.)
We have just such a climate and after several years' experimenting we decided on Pullman green as the most economical. (16.)
A dark yellow, similar to that produced by a combination of lemon chrome and black, would be most economical, as the heat is reflected and not enough is absorbed to affect the wearing quality of the varnish. (40.)
Olive green. (1.)

31. *If a car body were down hard on the side bearing plates on one side, would not this interfere with the free movement of the trucks on sharp curves, and be liable to cause derailment?*

Would not cause derailment unless dry and cutting. (24.)
Yes. (5, 10, 11, 8, 14, 34, 7, 16, 18, 3, 12, 30, 43, 1.)
With plain rub irons, yes; if spring supported or roller bearings are used, no. (21.)
Substitution of roller side bearings has stopped derailments in one case of this sort. Usually keeping the rub plate well greased will prevent trouble of this kind. (40, 28.)

## CAR EQUIPMENT.

32. *What is your experience with, and your estimation of the value of, grooving commutators, to date?*

Grooving commutators reduce injurious sparking very materially, increase life of commutators by permitting the use of a softer carbon brush. Up to date results are favorable. (24.)
Have had very good success with large motors which have good protection from oil; but on small motors have had trouble from oil and carbon dust. (23.)
All of the commutators on our elevated division have been slotted for the past 18 months and we are now about 65 per cent completed on our surface division. The results obtained have been very satisfactory and troubles have unquestionably been materially reduced. We feel that it is a very good thing on commutators on all types of railway motors. (5.)
Very satisfactory. (10, 8, 37, 34, 1, 12.)
My experience with grooved commutators together with imported brushes has been extremely satisfactory on all types of motors, particularly on the older types. We have slotted commutators that have been in service over two years, with practically no indications of wear; whereas the life before slotting was about two years. (42.)
It saves at least one-half of cost in maintenance of commutators and motor carbons. (11.)
We have been grooving commutators for about two years and would not think of discontinuing the practice. (43.)
Necessary in some cases where mica is too hard. (14.)
Satisfactory, provided a soft non-lubricated brush is used. (13.)
The motor equipment on this road when purchased had all commutators grooved. After about two years of operation the commutators were turned off to a point where the grooves were eliminated, and we experienced so much trouble with the commutators in that condition that we found means to groove them again. We know positively that commutator troubles are few with grooved commutators as compared with ungrooved commutators on motors of about 75 hp and the life of commutators is greatly increased. (7.)
Immense advantages arise from the grooving of commutators of armatures. It is possible to use a commutator properly grooved probably ten times as long as if it were not grooved. The improved commutation produced by the grooving of the commutator which includes the use of a high-grade brush is extremely satisfactory. It is also possible to keep armatures and interior of motor shells much cleaner, owing to the small amount of carbon and mica dust. (3.)
After three years of experience of grooving commutators, good results have been obtained, flat commutators and flashing have been eliminated and a longer life assured to the brushes and commutators. (18.)
Commutators can be grooved at a cost of not over 10 cents per commutator, and the grooving increases the life of the commutator from 100 to 150 per cent, as well as increasing the brush life by about 40 per cent. (40.)
Our experience has shown that the grooving of commutators on non-interpole motors of 125 hp and over is very beneficial to the commutation, and reduces maintenance costs through reducttion in temperature of the armature. It is not necessary on small motors, or interpole motors of any size up to 200 hp. (30.)

33. *How does the maintenance cost of interpole motors compare with that of the straight series motor?*

We have 100 elevated cars equipped with interpole motors and we feel that the maintenance costs are less, due principally to the reduction in flashing. The interpole motors with which we have had experience have given very satisfactory service. (5.)
Should say that the maintenance is one-third less. (11.)

34. *What kind of oil has given most satisfaction in lubricating engineer's valve?*

Olive oil. (24, 5.)
Cylinder oil. (10.)
We use a good grade of machine oil. (11, 16.)
Non-fluid oil. (37.)
Arctic machine oil. (16.)
Graphite and light engine oil. (14.)
Red engine oil. (13.)
Air compressor oil. (34.)
We use a good grade of engine oil, and have had no trouble with it. (7).
High-grade graphite grease. (3, 40.)
We obtain best results with lard oil. (18.)
A special preparation having the consistency of grease, but without the latter's tendency to cake. (30.)
Dixon's graphite grease for triple valves. (28.)

35. *In elevated or subway service, what is the maximum difference allowable in the standing brake-cylinder piston travel and running brake-cylinder piston travel, before the wear in the pedestal boxes or other parts of truck should be taken care of?*

The difference between standing brake-cylinder piston travel and running brake-cylinder piston travel in elevated service should be not greater than 4 in. maximum. (5.)
This would depend on the brake leverage ratio. On cars having a brake leverage ratio of ten to one we allow a difference of 1½ in. for 4½ in. standing piston travel, and 2 in. for 6 in. standing piston travel before the wear on the trucks is taken care of. (30.)

36. *What are the causes of broken brushes on 101-B motor, and remedy?*

High mica; groove the commutators. (23, 5.)
We have had broken brushes on many types of motors, but grooving the commutators and the use of French carbon brushes have eliminated this trouble. (43.)
We have had some trouble with broken brushes on 101-B motors, due to poor quality of brush and too high brush tension. With the use of high-grade brushes this trouble has entirely disappeared. (42.)
Use soft brushes and keep brush holders close to commutators. (13.)
The probable cause for the broken brushes on the 101-B motor is the absence of shunts on the brush holders, which produces an undue wear in the brush slots, and in turn such undue movement is given the brush as leads to its being rapidly broken. The remedy, therefore, is to see that the brush holders are equipped with proper shunts and these maintained with good firm contacts. (3.)
Have not experienced any trouble with broken brushes in our 101-B motors. (18.)
Use two brushes per holder in place of one. (40.)
High mica and brittle brushes have been the principal causes of broken brushes. Have found a remedy by slotting commutators and using high-grade brushes. (5.)

37. *What variation from the correct distance may be allowed between axle and armature shaft and still obtain good results in gears, pinions and bearings?*

1/16 in. (24, 21.)
3/16 in. (10, 16.)
Not be more than 1/32 in. (11.)
About ⅛ in. (8, 3.)
3/32 in. on G. E. 73 C. motors. (7.)
3/64 in. (18.)
Should be automatically taken care of by proper inspection on a mileage basis. (30.)

38. *What is proper pressure for pressing cast iron and rolled steel wheels and cast steel gear wheels on the following sizes of axles: 4 in. 4½ in. and 5 in.? (Knees not to be used.)*

| *Cast Iron Wheels.* | *Gear Wheels.* | *Steel Wheels.* |
|---|---|---|
| 4 in., 25 to 35 tons. | 4 in., 35 to 40 tons. | 4 in., 35 to 40 tons |
| 4½ in., 30 to 40 tons. | 4½ in., 40 to 45 tons. | 4½ in., 40 to 45 tons. |
| 5 in., 35 to 45 tons. | 5 in., 45 to 50 tons. | 5 in., 45 to 50 tons. |

(24.)

The following pressure for cast iron wheels:

| | |
|---|---|
| 4 in. axle., 30 to 35 tons allowed | 0.013 |
| 4½ in. axle, 35 to 40 tons allowed | 0.015 |
| 5 in. axle, 40 to 45 tons allowed | 0.017 |
| *Steel Wheels.* | |
| 4 in. axle, 35 to 40 tons allowed | 0.008 |
| 4½ in. axle, 40 to 45 tons allowed | 0.010 |
| 5 in. axle, 45 to 50 tons allowed | 0.012 |

The gears are pressed on about the same as the steel wheels. Allowances given for fit are what we are using at the present time, but in different grades of iron or steel all vary, as hard wheels take much less than soft ones. (23.)
For cast iron and steel-tired wheels we use 10 tons per inch in diameter of axles. (43, 30.)
Rolled steel wheels on 4 in. axles, 45 tons min., 60 tons max.
Rolled steel wheels on 4½ in. axles, 60 tons min., 75 tons max.
Rolled steel wheels on 5 in. axles, 60 tons min., 75 tons max.
Cast iron wheels on 4 in. axles, 10 tons pres. per 1 in. diam.
Cast steel gears with keys, 35 to 40 tons pressure.
Cast steel gears without keys, 60 tons pressure. (5.)
4 in. cast iron, 40 tons.
4½ in. cast iron, 45 tons.
5 in. cast iron, 50 tons.
Steel wheels and gears, 5 tons less on each size. (10.)
We use only 4-in. axles; 35 tons good practice for chilled wheels, but pass at 30 tons. Solid steel wheels, 45 tons. Solid steel gears require more attention, their elastic limit seems to be reached at about 60 tons, so we press at 45 to 50 tons, as we believe a gear pressed on at 60 tons is more likely to become loose than one pressed on at 40 tons. (21.)
Cast iron, 4 in., 35 tons; 4½ in., 40 tons; 5 in., 45 tons.
Rolled steel wheels, 4 in., 40 tons; 4½ in., 40 tons; 5 in., 45 tons. Cast steel gear where key is used, 4 in., 10 tons; 4½ in., 12 tons; 5 in., 15 tons. (11.)
Twenty-nine tons pressure on wheels on all sizes of axles and 10 tons pressure on gears. (8.)
Cast wheels, 4 in., 40 tons; steel, 4½ in., 45 tons; 5 in., 45 tons. Gears with key, 20 tons; gears without key, 50 tons. (37.)
Twenty-five to 35 tons for wheels on 4 in. and 4½ in. axles, 35 to 45 tons for gear wheels. (13.)
Cast iron and rolled steel wheels and cast steel gear wheels; 4-in., 4½-in. and 5-in. axles are from 35 to 40 tons. (16.)

| | *Cast Iron Wheels* | *Cast Steel Gear Wheels* | *Rolled Steel Wheels* |
|---|---|---|---|
| 4 in. | 35 tons | 35 tons | 35 tons |
| 4½ in. | 40 tons | 40 tons | 40 tons |
| 5 in. | 45 tons | 45 tons | 45 tons (3.) |

We allow a pressure of 35 to 40 tons for cast iron wheels and cast steel gears for 4½-in. axles. (18.)
Cast iron wheels, 8 tons, and steel wheels, 10 tons per inch of diameter of wheel fit. (28.)
Thirty-five to forty tons gear wheels. Thirty-five to forty-five tons on wheels. (1.)
Standard rule is 10 tons per inch of diameter of journal. (30.)

39. *Owing to the bad riding of cars, excessive wear of brake hangers, and waste of power due to lost end motion of journal boxes on axles having M. C. B. journals, should this type of journal be modified by some device to check the end motion, and what would be the best device to use?*

More shoulder, if possible to obtain, as the only remedy. (24.)
In our experience M. C. B. journals on our heaviest equipment have proven satisfactory. Either a solid check plate held in place by grooves in journal box against end of journal or a journal brass with a hood extending over end of journal should be effective. (5.)
A brass end check plate on end of journal, same as used in the Peckham 14 A XX truck. (10.)
Permit us to observe that we do not agree with the premises of this section, inasmuch as so far as we know bad riding of cars, excessive wear

of brake hangers and waste of power due to lost end motion of journal boxes on axles have never been attributed to the M. C. B. type of journals and by far the greater number of railway cars now in operation are equipped with this type of journal. (21.)

Some modification should be made in the M. C. B. bearing and is being made. Probably the best modification is to cast a hood on the journal bearing wedge and attach an adjustable bronze plate to the hood which forms an end bearing for the axle. The adjustment should be made with shims and the journal boxes should be so constructed that these shims can be put in from the top without removing the wedge. Another modification which is also in successful use is to cast the hood on the journal bearing, but this form of end bearing is not adjustable. The end play of the axle with reference to the truck frame should be limited to ⅛ in. to entirely avoid brake hanger trouble and waste of power due to the wheel flanges grinding on the sides of grooves in brake shoes when brakes are not applied. (33.)

We overcome this trouble by babbitting journal brasses to take up end play at a very light expense, with excellent results. We believe the M. C. B. journal is the best to be had. (7.)

When spool or shoulder becomes worn on end of axle, turn old spool off and shrink collar on end of axle. Let collar be high enough to give journal bearing at least ¾-in. bearing on end. This will modify trouble to great extent. (16.)

Check plate possesses many advantages that are lost by the adoption of the M. C. B. journal. (3.)

Caused by mismated wheels, trucks out of square or worn flanges and trucks not swinging free on the center bearings. Ball-bearing center plates will save power; cars will take curves more freely and will reduce flange wear, which is one of the principal causes for side motion. (18.)

Collarless axle with end thrust bearing is most satisfactory. (30.)

40. *What are the causes of thick and thin wheel flanges, and remedy?*

Trucks not having wheels properly mated. Axles not parallel to each other. Wheels not square and in line with center line of truck. One wheel on same axle harder than the other. A good center bearing which can be properly lubricated and kept in easy working order will tend to reduce wear on flanges materially. (23, 24.)

Continued operation in one direction against special work. Bodies riding heavy on side bearings. Trucks out of square. Remedy—keep trucks square, keep cars shimmed to prevent their riding heavily on side bearings and reverse the cars or wheels operating against special work. (5.)

Difference in hardness of wheels. (10.)

Both variation in tape size and texture of material in tread of wheel. For steel wheels we grind thick flange wheel 0.02 in. to 0.04 in. smaller in diameter. (21.)

Curves in the track; motor crowding the wheels; truck center not square or in trim; wheels that are out of gage and not properly pressed on the axle. (11.)

The principal cause of thick and thin wheel flanges is a difference in diameter between the two wheels on the same axle. The remedy is to take out the pair of wheels before the flange has become too thin for use and turn the large wheel to a smaller diameter than the thin flanged wheel and thus reverse the wearing action. (33.)

Thin wheel flanges on this road are caused mostly by swaying of cars, twisting of trucks, running at high speed. We take up all excessive wear in pedestals, etc., which materially reduces the amount of tire turning to overcome thin flanges. (7.)

When truck is not true one wheel pressed on too far toward center of axle, car body riding lighter on one side bearing than on the other. (16.)

Lack of squareness of truck frames; wheels not being properly pressed on from the center of the axles; wheels not properly mated as to tape size. (Two wheels should not differ more than one tape.) A different density or hardness of metal occurring in two wheels on the same axle; use of brake shoes having a heavily chilled face and these brake shoes not applied to gage; improper distribution of the equipment on car body produces irregular distribution of load. (3.)

Trucks out of square, binding on the side bearings and operating cars on curves, which are longest on one side. Remedy: Square the truck, free movement on the center bearing and turn cars twice a week. (18.)

When one wheel of a pair has a thick flange and the other a thin one, the trouble is usually caused by a difference either in original diameter or in the hardness of the metal. It can usually be overcome by grinding or turning to a smaller diameter the wheel with the thick flange. On one of our branches both wheels of the outside axle on each truck develop thin flanges, due to excessive track curvature. No known remedy for this. (12.)

All of our sharp and thick flange troubles are cared for by turning. Do not resort to the method referred to as a means toward correcting sharp flanges. (5.)

Have not been able to materially correct this trouble. (40.)

41. *What wear should be obtained from cast-iron wheels under 11-ton cars, expressed in terms of (a) car miles; (b) reduction of diameter; (c) percentage of weight?*

*a*, 45,000 miles; *b*, ⅞ in. to 1⅛ in.; *c*, 15 per cent to 20 per cent. We get: *a*, 25,000 miles; *b*, ⅜ in. to ⅝ in.; *c*, 12 per cent to 13 per cent. (24.)

*a*. 40,000 miles; *b*, ¾ in.; *c*, 25 lb. This last figure would depend somewhat on the tread of the wheel. (43.)

*a*, 40,000 miles; *b*, ⅞ in. (5.)

*a*, 42,000 miles. (10.)

Should say 50,000 miles under good conditions. (11.)

*a*, 50,000 miles; *b*, 1 in.; *c*, 15 to 20 lb. (8.)

3/16 in. wear. (16.)

(*a*) Depending upon the service, from 40,000 to 75,000 miles. (*b*) 1½ in. reduction in diameter. (*c*) About 10 per cent. (3.)

Cast-iron wheels between 26,000 and 27,000 miles, due to all classes of trouble. This mileage is about half of what should be obtained. (40.)

42. *What is the relative efficiency and maintenance cost of solid steel wheels as compared with steel-tired wheels?*

In our opinion the efficiency of steel-tired wheels other than in the matter of maintenance cost and factor of safety is equal to that of the rolled solid steel wheel. On account of the factor of safety for elevated service and reduced maintenance in renewing worn out and loose tires, the solid steel wheels are most desirable and economical. (5.)

Solid steel wheels best, and maintenance less if steel-tired wheels have cast centers. (37.)

Solid steel wheel most economical, account more mileage, tire does not come loose, and a new wheel can be purchased for about the same cost as a new tire. (34.)

Our experience shows a slight advantage in the matter of car miles obtained in favor of the steel-tired wheels, but not enough, however, to warrant the additional cost of re-tiring. (40.)

43. *What success has been attained toward correcting sharp flange wear of car wheels by reducing, by turning or grinding, the excessive diameter of the thick flange wheel on the same axle?*

Good. Leave soft wheel 1/16 in. larger when turning. (10.)

You cannot entirely eliminate turning, but life of thin flange may be very much increased by grinding its mate 0.02 in o to 0.04 in. smaller. (21.)

Grind the tread of wheel with thick flange close up to flange and with very little taper and increase the taper on the tread of wheel with thin flange. This shifts the wear to the thick flange. (8.)

Always turn both wheels on the same axle. Keeping center and side bearings well lubricated will tend to lessen trouble with steel wheels. (34.)

Both wheels should be turned to standard tread and flange. (28.)

Mismated wheels can be overcome by close inspection, turning cars and mating with wheels of the same flange thickness. (18.)

Turning down the excessive diameter of the thick flange wheel has always been successful with us in correcting sharp flange wear. (30.)

This will usually prove an effective cure for the trouble if taken in time. (12.)

This is our usual method for correcting this difficulty and the results have been entirely satisfactory. (43.)

44. *Is not the present ⅛-in. side clearance between standard journal boxes and the brass and wedge more than is desirable? Would not a better condition be obtained by reducing this clearance to 1/16 in., the journal box being machined to a dimension of 1/16 in. in excess of width of standard brass and wedge?*

One-sixteenth inch is ample if journal boxes are machined. It will improve conditions in that a better alignment of trucks can be maintained, and reduce lost motion in brakes. (24.)

One-sixteenth inch is better, but with journals machined 1/32 in. would be enough. (23. 27.)

Yes. (5, 10, 12, 1, 14, 3, 18, 30.)

We believe that ⅛-in. M. C. B. is correct. (11, 28.)

It is our opinion that the ⅛-in. side clearance between standard journal boxes and the brass and wedge is little enough. It would be found that if this clearance were reduced to 1/16 in. the result would be binding and hot journals, until the wear reached a clearance of ⅛ in. (31.)

The gain would not equal the cost of the extra machinery necessary. (21.)

Clearance should be reduced as much as possible. Believe 1/16 in. is much better than ⅛ in. (7.)

One-eighth inch is too much. Journal box should be machined to a dimension of 1/16 in. in excess of width of standard brass and wedge. (30.)

The maximum width of journal bearings at their centers should be not over 1/32 in. less than the inside width of the journal boxes. This close fit is necessary to avoid tight brakes when car is running with closely adjusted brake shoes. For the same reason the journal boxes should be rigidly connected to each other by the equalizer bars and not carried loosely between pedestals. (33.)

We think 1/16 in. more desirable. (16.)

### MISCELLANEOUS.

45. *What is the most feasible and economical means of transmitting 400 amperes 8½ miles over a mountain interurban line, operating conditions being as follows: Headway, 20 minutes. Average speed first mile, 10 miles per hour. Average speed next four miles, 35 miles per hour. Average speed last three and one-half miles, 10 miles per hour. Average stops per mile for the above sections, 2.0, 0.29 and 0.86, respectively. Grades—First three miles, straight and level. Next two miles, straight, average grade 2½ per cent. Last three and one-half miles, 80-ft. radius curves every 200 ft., average grade 4 per cent. Equipment—Eight 25-ton cars, with 160 hp, four motors per car.*

If you have alternating current put in a substation about two miles from the end of the line, use one No. 0000 feeder and one No. 0000 trolley the whole length of the line. If you have not alternating current, put in two 1,000,000-cm. feeders the whole length of the line. This may cost a little more than a booster or storage battery, but will require much less attention and be subject to much less depreciation. (12.)

46. *Should not all city and interurban electric railways adopt standardization as fast as possible?*

All replies, 16 in number, were affirmative.

## WEIGHT OF PAINT ON INTERURBAN CARS

In an editorial in the Electric Railway Journal of Sept. 7, 1910, attention was called to the weight of paint and varnish used on city rolling stock. A car builder in the Middle West states that the paint and varnish used to finish six 51-ft. interurban cars which were completed recently weighed nearly 1500 lb. per car. The purchaser insisted that all parts of the woodwork should be filled with white lead before being concealed or given the necessary finishing coats of paint and varnish.

The street railway employees in Warsaw, Russian Poland, went on strike for higher wages on Oct. 1. The day after the strike was declared the police arrested nearly 1000 of the strikers and compelled them to return to work. As a result 100 cars were kept in operation.

The Washington, Alexandria & Mount Vernon Railway is making extensive improvements and beautifying the grounds about its repair shops and power plant at Four-Mile Run. The grounds have been sodded, flower beds laid out, making a most attractive picture from the car windows. It is also proposed to beautify the grounds around the station at Arlington Junc- improved. The work is being done under the supervision of P. E. Cliff, superintendent of the road.

## FRIDAY MEETING OF ENGINEERING ASSOCIATION

The meeting of the Engineering Association on Friday morning was held in the Greek Temple. The first order of business was the continuation of the discussion on the report of the committee on heavy electric traction.

### HEAVY ELECTRIC TRACTION

The secretary read a letter from E. B. Katte, New York Central Railroad, expressing his disappointment at being unable to attend the convention and discuss the report of the committee on heavy electric traction, of which he was a member. Continuing, the letter said:

"At the time I recommended the clearance diagram included in the report as Fig. 1, which shows limited clearance of permanent way and rolling stock equipment to permit of standard third-rail location, I was not aware that these clearances had not been adopted by the American Railway Engineering & Maintenance of Way Association, although they had been adopted by the American Railway Association.

"It is desirable that the Engineering Association should work in close harmony with the American Railway Engineering & Maintenance of Way Association. I have recently been appointed a member of a committee of that association which will have charge of electrical matters. A meeting of this committee will be held next week at which a third-rail clearance diagram will be considered, somewhat different from the one now before you, and which will afford a greater clearance between fixed objects and rolling equipment.

"I, therefore, suggest that the portion of the report of the committee on heavy electric traction pertaining to standard location of third-rail working conductors be laid on the table until the committee can hold another meeting and further discuss the matter."

On motion, the recommendations for standard location of third-rail working conductors were referred back to the committee for further consideration during the coming year.

Owing to the absence of Martin Schreiber, Newark, chairman of the committee on buildings and structures, consideration of the report of this committee was postponed until later in the morning, and the Question Box was presented for discussion.

### QUESTION BOX

William Roberts, Akron, Ohio, referring to question No. 1, said that the Northern Ohio Traction & Light Company had carefully considered the matter of offering a bonus for high-quality coal. He was of the opinion that penalties and premiums should go together. In taking samples of coal for analysis 10 lb. of coal were taken from approximately the center of each of six cars. These samples were mixed together, pulverized and then sent to the chemist. His experience had been that there was not enough variation in the quality of the coal received from one mine to justify either penalties or premiums. He knew of a number of companies that had gone back to the old method of buying coal after trying a contract based on heat units.

A. Wolff, Baltimore, said that in buying coal he demanded a certain standard of heat units, but that the percentage of ash was also important. His specifications required coal containing not more than 7 per cent of ash.

B. F. Wood, Pennsylvania Railroad, thought the tendency in modern power-house operation was to use the cheaper grades of fuel. The Hudson & Manhattan Railroad was burning in its power house at Jersey City No. 3 buckwheat anthracite coal. Where the cheaper grades of bituminous coal were used, some form of automatic stoker which broke up the clinkers was required.

H. Barker, New York, in discussing question No. 2 relating to the use of boiler compounds, said that there were many instances in which it did not pay to install water-treating plants to remove impurities in the water even though the percentage of impurities was very high. Skilfully compounded boiler compounds could be made up to suit almost any conditions of bad water. The speaker thought that where a proprietary boiler compound is specified, the chances were about one in 1000 that the compound of unknown composition would prove suitable for the water in which it was used. Referring to Mr. Roberts' methods of taking samples of coal, the speaker thought that the standard method used by the United States Geological Survey was preferable.

B. F. Wood gave his experience with a boiler plant in Pittsburgh in which soda-ash was used. The soda-ash was fed into the water at a fixed rate, but after one year's operation it was found that boiler tubes were failing at the rate of one a day. An investigation showed that the soda-ash was not being fed at the proper rate. As soon as the difficulty was corrected, no more trouble was experienced from leaking tubes. He thought that wherever soda-ash was used it was necessary to have a system of accurately feeding the proper quantity of soda-ash to the water.

E. O. Ackerman, Columbus, Ohio, in discussing the questions on track construction said that, in his opinion, asphalt pavement should be prohibited in all track work in cities because it cannot be made sufficiently permanent. He thought that a granite block pavement was the most durable. Referring to question No. 13, regarding the use of tie plates on yellow pine ties, he thought that with the proposed standard rails having a wide base, properly secured to the ties, it would not be necessary to use tie plates unless the ties were spaced a long distance apart. In his opinion, screw spikes were an excellent fastening, as they prevented any movement between the rail and the ties. Concerning question No. 15, on the use of grooved rail and T-rail in paved streets, he thought that the grooved rail was not more economical under all circumstances. On lines where there is light vehicular traffic, T-rail was more satisfactory. He did not believe that solid manganese crossings were economical because the points at which the rails intersect will show as much wear if the entire piece is made of solid manganese steel as they would if a manganese center only was used.

M. J. French, Utica, said that he was using a bitulithic pavement on some suburban lines. The binder was a mixture of coal tar and asphalt. A foundation of concrete 6 in. deep was first laid down and on this the top surface, 2 in. thick, was laid and compressed with a 15-ton roller. A hot coating of the liquid binder was poured on the top surface and over this screenings were scattered and thoroughly rolled in. Vehicular traffic was allowed on the street while the pavement was being laid. As soon as the pavement had been laid it was indestructible as far as team traffic was concerned. The track was of 4½-in., 60-lb. T-rail, placed on steel ties. He had been fortunate in being able to lay this track without having to maintain traffic over it, and consequently the concrete had been given an opportunity to take a permanent set. On this line, steel ties had been used at the turn-outs. The ties were of such length as to pass entirely across under the turn-out and they did not require inweaving of the ties.

### BUILDINGS AND STRUCTURES

Further discussion on the Question Box was postponed at this time and Martin Schreiber presented the report of the committee on buildings and structures.

A. T. Clark, Baltimore, described the Park Terminal Car House of the United Railways & Electric Company, which is the terminal for five city lines. This car house was fully described in the Electric Railway Journal of Sept. 17, 1910.

The secretary read a discussion on the report sent by night letter-telegram from George Weston, Chicago, Ill.

Mr. Weston said that he agreed generally with the conclusions on pages 4, 5 and 6 of Mr. Schreiber's report. The minimum radius of switch mentioned under track layout, paragraph E, was desirable, but sometimes a smaller radius switch must be used on account of the angle to overcome restricted distances, required clearances, etc., where it is necessary to place turn-outs. Under building construction, paragraph F, reference was made to copper and wire glass as satisfactory and permanent materials for light side walls. This was true where the wall was not on the ground floor or where the buildings are not

heated; otherwise, it would seem better construction to use brick or other fireproof material with metal windows and wire glass. In the appendix, page 8, the third line from the top reads "Adjoining property and buildings should be examined and possible damage calculated." This was not always true. In Chicago, for instance, the abutting property owner must take care of and support his own buildings at his own expense. No hard and fast rules could be laid down to govern the arrangement of terminals, each location generally having its own problems. The track and station capacity, the interlocking plants, signals, etc., should be arranged so that the minimum headway required for cars can be maintained at the terminal, making provisions for future increase of travel and consequent reduction of headway.

The title of the report, "Urban and Interurban Passenger Terminals," possibly had restricted its scope to the facilities necessary to handle the people that desired to enter and leave the cars at a particular point and the track, signal and station facilities for handling the necessary number of cars required to go by that point in a given time. It would seem, however, that this subject could be extended to include a study of the advantages that might be derived from providing layover tracks for the storage of extra cars at terminals that were affected by rush-hour travel in order to save dead mileage and to have the cars ready for the return flow of travel in the rush hours in the opposite direction. The question of terminal facilities and the method of operating cars varied in different large cities by reason of the variations in the shape of the cities and the location of the congested business district with respect to the residential sections. Mr. Weston said that these could be summarized as follows:

First—A peninsular city long and narrow with the congested business district at one end like New York.

Second—A circular form where the congested business district is in the center from which the city radiates in all directions, like Indianapolis.

Third—A fan-shaped or semi-circular form generally located on a river or lake front, as Chicago or St. Louis, with the congested business district on the water front, from which the city radiates in the shape of a semi-circle or fan.

It would probably be possible to work out a specific system of car operation for each of the three types enumerated above. Such systems could be applied generally to cities in that class, the entire study to be made from the viewpoints of convenience to the public, the demands of traffic and economy in operation. This would involve the question of operating cars from all points to the business district and return; the operation of through routes from one residence district through the business center to another residence district; the operation of cars, by the zone system, the length of each zone being regulated by the traffic affecting the required headway of cars—operating a wide headway in the outlying district and closer headways in the inner zone districts. In conjunction with the different general plans of operation one should consider the terminal facilities best adapted.

W. V. Dee, Bridgeport, Conn., thought that roof lighting was a subject worthy of the consideration of the committee.

R. V. Collins, New York, discussed automatic switches and signals. In designing intersection points in busy cities, it was found necessary to arrange the interlocking with fewer switch and signal movements than in steam railroad practice because of the extremely short distance between cars and other special conditions. It was necessary also to have the operators throw the switches more quickly than in steam service. The electrical switch-throwing apparatus was harder to protect on an electric railway because it is usually installed underground in paved streets and is liable to trouble from grit and water. Mr. Collins then described an electric switch in the Jersey City terminal of the Public Service Railway. This switch makes about 2000 movements a day. In conclusion, Mr. Collins discussed the requirements which automatic switches and signals have to fulfill in electric railway service.

Mr. Gennet, Pittsburgh, thought the suggestion in paragraph D, section 2, was a good one. The cost of maintenance in terminals for such service was certainly an important one. Experience seemed to justify the use of high-carbon, low-phosphorus, open-hearth steel. In the last few years there had been a considerable development of ferro-titanium, nickel chrome and possibly vanadium steels which might work equally well if it should be possible to obtain grooved rail for special purposes. He protested against the use of second quality rails in terminals where the traffic was heavy and frequent and in other terminals where the cars and locomotives were very heavy.

J. S. Doyle, New York, referred to the welfare quarters which the Interborough Rapid Transit Company had installed.

H. N. Latey, New York, said that cast-iron fittings had been installed in the New York subway toilets because in the original equipment the white marble and brass fittings had been dismantled by thieves who took the brass. Sometimes a water pipe was cut and the water kept on running until the trouble was discovered. With regard to overhead current collection at terminals, wire had been tried at the Williamsburgh Bridge. It was not desirable to use wire where the supports were any great distance apart because of the difficulty of keeping the wire straight. Pans were used at the Brooklyn Bridge.

A. Wolff, Baltimore, was not in favor of using grooved wire on curves, as it was likely to get out of shape.

W. C. Sparks, Anderson, Ind., did not approve of the committee's recommendation for 30-ft. radius curves. The standard radius on his road was 50 ft. He had some curves of 37-ft. radius, but interurban cars 62 ft. long frequently were stalled on these sharp curves.

C. F. Bedwell, Newark, thought that in the design of car houses and terminals more attention should be given to the drainage of surface water in the summer and winter.

William Roberts, Akron, Ohio, thought that in approaches to train sheds solid overhead construction was better than trolley wires, for the reason that it was impossible to maintain a perfect curve on the wire, whereas with the use of a copper bar a perfect curve could be set up and there would be less wear on the trolley wheels and less danger of their coming off.

J. W. Corning, Boston, said that the trolley wire over straight track in the terminals of the Boston Elevated Railway was protected from the ironwork of the terminal by a wooden trough. The trolley wire was supported by ordinary hangers and short-span wires. In the open cut of the Boston subway a grooved trolley wire was first used in 1895. It was supported at intervals of about 8 ft. with special ears. As the wire wore out it was replaced by ordinary No. 00 trolley wire of circular cross-section and no difficulty had been experienced in keeping this construction in good condition.

Martin Schreiber, in closing the discussion on the report of the committee on buildings and structures, suggested that the association accept the report and that the committee should be instructed next year to go over the conclusions and modify them in such a way that they could be adopted next year as recommended practice. On motion the report of the committee was accepted.

### STANDARDS

The report of the committee on standards was read by the secretary. Acting President Harvie reminded the members that this was their last opportunity of recording their opinion of the standards proposed before they were submitted to the American Association for final adoption.

The suggestion of the committee on equipment that rolled-steel wheels with rims 3 in. thick be dropped from the proposed standards for rolled-steel wheels was approved.

E. O. Ackerman, Columbus, explained that the rail sections approved by the committee on standards for adoption as recommended practice had been designed to harmonize with the standard wheel treads and flanges already adopted by the association.

M. J. French, Utica, suggested that the 100-lb. A.S.C.E. rail met all requirements where wide tread wheels were in use.

On motion, the rail sections approved by the committee on standards were adopted as recommended practice.

On motion, the section of No. 0000 grooved trolley wire, approved by the committee on standards, was adopted as standard, as was also the table of sizes of wire.

G. W. Palmer, Jr., Boston, explained that the recommendation covering recommended practice in ordering cables was an attempt on the part of the committee on power distribution to establish a uniform practice in ordering cables which would result in the manufacturer furnishing cables having exactly the area of cross-section required in the order. It was, therefore, thought best to specify sizes of cables by stating the number of strands and the size of the separate strands. On motion, the method outlined in the report was adopted as recommended practice.

H. H. Adams, New York, explained that no action need be taken at this time on the recommended specifications for wrought-iron bars and limit gages for round iron, as these subjects had been considered this year by the committee on equipment and would be referred to the committee on standards next year for the proper action.

The recommendations of the committee on standards with regard to specifications for steel axles were withdrawn owing to the action which was taken at the meeting on Wednesday instructing the committee on heavy electric traction to confer next year with a committee from the American Society for Testing Materials.

PRESENTATION TO JOHN W. CORNING

H. H. Adams, New York, referred to the resignation of John W. Corning as secretary of the association, which was announced at the session on Wednesday morning. He said that the progress which the association had made during the past three years was largely due to Mr. Corning's untiring efforts and he expressed the regret of every member of the association that Mr. Corning had found that the work in connection with his duties as electrical engineer of the Boston Elevated Railway had become so pressing that it was impossible for him to continue longer as secretary of the association. The members of the association did not want Mr. Corning to go away from the convention without some small evidence of appreciation of the work which he had done for the association. On behalf of the members he wished to present Mr. Corning with a small token of the esteem in which the retiring secretary was held by his fellow members. He then presented to Mr. Corning a beautiful open-face gold stop-watch and chain. The watch-case will be engraved later with a suitable inscription.

In accepting the gift Mr. Corning expressed his astonishment and delight, and said he had undertaken the duties of secretary in 1907 with some misgivings, but with the hearty co-operation of the other officers and members he had found his task was one of pleasure. He felt very grateful for the many warm friends and acquaintances which he had made during his term of office and he thanked the members for the gift, which he would always prize. The meeting then adjourned until 2.30 p. m.

AFTERNOON SESSION

The meeting was called to order by Acting-President Harvie at 2:45 p. m., and the first order of business was the continuation of the discussion on the Question Box.

G. W. Palmer, Jr., Boston, said that up to the present time his company had used nothing but horse-drawn emergency line wagons. Automobile emergency wagons had been under consideration for some time and the speaker thought that storage-battery wagons were particularly adapted to electric railway service inasmuch as the batteries could be charged at the actual cost of production of electricity and repairs to the motors and other parts of the equipment could be made readily in the railroad shops.

William Roberts, Akron, Ohio, discussed grooving of commutators. The only motor troubles which he had had were on cars having grooved commutators. He thought that the best solution of sparking was to use the right grade of carbon brushes.

H. H. Adams, New York, said that in his opinion if commutators were grooved a much cheaper grade of mica could be used. The tension on the brushes entered into the problem. He had been discussing with some of the manufacturers the possibilities of case hardening the flanges of rolled-steel wheels to prevent excessive flange wear. Some of the manufacturers thought that it was possible, but others thought that it could not be done.

John Lindall, Boston, thought that grooving commutators increased the life of the commutators and reduced trouble from flashing. With reference to the proper pressure for putting on cast-iron and rolled-steel wheels he allowed 8 tons per inch of axle diameter for cast-iron wheels and 10 tons per inch of diameter for solid steel wheels. His experience has been that sharp flanges on wheels were usually due to the truck being out of square or to differences in diameters of the wheels mounted on the same axle.

P. V. See, New York, said that he put steel wheels on axles by pressure and shrinking. The hub of the wheel was heated and was then pressed on the axle under a pressure of about 50 tons. The wheels could not be pressed off without heating, even under as much as 300 tons pressure.

John Lindall, Boston, said that he had never felt that it was necessary to shrink on wheels. He had recently installed a pressure recorder on the wheel press to give a continuous record of the pressure as the wheel went on. The cards obtained in this manner were filed with the wheel records and they served to check the fit of the wheel.

William Roberts, Akron, Ohio, said that heating the wheels while they were being pressed on was very likely to distort them. He thought that a pressure of 25 tons was sufficient for a wheel on a 5½-in. axle.

The secretary read the following letter from C. B. Voynow, Philadelphia:

"As most of the subjects to be investigated by the various committees for the following year are selected by the executive committee after the convention, the members at large often do not know what the subjects are until the preliminary reports are printed and distributed among them a few weeks before the convention. This gives them very little time to get acquainted with the subjects reported, and as the time for discussion at the convention is extremely limited the majority of members are able to take only a perfunctory part in the work of the association. Moreover, the committees do not get the full benefit of co-operation of the members. In order to give each member the opportunity of taking a more active part in the work of the association, I would suggest the following:

"That as soon as a committee has definitely decided upon the scope of a particular subject to be developed and reported at the next convention, a circular should be sent immediately to all the members of the Engineering Association, giving in detail the subjects which it is intended to include in the report and the data required by the committees. A request for such data should be sent not only to member companies, but to all associate members of the Engineering Association; and, further, if there is any new development in the committee work the same should also be reported to all the members.

"Such procedure would be of the greatest value to the association. By keeping the members in touch with the work of the committees it would develop a deeper individual interest and activity among the members. It would give the committees great assistance in developing their reports and when these reports are presented at the convention all those present would be able to take part intelligently in the discussion."

The recommendation contained in Mr. Voynow's letter was referred to the executive committee for action.

The secretary then read the proposed changes in the constitution and bylaws of the association whereby the name was changed to the American Electric Railway Engineering Association and its scope was enlarged to include representatives of electrified sections of steam railways. On motion the proposed changes were adopted.

A motion of thanks to the chairman and members of the several committees which reported this year was made and carried.

The report of the nominating committee was presented by

William Roberts, Akron, Ohio. The following names were proposed for officers of the association:

W. J. Harvie, Syracuse, N. Y., president.

E. O. Ackerman, Columbus, Ohio, first vice-president.

J. S. Doyle, New York, second vice-president.

Martin Schreiber, third vice-president.

Norman Litchfield, New York, secretary and treasurer.

Members of the executive committee: John Lindall, Boston, Mass.; E. J. Burdick, Detroit, Mich.; G. H. Kelsay, Anderson, Ind.; C. B. Voynow, Philadelphia, Pa.

On motion the secretary was instructed to cast the ballot for the nominees and they were declared elected.

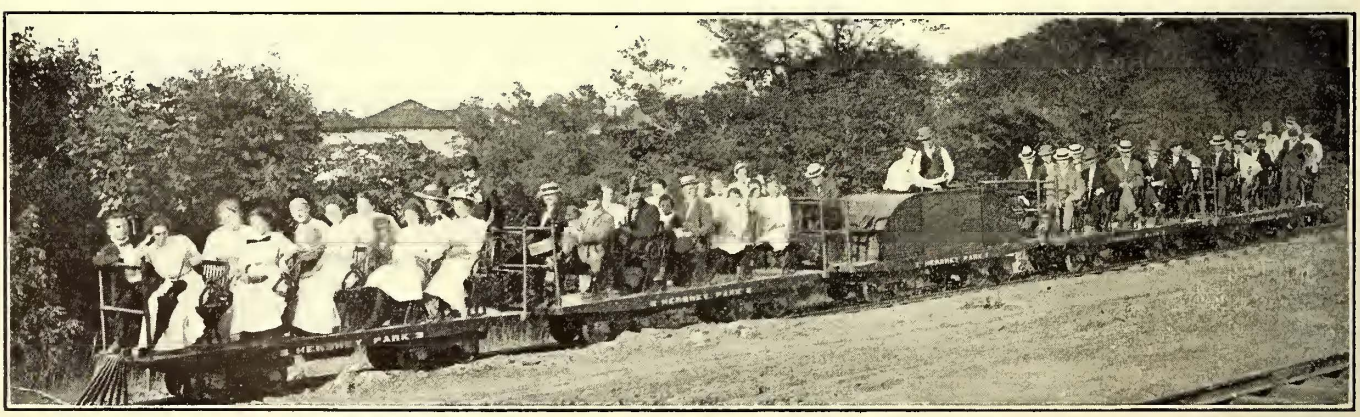
W. J. Harvie, the newly elected president, said that in his own behalf he wished to express his appreciation of the extent to which the members of the association had assisted in making the convention this year so successful. He thanked the members for the honor conferred upon him and said that in behalf of the executive committee he hoped that the convention next year would be equally successful.

The meeting then adjourned.

## MINIATURE ELECTRIC TRAINS FOR PARKS

Miniature steam trains are a well-known institution of many amusement parks, but no one seems to have built an electric equipment for this service until last season when the Lancaster Iron Works, Inc., of Lancaster, Pa., installed such a train in Hershey Park, Hershey, Pa. As shown in the accompanying illustration the train is made up of four flat trail cars, which carry 18 to 30 people each, and a locomotive. As there is no loop on the Hershey line the locomotive is always placed in the middle of the train for the convenience of the motorman. The power equipment, which consists of two 10-hp motors and one railway type controller, is capable of operating the four trailers at 20 m.p.h. A novelty in the braking apparatus is the use of a combination wheel and track brake.

The Hershey line is of 22-in. gage and is now 1 mile long. It is the property of the well-known chocolate manufacturer of that name who had it installed in the park which was laid out principally for his employees. The line is to be extended about 4 miles more next season when five trains probably will be operated. A railway of this kind can, of course, be made self-contained by the use of storage batteries if the conditions do not permit the ordinary form of power collection. It is hardly necessary to point out that such a miniature electric line is peculiarly appropriate for an electric railway park aside from its superiority to steam in giving freedom from smoke and cinders.

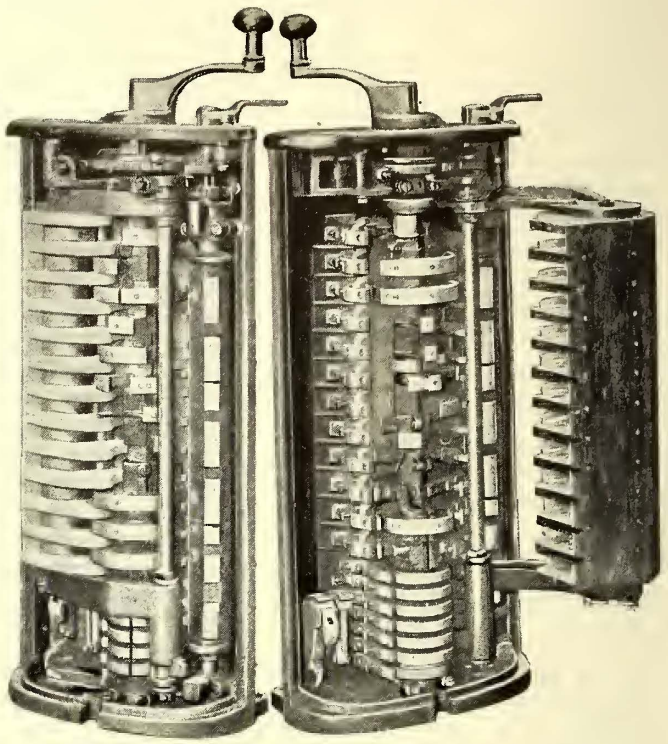


Miniature Electric Train Operated in Hershey Park, Hershey, Pa.

New York's fourth annual electrical show was opened to the public on Monday, Oct. 10, with an electric luncheon given in the restaurant of Madison Square Garden to the representatives of the metropolitan press by the New York Edison Company.

## IMPROVED DICK-KERR CONTROLLERS

Dick, Kerr & Company, Limited, London, England, have recently made some improvements in their controllers to meet the heavier requirements of English tramways due to increased speed, the use of top covers for the upper deck and, above, all, to the application of magnetic brakes for service conditions. The alterations have been made without changing the former moderate dimensions of the controllers. The metallic shield



Two-Motor Controller Arranged for Electric Braking

blow-out feature, which was introduced a few years ago, has been made more powerful to secure cleaner contacts and thereby reduce the maintenance.

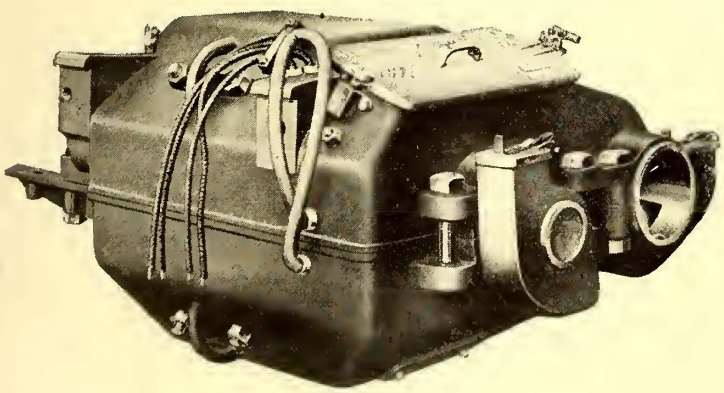
The main frame is of cast iron lined with insulation. The cover is of enameled sheet iron, but has been simplified by using a spring catch instead of hinges and screws. The cover is lined with asbestos throughout, and also with mica opposite the points where arcs are broken. The contact fingers have renewable copper tips, the adjusting screw of the contact fingers being automatically locked by a spring to obviate locking the screw by a lock nut or other device. The segments are of hard-drawn copper tubing and all segment tips subject to burning have short renewable tips. Wood has been entirely eliminated from the construction of the main power cylinder, the shaft being of square section steel throughout, with mica insulation baked thereon, around which the segment castings

are firmly clamped. The reversing cylinder is also strongly constructed, having a round steel shaft with a mica sleeve insulation, around which is fitted the wooden drum carrying the reversing contact plates. The contact fingers are made adjustable to a sufficient extent, so that the contact pressure on the cylinder segments can be varied as desired.

There are 15 notches in all on the braking controllers, four for series work, four for parallel and seven on the brake side; on the non-braking controller the same power notches are provided, but no braking notches.

The novel feature of the braking controller is the combination of the braking and power cylinders on the same shaft. This eliminates the mechanical device previously necessary for throwing over a special brake cylinder when passing from the off position on to the brake notches; where magnetic braking is utilized to any great extent, this is a notable improvement for it insures positive braking action. A separate reversing cylinder is provided, and the usual Dick-Kerr arrangement of interlocking the reversing and power handles is embodied to prevent the switching on of power until the reversing handle has been removed to the ahead or reverse position. It is also impossible for the reversing handle to be removed until the power handle is returned to the off position. The reversing handle is only removable from the controller in the off position.

The power handle is now non-removable from the controller. This feature will help to reduce maintenance cost, prevent the power handle from getting damaged or lost, and secure better and more positive operation of the controller. Another practical point is the arrangement of the motor cut-out switch. This consists of a knob projecting through the back of the controller at the top, which can only be operated by the reversing handle. The turning of the knob either upward or downward through a quarter of a revolution cuts out either motor, or in the four-motor controller a pair of motors, the intermediate position leaving both or all motors connected. Thus a motorman can, in a few seconds, by means of his reversing handle, throw any motor or pair of motors in or out for test; this saves any block in traffic and also obviates the necessity of meddling with the controller in any other way. The cut-out switch is also so interlocked with the reversing cylinder that a motor cannot be cut out except when the reversing switch is in the off position and it is impossible to move the reversing switch except when the cut-out switch is in an operating position. In cutting out either motor a locking lever is raised, which prevents the power cylinder from being moved beyond the last series position. Each motor, when running single, will, therefore, start up as usual on the first series notch of the controller.



Suspension Side of Motor

Electric braking is arranged for with both motors in circuit or with either motor alone. An automatic run-back electric brake can be embodied in the controller, if desired, which comes automatically into operation with the power handle in the off position. This action is entirely independent of the motorman and thus absolutely prevents a car running away backward on any grade. The run-back operates with either motor cut out, as well as with both motors in circuit.

## A NEW ALLIS-CHALMERS RAILWAY MOTOR

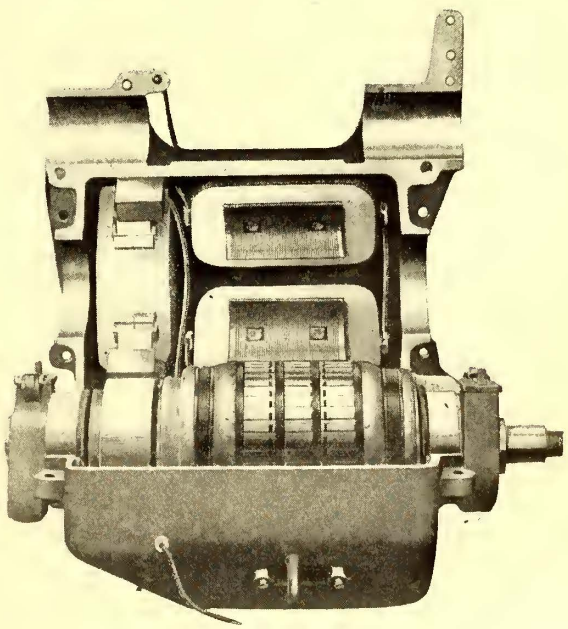
In adding to its line of railway motors Allis-Chalmers Company has recently placed on the market its Type 302. This motor is of the same general type as this company's other railway motors. The field frame is of cast steel and is split horizontally through the armature and axle bearings. It has a large bore at each end to receive the armature-bearing housings. An opening in the top half over the commutator and hand holes at each end of the bottom half are provided for inspection. The top half carries the axle bearings and lugs for the cross-bar suspension.

The pole pieces are made of soft steel punchings clamped between malleable-iron plates and securely riveted. The field coils are of the mummified type. Special insulation is used on these coils and, for final finishing, the whole coil is treated with an insulating varnish by the vacuum process. This construction gives a coil with excellent heat-conducting properties. The armature bearings are in solid housings. The pinion end journal is 3½ in. in diameter by 9½ in. long and the commutator end 3 in. in diameter by 7⅛ in. long. The bearing bushings are cast metal, lined with high-grade babbitt and fit accurately the bore of the housing to which they are securely keyed.

Gears are furnished either in solid or split types as desired. These are 5-in. face and have three-pitch involute cut teeth. The pinions are high-grade hammered steel and are bored taper to fit the taper on the armature shaft, to which they are securely keyed. Gear cases are supplied either in sheet steel or malleable iron.

The armature core is built up of soft-steel laminations which are annealed and varnished after punching. These are secured between end heads, which have rims to support the coil ends and protect the coils. The coils are wire-wound and very carefully insulated. They are secured in place by numerous bands sunk well below the surface of the core. The commutator bars are of hard-drawn copper, mounted on a cast-steel sleeve.

This motor has a continuous capacity of 50 amp at 300 volts and 45 amp at 400 volts with a maximum temperature rise of 75 deg. C. on hourly rating. A two-motor equipment will operate cars weighing 25,000 lb. without electrical load or equipment at a schedule speed of approximately 11 m.p.h. and a maximum speed of about 30 m.p.h. A four-motor equipment on interurban service will operate cars weighing 35,000 lb., without electrical equipment or load, at a schedule speed of about 24 m.p.h. and a maximum speed of about 40 m.p.h. These schedules and speeds are based on straight and level track and 500 volts line pressure.



Motor With Frame Opened

# News of Electric Railways

### Rapid Transit Educational Campaign in Boston.

The Boston (Mass.) Elevated Railway has begun the publication of a series of rapid transit maps in the daily papers of Boston to acquaint the public in a systematic way with the improvements which have been effected in transportation facilities by the company since it assumed control in January, 1898. The company announces that on account of the consideration to be given by state boards and commissions to the question of further extensions and additions to the rapid transit facilities the present is deemed a proper occasion to show by map and explanatory comment the exact scope and detail of what has been added to the transit facilities of Boston under its administration. In its initial advertisement the company says that while in general it believes the facilities now in use and those to which it is committed are orderly and comprehensive, neither the company nor its directors claim that they are wholly free from defects, nor do they believe that nothing more remains to be done. It believes that intelligent criticism, based upon popular experience, will assist in pointing out specific opportunities for betterment, and welcomes helpful criticism and suggestion, stating that it is always glad to adopt such suggestions so far as they are feasible.

The Legislature of 1910 assigned a number of important investigations to the Massachusetts Railroad Commission and the Boston Transit Commission in connection with proposed transit improvements in the Boston district. Among these were the question of subway construction between Park Street and the South Station; proposed facilities in the way of underground lines to South Boston and Dorchester points; a proposed loop subway from Park Street and Scollay Square under Bowdoin Square and the West End to the Charles River; the question of acquiring a controlling administrative interest in the West End Street Railway and other street railways by the Boston Elevated Railway, and other matters of a broad interest in transportation circles in Eastern Massachusetts. Not a few of the propositions thus referred by the Legislature have already been discussed, either at public hearings before the last General Court, in the press or before the sitting boards; but their merit or defects remain to be formally determined by the commissions so that they can report to the Legislature of 1911. The Boston Elevated Railway is committed to heavy expenditures for additional subway and tunnel lines, and it desires to demonstrate to the public that facilities at Boston have proceeded along logical lines in the last 12 years. In its appearances before various committees and commissions during the last year the company has emphasized the large investment to which it is committed and has pointed out the necessity of careful consideration before embarking upon sweeping additions to the present plans for rapid transit expansion. It feels that if the public acquires a better knowledge of rapid transit evolution in Boston during the last 12 years the present problems will be approached with a more open mind by all concerned.

The initial advertisement, dated Sept. 28, 1910, pointed out that when the company took charge the population of the cities and towns in which it operates was approximately 843,090. Now it is about 1,098,917, or an increase of only about 30 per cent. At the beginning of the period there was invested $25,960,000, while to-day the investment is $81,440,000—an increase of 213 per cent. In January, 1898, there were 304.5 miles of surface track, and at that time only the Park Street loops of the Tremont Street subway were in operation. The size of this subway in relation to the rest of the system was almost insignificant. The initial advertisement showed a complete map of the surface and subway system as of Jan. 1, 1898.

The second advertisement appeared in the morning and evening dailies of Oct. 3, 1910, and showed a map of the Boston system as of June, 1901, when the elevated lines between Dudley Street and Sullivan Square were placed in operation. The company points out that, including the structure, equipment and real estate, the original elevated system cost more than $20,300,000, and that this money would have built 250 miles of surface lines with all necessary equipment with expensive city construction and with paving. The company shows that the surface running time between Dudley Street and Sullivan Square was 45 minutes, and that the original elevated system cut this to 21 minutes; it connected the two great steam railroad stations on the opposite sides of the city, located two large terminals in the heart of the rapidly growing northern and southern suburbs, and embodied every known appliance at the outset for safety and convenience. Attention is called to the use of block signal systems with safety devices and side doors on the cars, and mention is made of the fact that the station designs were the result of a prize competition among architects. Pains were also taken to make the structural design open and light and to introduce architectural effects by the use of archways. As it was not feasible to build an elevated structure through the crowded business center, the Tremont Street subway was temporarily utilized for train service, the company overcoming the almost insuperable engineering difficulties and saving the public the delay of waiting for the opening of the Washington Street tunnel. By these improvements 500,000 people were brought two miles nearer downtown Boston. The company expects to publish about 12 of these educational maps and discussions, and review its accomplishments along the lines indicated in the first two advertisements above mentioned. The maps are attracting widespread popular interest by virtue of their location in the most conspicuous parts of the papers in which they appear.

### President of Long Island Railroad on New York's Transit Needs

Ralph Peters, president and general manager of the Long Island Railroad, addressed a letter on Oct. 5, 1910, to Mayor Gaynor, of New York, in regard to the rapid transit needs of the city in which he said in part:

"No doubt it would be a desirable thing to have a subway from every center of business and population in each of the boroughs to the business centers of Manhattan, but it is surprising that those who give proper thought to these matters should advocate such construction without fully realizing the very large sums of money required to build such subways, and the enormous revenues necessary to pay the interest thereon, and to operate and support the subways profitably after construction.

"The subway as a type or form of transportation line can only find justification in the transportation of people to and from densely settled areas, and where there is no available space on the surface for sufficient or rapid transportation lines to handle the traffic. Manhattan with its restricted area, bounded on each side by rivers and extending lengthwise many miles, the entire surface congested, with a dense population and a vast business, could not meet its continued growth without subways. It was logical and proper that such costly methods of providing improved transportation facilities by subways should be adopted for densely congested parts of the Island of Manhattan, in the Borough of Brooklyn, or in the other boroughs.

"It is, however, illogical and wasteful to adopt similar methods for the outlying parts of the Boroughs of Brooklyn, Queens, the upper Bronx, and Richmond, except as it may be necessary to extend the Manhattan subways under the waters to reach these outlaying boroughs, until the crying needs of the densely congested portions are first provided. Ample transportation lines in the open can be provided at far less cost, and in shorter time, affording greater relief to a more extended territory.

"It would be unwise to jeopardize the investment which the City of New York now has in the existing subway, and especially before its system shall be properly completed, by paralleling it with an opposition line that will not be self-supporting, and it would not give the citizens what they want—access to both the east and west sides of Manhattan, with convenient transfers bringing them in and out of three boroughs. You are right in your position that the

proper thing to do is to strengthen the city's investment in the existing subways by making extensions to them which can be profitably operated and will furnish the greatest relief in the shortest time and for the least capital outlay.

"The present subway is a tri-borough route; with its extensions, including the opening of the Steinway Tunnel to Queens, it will be a four-borough route, and will furnish greater convenience and service than any other route that could possibly be constructed.

"It is wise to keep open certain avenues for additional future subway development; but, for the immediate present, the plan to make the much-needed extensions of the existing subways as proposed is the only wise and proper solution of the problem.

"The proposed extensions of the existing subway would be of inestimable benefit to the transportation lines which I represent and the large number of citizens using them daily, and there is room in Queens and Brooklyn for additional surface lines which can be constructed so as to feed the proposed subway extensions. Anything that will benefit the transportation lines of Long Island will be of benefit to the public, the city, and the State.

"I am sure that under your wise and broad-minded direction the city will first build a self-supporting transportation system that will improve the city's credit and with the aid of the Public Service Commission will furnish at the earliest date possible with the smallest expenditure the greatest transportation system possessed by any city in the world.

"In helping to carry out this policy I am at the service of yourself and the commission if I can be of any assistance."

## The Columbus Strike

The strike of the employees of the Columbus Railway & Light Company is petering out. Little is said about it, and people are using the cars the same as before the strike was declared. The vigorous prosecution of men accused of rioting and their punishment have put a damper on operations of this kind, and this source of danger to passengers once out of the way conditions will soon become normal.

Arthur Sands was found guilty on Oct. 5, 1910, of throwing stones at a street car during one of the riots that occurred in connection with the strike at Columbus. Policemen and other witnesses testified that they saw Sands throw stones. He denied the statements. On the same day a grocer, accused of having dynamite in his possession, and James N. Orr, a member of the railway employees' association, who was charged with dynamiting a car, were arraigned and pleaded not guilty.

Charles Lewis, who pleaded guilty to throwing stones at cars several days ago, was sentenced on Oct. 4, 1910, to serve one year in the penitentiary. Two Italians were sentenced to indefinite terms in the Mansfield reformatory.

## Single-Phase Railway for Sweden

In the electrification of the Swedish railroad between Kiruna and Riksgraensen use will be made of the 15-cycle, single-phase system with an e.m.f. of 15,000 volts at the trolley.

The main transportation over the railroad is represented by the haulage of iron ore to the Norwegian frontier at Riksgraensen. The ore trains are unusually heavy, the total weight being more than 2000 tons. Each train of this weight will be hauled by two locomotives, each equipped with two 1000-hp. motors. These 4000-hp. locomotives will be among the largest ever constructed.

There will be a certain amount of passenger traffic, which will be handled by means of express trains, each of which will be provided with a single 1000-hp. locomotive, designed for a speed of 100 km (62 miles) per hour.

The hydroelectric generating station will be located at Porjus Falls, 120 km (75 miles) from Kiruna and 130 km (80 miles) from Riksgraensen. The station will be equipped with three 10,000-kva, single-phase alternators. The energy will be transmitted at an e.m.f. of 80,000 volts to four transformer substations, where it will be reduced to 15,000 volts.

The contract, which has been let to the Siemens-Shuckert-Werke, Berlin, Germany, and the Allmaenna Svenska Elektriska Aktiebolaget, Westeras, Sweden, calls for the completion and operation of the line in the latter half of 1914. According to the official estimate, the total amount involved in the undertaking—will be about $4,000,000.

**Use of Double Trolley Recommended by Council Committee of Milwaukee.**—The Railroad Committee of the City Council of Milwaukee, Wis., has recommended to the Council the passage of an ordinance to require all electric railways operating in Milwaukee to use the double trolley system.

**Appraisal of the Tacoma Railway & Power Company's Property.**—The Tacoma Railway & Power Company, Tacoma, Wash., has retained H. P. Gillette, New York, N. Y., to appraise the physical property of the company. Mr. Gillette will be assisted in this work by Richard T. Dana.

**Interurban Extension Increases Land Values.**—Indicating the benefit which a suburban electric railway is to the residents of the community through which it runs, specific information has been made public regarding the increase in real estate values along the new Shelbyville extension of the Louisville & Eastern Railroad, Louisville, Ky., showing that the increase has been as much as 33⅓ per cent in some cases. Property which was purchased for $150 an acre before the extension was built is now being sold at $200 an acre.

**Date Set for Opening Pennsylvania Railroad Tunnel to New Jersey**—The Pennsylvania Railroad has announced that it will open its line under the Hudson River between the terminal station of the company at Thirty-third Street and Seventh Avenue, New York, N. Y., and Harrison, N. J., on Nov. 27, 1910. At Harrison connection is made with the main line of the company. On Sept. 8, 1910, the company opened the section of its line extending from the terminal station in New York under the East River to Long Island.

**Street Railway Commission in Toronto.**—The special committee of the Council of Toronto, Ont., on street railway matters has decided that it is desirable that the management and operation of the proposed municipal street railway system should be placed in the hands of a commission, and the Board of Control has been requested to consult with the legal department of the city with a view to drafting a constitution for the guidance of the commissioners when they are appointed. It is intended to ask the people to vote $750,000 for the construction of new lines. It has been decided by the special committee on street railway matters not to take any action on the recommendations made in the report of Jacobs & Davies, New York, N. Y., on the underground system until the attitude of the Toronto Railway regarding the sale of its property to the city has been learned. An outline of the system recommended by Jacobs & Davies was published in the ELECTRIC RAILWAY JOURNAL of Sept. 10, 1910.

**Denial of Motion to Set Aside Court Proceedings in Case of Commission Against Mr. Whitridge.**—Justice Bischoff of the Supreme Court of New York has denied a motion by the Public Service Commission of the First District of New York to set aside all proceedings before Justice Brady in the commission's suit to recover penalties from F. W. Whitridge, receiver of the Union Railway, for failure to equip his cars with fenders. The commission held that Justice Brady was interested in the case as a stockholder in the Third Avenue Railroad, which owns the stock of the Union Railway. Justice Brady dismissed the complaint. Justice Bischoff says that at the time of the trial the Third Avenue Railroad had been sold under foreclosure and that the stockholders had no remaining interest in the stock of the Union Railway. The Public Service Commission contended that under a plan of reorganization which had not yet been approved the stockholders of the Third Avenue Railroad might have an opportunity to buy stock in the reorganized road and that a judgment against the receiver might have affected the assets of the new company. Justice Bischoff said that, while he had discussed the question as if first presented on the motion before him, the fact that it was raised before Justice Brady on the trial and disposed of by him made it impossible to review it in the manner sought, but required that it be taken to the Appellate Division the same as any other appeal.

# Financial and Corporate

## New York Stock and Money Market.

Oct. 13, 1910.

Within the past few days the stock market has shown much improvement in tone and considerable advance in price. Trading has not been heavy and the outside public is notably absent from the market. In the increased activity Interborough-Metropolitan issues have taken their share. Prices for these stocks have shown little change. There has been quite liberal buying of Manhattan Elevated and the price rose to 146 during the week.

The demand for bonds is somewhat improved but is not yet what the dealers in investment securities call satisfactory. The money market is still easy, but rates are stiffer. Quotations today were: Call, 3 @ 3¾ per cent; ninety days, 4⅝ @ 4¾ per cent.

### Other Markets.

There has been liberal buying of Rapid Transit stock in the Philadelphia market during the past week. The price after advancing to 21¼ was lower today on profit-taking sales.

In the Chicago market there is still some buying of Chicago Railways certificates, mostly Series 2, and prices have advanced several points. The adoption of the consolidation ordinance has had a distinctly strengthening effect on the traction market.

In Boston there has not been a great amount of trading in tractions. Boston Elevated is the most active of the list, but only small lots are sold. Prices are unchanged.

Traction interest in Baltimore during the week has been limited to the bonds of the United Railways Company. These have been fairly active at former prices.

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

| | Oct. 4. | Oct. 13. |
|---|---|---|
| American Railways Company | a44 | a43¼ |
| Aurora, Elgin & Chicago Railroad (common) | 33 | 33 |
| Aurora, Elgin & Chicago Railroad (preferred) | a89 | a89 |
| Boston Elevated Railway | 128¾ | 128½ |
| Boston & Suburban Electric Companies | 14¼ | 14¼ |
| Boston & Suburban Electric Companies (preferred) | 72 | 72 |
| Boston & Worcester Electric Companies (common) | 10½ | a10½ |
| Boston & Worcester Electric Companies (preferred) | 36 | 36½ |
| Brooklyn Rapid Transit Company | 77 | 77⅝ |
| Brooklyn Rap. Transit Company, 1st pref. conv. 4s | 83¾ | 83¾ |
| Capital Traction Company, Washington | 128¾ | 120 |
| Chicago City Railway | *102¾ | *102¾ |
| Chicago & Oak Park Elevated Railroad (common) | *3¼ | *3¼ |
| Chicago & Oak Park Elevated Railroad (preferred) | *7¼ | *7¼ |
| Chicago Railways, ptcptg., ctf. 1 | a65 | a75 |
| Chicago Railways, ptcptg., ctf. 2 | a16 | a18⅜ |
| Chicago Railways, ptcptg., 3 | a8 | a9 |
| Chicago Railways, ptcptg., ctf. 4 | a5 | a5 |
| Cleveland Railway | 91½ | 91½ |
| Consolidated Traction of New Jersey | a73 | a73 |
| Consolidated Traction of N. J., 5 per cent bonds | a104 | a104 |
| Detroit United Railways | *45 | *45 |
| General Electric Company | 148½ | 153¾ |
| Georgia Railway & Electric Company (common) | a117 | a118½ |
| Georgia Railway & Electric Company (preferred) | 87 | 88 |
| Interborough-Metropolitan Company (common) | 20⅞ | 20¾ |
| Interborough-Metropolitan Company (preferred) | 56½ | 57 |
| Interborough-Metropolitan Company (4½s) | 81½ | 81 |
| Kansas City Railway & Light Company (common) | 24 | 23½ |
| Kansas City Railway & Light Company (preferred) | 80 | 80 |
| Manhattan Railway | 143 | 143 |
| Massachusetts Electric Companies (common) | a20 | a19⅞ |
| Massachusetts Electric Companies (preferred) | a84 | a84 |
| Metropolitan West Side, Chicago (common) | a20 | a20 |
| Metropolitan West Side, Chicago (preferred) | a62 | a70 |
| Metropolitan Street Railway | *15 | *15 |
| Milwaukee Electric Railway & Light (preferred) | *110 | *110 |
| North American Company | 68 | 69⅜ |
| Northwestern Elevated Railroad (common) | a20 | a20 |
| Northwestern Elevated Railroad (preferred) | a60 | a60 |
| Philadelphia Company, Pittsburg (common) | a45⅜ | a46¾ |
| Philadelphia Company, Pittsburg (preferred) | a42 | a43½ |
| Philadelphia Rapid Transit Company | a20⅞ | a19 |
| Philadelphia Traction Company | a82 | 82 |
| Public Service Corporation 5 per cent col. notes | a95 | a95 |
| Public Service Corporation, ctfs | a101 | a100½ |
| Seattle Electric Company (common) | *109 | *109 |
| Seattle Electric Company (preferred) | *98½ | *98½ |
| South Side Elevated Railroad (Chicago) | a58 | a58 |
| Third Avenue Railroad, New York | 9 | 10½ |
| Toledo Railways & Light Company | 8¼ | 8¼ |
| Twin City Rapid Transit, Minneapolis (common) | 112½ | 112½ |
| Union Traction Company, Philadelphia | a46 | a43½ |
| United Rys. & Electric Company, Baltimore | 14⅝ | *14⅝ |
| United Rys. Inv. Co. (common) | *15 | *15 |
| United Rys. Inv. Co. (preferred) | 57 | 57 |
| Washington Ry. & Electric Company (common) | a32½ | 33 |
| Washington Ry. & Electric Company (preferred) | a88½ | 89 |
| West End Street Railway, Boston (common) | a84½ | 84½ |
| West End Street Railway, Boston (preferred) | *100¾ | 100¾ |
| Westinghouse Elec. & Mfg. Company | 70½ | *70½ |
| Westinghouse Elec. & Mfg. Company (1st pref.) | 129 | *129 |

a Asked. *Last sale.

## Annual Report of the Kansas City Railway & Light Company

Gross earnings of the Kansas City Railway & Light Company in the fiscal year ended May 31, 1910, amounted to $7,161,042, an increase of $533,065, or 8 per cent over the preceding year. A comparison for two years follows:

| Year ended May 31: | 1910. | 1909. |
|---|---|---|
| Gross earnings | $7,161,041 | $6,627,977 |
| Operating expenses | 4,153,249 | 3,766,788 |
| Net earnings from operation | $3,007,792 | $2,861,189 |
| Other income (net) | 17,399 | 1,218 |
| Gross income less operating expenses | $3,025,191 | $2,862,407 |
| Deductions—Fixed and Other Charges: | | |
| Taxes | $477,110 | $462,745 |
| Interest on bonded debt | 1,356,588 | 1,378,657 |
| Bond discount and commission (proportion written off) | 170,734 | 143,630 |
| Interest on floating debt | 77,230 | 45,201 |
| Reserve for doubtful accounts receivable | 20,693 | 17,408 |
| Sundries, repairing flood damage, etc | 607 | 3,139 |
| Bond sinking fund provision (Corrigan issue) | 55,000 | 55,000 |
| Total | $2,157,962 | $2,105,780 |
| Net income | $867,229 | $756,627 |

In the two years ended May 31, 1910, the company has appropriated $900,000 for depreciation, accruing renewals and other special expenditures and paid dividends on the preferred stock, aggregating $940,750. The balance sheet surplus as of June 1, 1908, was $680,621, and as of May 31, 1910, it was $463,727. Traffic statistics for two years compare as follows:

| Year ended May 31: | 1910. | 1909. |
|---|---|---|
| Passengers carried for revenue | 111,171,548 | 104,950,526 |
| Passengers carried on transfers | 47,280,535 | 45,356,172 |
| Gross earnings per car-mile, cents | 24.20 | 22.18 |
| Operating expenses per car-mile, cents | 14.38 | 12.75 |
| Net earnings per car-mile, cents | 9.82 | 9.43 |
| Gross earnings per car-hour | $2.208 | $2.036 |
| Operating expenses per car-hour | $1.312 | $1.171 |
| Net earnings per car-hour | $0.896 | $0.865 |
| Track mileage, between termini, all roads | 130.432 | 129.832 |
| Track mileage, single track, all roads | 249.709 | 249.709 |

## Annual Report of the Lake Shore Electric Railway

Gross earnings of the Lake Shore Electric Railway in 1909 amounted to $919,612, an increase of $52,343, or 6 per cent, over 1908. The total revenue for 1909 exceeded the results of 1907, when gross earnings amounted to $913,161. A comparative statement showing the operations of the Lake Shore Electric Railway, including the Sandusky, Tremont & Southern Railway, for two years follows:

| Earnings | 1909 | 1908 | Increase |
|---|---|---|---|
| Passenger revenue | $818,263 | $792,614 | $25,649 |
| Baggage revenue | 2,512 | | 2,512 |
| Parlor, chair and special car revenue | 6,622 | 3,870 | 2,752 |
| Mail revenue | 1,968 | 2,050 | *82 |
| Milk revenue | 2,238 | 2,142 | 96 |
| Freight revenue | 58,595 | 48,338 | 10,257 |
| Switching revenue | 117 | 61 | 56 |
| Miscellaneous transportation revenue | 43 | | 43 |
| Station and car privileges | 2,683 | 2,705 | *22 |
| Parcel room receipts | 363 | | 363 |
| Storage | 112 | | 112 |
| Rent of tracks and terminals | 2,209 | 2,014 | 195 |
| Rents of equipment | 4,897 | 8,268 | *3,371 |
| Rents of buildings and other property | 600 | 678 | *78 |
| Power | 12,054 | 69 | 11,985 |
| Miscellaneous | 6,336 | 4,460 | 1,876 |
| Total | $919,612 | $867,269 | $52,343 |

| Expenses | 1909 | 1908 | Increase |
|---|---|---|---|
| Maintenance way and structure | $77,306 | $58,034 | $19,272 |
| Maintenance equipment | 65,089 | 73,441 | *8,352 |
| Operation power plants | 70,641 | 84,892 | *14,251 |
| Conducting transportation | 175,491 | 167,212 | 8,278 |
| General | 108,804 | 107,394 | 1,410 |
| Total operating expenses and taxes | $497,331 | $490,974 | $6,357 |
| Net earnings | $422,281 | $376,295 | $45,986 |
| Other income | 25,000 | 25,000 | |
| Surplus | $447,281 | $401,295 | $45,986 |
| Interest paid | 350,450 | 326,233 | 24,217 |
| Net surplus | $96,831 | $75,062 | $21,769 |
| Per cent of operation | 54.08 | 56.61 | *2.53 |

* Decrease.

Of the total gross earnings for 1909 the Cleveland division, with 60.44 miles of road, furnished a larger proportion than any other division. The contribution of this division toward the total gross revenue was $416,923. The Toledo division, with 62.25 miles of road, furnished $336,434. The Cleveland division showed the largest earnings per mile of road, $6.898. The average for the entire system of 170.13 miles of road was $5,408. Earnings per car mile on the Cleveland division were 33.16 cents.

The operating expenses included maintenance expenditures of $142,395, equal to 15.5 per cent of gross revenue. Conducting transportation costs were $175,491, or 19.1 per cent of the gross revenue, and operation of power plants cost $70,641, or 7.7 per cent of gross.

Traffic statistics compare as follows:

| | 1909 | 1908 | Increase |
|---|---|---|---|
| Car-miles | 3,325,869 | 3,339,131 | *13,262 |
| Income per mile—cents | 27.65 | 25.97 | 1.68 |
| Oper. and taxes per car-mile—cents | 14.95 | 14.70 | 0.25 |
| Net earnings per car-mile—cents | 12.70 | 11.27 | 1.43 |
| Passengers carried | 4,951,002 | 4,788,418 | 162,584 |
| Earnings per passenger—cents | 18.57 | 18.11 | 0.46 |

* Decrease.

The annual report of the Lorain Street Railroad shows gross earnings of $164,471 in 1909, an increase of $21,090 over 1908. Operating expenses and taxes were $88,853 last year, as compared with $90,574 in the previous year.

**Boston (Mass.) Elevated Railway.**—The Boston Elevated Railway has submitted a report to the Massachusetts Railroad Commission for the nine months ended June 30, 1910, the fiscal year in Massachusetts having been changed by law. The earnings for the nine months ended June 30, 1910, compare with the earnings for the fiscal year ended September 30, 1910, as follows: Gross income for nine months, $11,383,686, compared with $14,493,853 for the year; operating expenses for the nine months, $7,321,396, as compared with $9,488,483 for the year; net earnings for the nine months, $4,062,290, as compared with $5,005,369 for the year; other income for the nine months, $135,998 (no item of this kind in 1909); total net income for the nine months, $4,198,288, as compared with $5,005,369 for the year; all charges for the nine months, $3,589,342, as compared with $4,163,951 for the year; balance for the nine months, $608,946, as compared with $841,417 for the year; dividends for the nine months, $598,500, as compared with $802,503; surplus for the nine months, $10,446, as compared with $38,941 for the year.

**Interborough Rapid Transit Company, New York, N. Y.**—In regard to the proposed financing of the Interborough Rapid Transit Company and the election of J. P. Morgan, Jr., George F. Baker, Jr., and Frank A. Vanderlip to the board of directors of the Interborough-Metropolitan Company, an official of the Interborough Rapid Transit Company is quoted as follows: "It is unlikely that any public announcement will be made until full particulars have been settled upon between the Public Service Commission, the Board of Estimate and the Interborough Company in reference to third tracking the elevated lines."

**International Traction Company, Buffalo, N. Y.**—The committee of bondholders of the International Traction Company, acting under the bondholders' agreement dated June 21, 1910, announces that more than a majority in amount of the 50-year 4 per cent collateral trust gold bonds of the International Traction Company has been deposited under this agreement, and that it has made the necessary arrangements for an advance of the interest due on July 1, 1910, to the holders of certificates of deposit issued for the bonds deposited with the committee.

**Sterling, Dixon & Eastern Electric Railway, Dixon, Ill.**—The Sterling, Dixon & Eastern Electric Railway and the Lee County Lighting Company have elected the following officers: John I. Beggs, president; Clement C. Smith, vice-president; Robert Camp, secretary and treasurer, all of Milwaukee; E. P. Maxwell, Dixon, Ill., assistant general manager. The vice-president will assume the duties of general manager.

**Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.**—The following committee, upon the request of holders of a large proportion of the first and second mortgage bonds and stock, urges the holders to deposit their securities with the Safe Deposit & Trust Company, Baltimore, Md., or the Cleveland Trust Company, Cleveland, Ohio: John L. Severance (chairman), George A. Craig and John Sherwin, Cleveland; John J. Nellogan, third vice-president of the Safe Deposit & Trust Company, Baltimore, Md.; Hinsdill Parsons, who is associated with the General Electric Company, New York, N. Y., and George T. Bishop, one of the receivers. Depositors may withdraw without expense if dissatisfied with the plan when presented.

# Traffic and Transportation

## Explanation of Discontinuance of Sale of Tickets by Public Service Railway

The Board of Public Utility Commissioners of New Jersey has forwarded to Joseph Anderson, Sr., a copy of a letter sent to it by the Public Service Railway in response to a complaint filed with the board by Mr. Anderson, in which he took up the matter of the withdrawal from sale of the books of railway tickets. The letter which the company sent in reply follows:

"Gentlemen—Public Service Railway in reply to the letter of complaint of Joseph Anderson, Sr., dated July 5, 1910, respectfully submits the following, assuming that Mr. Anderson refers to Public Service Railway instead of to Public Service Corporation of New Jersey, Public Service Railway being the company that it engaged in operating the street railway system in Jersey City:

"(1) The public demand for tickets at the rate of 21 for a dollar did not warrant the cost of printing, handling and other expenses of issuing and selling the same; the sales of such tickets during a period of six months ending July 1, 1910, yielded more than $24,000 less than the amount received for the same period during the preceding year.

"(2) The largest purchasers of such tickets were the New York Telephone Company, Public Service Corporation of New Jersey and Public Service Gas Company. Not many of such tickets were purchased by other parties. The total of all such sales being less than 4 per cent of the total receipts.

"(3) The Public Service Railway is engaged in installing boxes to register fares paid by passengers on entering its cars, and the use of tickets is inconsistent with the operation of such boxes.

"(4) It is not the practice in other large cities and thickly settled localities, such as New York, Philadelphia, Chicago and Boston, to sell tickets to be used on street cars.

"(5) The ordinances giving consent to the construction, maintenance and operation of the system of street railways of Public Service Railway in Jersey City, which in legal effect are contracts, authorize the company to collect 5-cent fares."

## Statement Regarding Accident on Illinois Traction System.

William B. McKinley, president of the Illinois Traction System, Peoria, Ill., issued the following statement on Oct. 5, 1910, regarding the recent accident on the line of that company:

"The accident was perfectly inexcusable and I cannot imagine how Motorman Lierman forgot his orders as he has confessed to doing. He was one of the most careful men in the employ of the company and had gone on duty perfectly fresh. It was also his first order of the day. It was not as though he had a number of orders to carry out.

"I am informed by C. F. Handshy, general superintendent of interburban lines, that Frank Rowlings, the motorman whom Lierman relieved at Staunton asked Lierman if he had his orders as Lierman was coming out of the train dispatcher's office, and that Lierman replied: 'Yes; I am to meet second No. 73 at Wall's siding.'

"That was but ten minutes before the collision. I cannot imagine how any man could forget his orders in that length of time.

"The road has done everything in its power to safeguard its passengers."

**Approval of Freight Contract Asked**—The Aldermen of Worcester have petitioned the Railroad Commission of Massachusetts to approve the contract made by the city with the Worcester (Mass.) Consolidated Street Railway whereby the company is to be permitted to act as a common carrier of baggage and freight for 20 years.

**Increase in Wages in Atlanta.**—The Georgia Railway & Electric Company, Atlanta, Ga., has increased the wages of motormen and conductors in its employ one cent an hour. The new wage scale follows: First three months, 16 cents per hour; second three months, 17 cents per hour; second six months, 18 cents per hour; second year,

19 cents; third year, 21 cents; fourth year, 22 cents; fifth year and thereafter, 23 cents.

**Question of Fares to Outlying Sections of Tacoma.**—The Municipal Commission of Tacoma, Wash., has voted to place on file the offer of the Tacoma Railway & Power Company regarding fares within the city limits of Tacoma as extended. The company has offered to establish a 5-cent fare limit at the city limits as established following the annexation of Fern Hill and Larchmont if the Municipal Commission will amend the settlement ordinance so that territory hereafter annexed will have no claim to a 5-cent fare pending the life of the company's franchise. The company has also agreed to issue transfers between the lines of the Tacoma Railway & Power Company and the Pacific Traction Company and to remove all tracks from Cliff Avenue, leaving that thoroughfare in shape to be made into a boulevard."

**Another Through Route Established in Chicago**—The Chicago (Ill:) City Railway has established a through route from Stony Island Avenue on the east, west on Sixty-seventh Street to Rhodes Avenue, south on Rhodes Avenue to Keefe Avenue, southwest on Keefe Avenue to Sixty-ninth Street, and west on Sixty ninth to Western Avenue. A three and one-half minute schedule is followed during morning and evening rush hours. At other times of the day a seven-minute schedule is operated. Ultimately the line is to be extended both east and west. Starting from the corner of Jackson Park, the line now skirts Normal Park and Ogden Park, passing Oakwoods cemetery and the Normal School on the way. On the west it is to be extended to California Avenue.

**Proposed Substitution of Signals for Flagmen in Los Angeles.**—The Board of Public Utilities of Los Angeles, Cal., has sent to the Council of that city a report regarding the substitution of signals for flagmen at crossings in Los Angeles by the Pacific Electric Railway, in which it says: "We have received ample assurance that the Pacific Electric Railway is arranging to install the apparatus named at all the street and road crossings from Eighth Street, Los Angeles, to Watts as the first installment of that apparatus, but it has no intention to abolish the flagmen at any crossings where they are maintained according to agreement with the Board of Public Utilities until such time as that board may pass upon the adaptability of the automatic flagman and warning signal, authorize its use and abolishment of the human flagmen."

**City Attorney of Portland Says City Can Prescribe Fenders.**—City Attorney Grant, of Portland, Ore., has presented a lengthy opinion to the Mayor of that city in which he says that there is no legal obstacle to prevent the Council from prescribing for use on the street railways operating in the city any kind of a fender which the members of the Council decide that best meets the requirements in Portland. Mr. Grant says that the precise question of the liability of the city for damages to any person injured by reason of a defect or failure of a fender which had been approved by a city to operate properly has never been decided by the courts, but that in his opinion the city would not be liable. After quoting a number of decisions which bear on the case in point he says: "These cases show conclusively that the doctrine that the city is not liable for acts done in its legislative or governmental capacity, is not only the law in other states, but is the law here and everywhere. This would settle the question, it seems to me. Certainly the city, in prescribing the kind of fender to be used for the protection of the public, is acting in its governmental capacity. It is not interested in the matter in any other way. It derives no revenue, or profit, and has, and can have, no other interest in the matter, except the protection of the life and limb of its citizens. I desire, however, to state to the Council that in any ordinance that is passed it would have no right to specificially designate, by name, any certain or particular fender. The ordinance would have to be drawn so as to cover the specifications of the fender desired by the Council without specifically naming it. A municipal corporation has a dual capacity. One is the right of sovereignty, and while exercising this right the city is not liable. In the other capacity it is exercising a private, or proprietary right, where there is nothing discretionary, or judicial, and in that respect it is liable."

# Personal Mention

**Mr. F. W. Summers** has been appointed chief engineer and master mechanic of the Binghamton (N. Y.) Railway to succeed Mr. J. H. Cole, resigned.

**Mr. David S. Bachman** has been appointed superintendent of the Schuylkill & Dauphin Traction Company, Williamstown, Mass., to succeed Mr. W. T. Corbusier.

**Mr. H. K. Relf** has been appointed claim agent of the Oregon Electric Railway, United Railways and the Oregon Trunk Railway, with headquarters at Portland, Ore.

**Mr. William W. Handy** has been appointed assistant engineer on special work for the Pittsburgh (Pa.) Railways and the Allegheny County Light Company, Pittsburgh, Pa.

**Mr. P. P. Kincheloe, Jr.,** has been appointed assistant chief engineer of the South Covington & Cincinnati Street Railway and the Union Light, Heat & Power Company, with headquarters at Newport, Ky.

**Mr. J. J. Martindale** has been appointed electrical engineer of the Michigan United Railways, Lansing, Mich. Mr. Martindale was formerly chief engineer of the Northern Construction Company, Jackson, Mich.

**Mr. Clarence Wolf** has resigned as vice-president of the Philadelphia (Pa.) Rapid Transit Company and as a director of the company. As previously announced, Mr. C. O. Kruger, president of the company, has been elected a director to succeed Mr. Wolf. No successor to Mr. Wolf as vice-president of the company has been elected.

**Mr. F. S. Hunnewell,** who has been superintendent of the Palmer Division of the Springfield (Mass.) Street Railway for eight years, has been appointed superintendent of the Milford, Attleboro & Woonsocket Street Railway, the Interstate Consolidated Street Railway and the Attleboro Branch Railroad, Attleboro, Mass., effective Oct. 15, 1910.

**Mr. P. J. Kearny** has been appointed engineer in charge of electric traction on the New York, Westchester & Boston Railway, with headquarters at Mt. Vernon, N. Y. Mr. Kearny was formerly located at New Haven as assistant to the electrical engineer of the New York, New Haven & Hartford Railroad, which is constructing the New York, Westchester & Boston Railway.

**Mr. James McM. Smith,** formerly general manager of the Southern Michigan Railway, South Bend, Ind., has been appointed manager of the Toledo & Chicago Interurban Railway, Kendallville, Ind., to succeed Mr. A. J. Purington, who, as announced in the Electric Railway Journal of Oct. 8, 1910, has become general superintendent of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

**Mr. E. D. Atkins,** superintendent of the Worcester & Blackstone Valley Street Railway, Uxbridge, Mass., has been appointed superintendent of the Palmer Division of the Springfield (Mass.) Street Railway, effective on Oct. 15, 1910, to succeed Mr. F. S. Hunnewell, who has been appointed superintendent of the Milford, Attleboro & Woonsocket Street Railway, the Interstate Consolidated Street Railway and the Attleboro Branch Railroad.

**Mr. E. P. Shannon,** whose appointment as assistant to Mr. John F. Stevens, president of the Oregon Electric Railway, United Railways and the Oregon Trunk Railway, Portland, Ore., was announced in the Electric Railway Journal of Sept. 17, 1910, began his railroad career in 1897 as stenographer to the chief engineer of the Wisconsin Central Railway. Subsequently he was appointed chief clerk to the chief engineer of this company, and continued in this capacity for more than three years. Mr. Shannon then spent 14 months in the purchasing department of the Wisconsin Central Railway. He resigned from the Wisconsin Central Railway to become chief clerk to the general agent of the freight department of the Baltimore & Ohio Railroad in Chicago. After serving seven months in this capacity Mr. Shannon resigned to become secretary, chief clerk and assistant to Mr. John F. Stevens.

**Mr. F. M. Weld** has resigned as master mechanic of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., to become master mechanic of the Birmingham Railway Light & Power Company, Birmingham, Ala. Mr. Weld began his railway career in 1901 with the Wakefield

& Stoneham Street Railway. Later he was employed as an armature winder with the Haverhill & Amesbury Street Railway, Haverhill, Mass. He also served for a time as master mechanic of the Creighead-Kintz Company in Massachusetts. In 1895 Mr. Weld accepted the position of master mechanic of the Interstate Consolidated Street Railway, Peboro, Mass., and in 1907 he accepted the position of master mechanic of the Evansville & Southern Indiana Traction Company. In 1908 Mr. Weld was transferred from the Evansville & Southern Indiana Traction Company to the Chicago, South Bend & Northern Indiana Railway as master mechanic, both of these properties being controlled by the Murdock interests.

**Mr. William H. Forse, Jr.**, the newly elected president of the American Street & Interurban Railway Accountants' Association, is secretary and treasurer of the Indiana Union Traction Company, Anderson, Ind. Mr. Forse has been an active member of the association. He has served as a vice-president, and is a member of the committee on a standard classification of accounts and form of report. He is also president of the Central Electric Accounting Conference. Mr. Forse was formerly connected with a manufacturing company in St. Louis, Mo. He became connected with the auditing department of the Indiana Union Traction Company in 1903 and two years afterward was elected auditor. In November, 1906, he was appointed assistant treasurer, and shortly afterward was elected secretary and treasurer of the company. Mr. Forse has been an earnest student of accounting subjects, and has written papers and articles in relation to various features of his work. The system with which Mr. Forse is connected is primarily an interurban system. It operates a total of 366 miles of track, which include city lines in several of the communities through which the system extends.

W. H. Forse, Jr.

**Mr. George W. Rounds**, whose appointment as general superintendent of the Tacoma Railway & Power Company, Tacoma, Wash., was announced in the ELECTRIC RAILWAY JOURNAL of Oct. 8, 1910, was graduated from the Massachusetts Institute of Technology in 1889. He became associated with Thomson-Houston Company on railway construction work at Nashville, Tenn., and Concord, N. H., after completing his college work, and remained with the company several years. Mr. Rounds served the Union Street Railway, Dover, N. H., as superintendent after resigning from the Thomson-Houston Company, and in 1896 he became connected with West Roxbury & Roslindale Street Railway, which absorbed the Norfolk Central Street Railway, Dedham, Mass., and was in turn taken by the Norfolk Suburban Street Railway, and then the Old Colony Street Railway. He was connected with this group of companies for about six years as superintendent. In 1902 he became manager of the Canton-Akron Railway, which is now operated by the Northern Ohio Traction Company. After serving about three years with this company he became connected with Stone & Webster, Boston, Mass., going first with the Houghton (Mich.) Street Railway and then with the Terre Haute Traction & Light Company as general superintendent. In 1907 Mr. Rounds was appointed manager of the Savannah Electric Company in charge of the railway department. Early in 1910 he was made general superintendent of the Savannah Electric Company, from which position he resigned to go to Tacoma.

## OBITUARY

**Benjamin F. Lashar**, who was connected with street railroading in Bridgeport, Conn., for 25 years during the period of operation by horses ,and the early days of electricity as motive power, is dead.

# Construction News

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

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

## RECENT INCORPORATIONS

**Tidewater & Southern Railroad Company, Stockton, Cal.**—Application for a charter has been made in California by this company to build an electric railway to connect Stockton, Modesto and Turlock. At Atlanta a branch line will be constructed to Ripon. Capital stock, $1,000,000. Incorporators: John A. Mehling, J. A. Coley, K. C. Brueck, George E. Minges, George F. Schuler, Bryon A. Bearce and T. J. Wisecarver. [E. R. J., July 2, '10.]

**Uncompahgre & Gunnison Valley, Montrose, Col.**—Incorporated in Colorado to build a 29-mile electric railway to connect Montrose and Delta via the west side of the Uncompahgre River, along Spring Creek mesa and California mesa to Olathe and through Sharano and Coal Creek Valley. J. M. Pepper, Montrose, is interested. [E. R. J., Oct. 1, '10.]

***Billings (Mont.) Traction Company.**—Incorporated in Montana to build a street railway in Billings. Capital stock, $100.000. Incorporators: A. W. Patterson, C. J. Eddy and John A. Connolly.

***Trenton-Mercer County Traction Company, Trenton, N. J.**—Application for a charter has been made in New Jersey by this company to build a railway in Mercer County. Capital stock, $10,000. Incorporators: George W. MacPherson, Rankin Johnson, New York, and Oscar T. Crosby, Warrentown, Va.

***East Pubnico Amusement Company, Halifax, Nova Scotia.**—Chartered in Nova Scotia to build a 4-mile electric railway from Halifax across the Northwest Arm (a branch of Halifax Harbor) to the amusement park at East Pubnico, 4 miles from Dartmouth. Surveys have been made, rights-of-way obtained and construction will begin at once. Officers: Daniel Hawksmarth, president; J. F. George, secretary, and G. C. McClure, 20 Prince Street, Halifax, chief engineer.

**London & Northwestern Railway, London, Ont.**—Chartered in Ontario to build a 114-mile interurban railway to connect London and Sarnia via Hyde Park, Melrose, Lobo, Poplar Hill, Park Hill and Grand Bend. Preliminary arrangements have been completed and construction will soon be started. Capital stock, $500,000. Daniel A. Stewart, London, is interested. [E. R. J., Apr. 14, '09.]

**Greenville Railway & Light Company, Greenville, Tex.**—Chartered in Texas to build a 3-mile electric railway in Greenville. Capital stock, $300,000. Incorporators: S. A. Price, Albert Emanuel and H. L. Warren. [E. R. J., Aug. 20, '10.]

**Puget Sound, Chelan & Spokane Railway, Tacoma, Wash.**—Incorporated in Washington to build about 1200 miles of electric railway and to develop about 30 hydroelectric properties in Washington, aggregating more than 300,000 hp. Capital stock, $25,000,000. W. K. Palmer Company, 717-720 Dwight Building, Kansas City, Mo., has charge of all its engineering work and will supervise construction. [E. R. J., Oct. 1, '10.]

## FRANCHISES

***Fort Bragg, Cal.**—Thomas Bourns has asked the City Council for a franchise to build an electric railway in Fort Bragg.

**Sacramento, Cal.**—The Northern Electric Railway, Chico, has asked the Board of Trustees for a new franchise to extend its tracks in Sacramento.

**Elgin, Ill.**—The Elgin Traction Company will ask the City Council for a 20-year franchise to build an electric railway in Elgin. J. P. Sayer, promoter. [E. R. J., July 23, '10.]

**St. Louis, Ill.**—The Southern Traction Company, East St. Louis, will ask the Municipal Assembly for a franchise to use the Municipal Free Bridge and to extend its railway over certain streets in St. Louis.

**Troy, Ill.**—The St. Louis & Eastern Traction Company, East St. Louis, will apply to the City Council for a franchise to build its railway through Troy. This proposed railway

will connect Granito City and Greenville via Collinsville, Troy, St. Jacob, Highland, Pierson and Pocahontas. A. W. Crawford, Hillsboro, is interested. [E. R. J., Sept. 3, '10.]

**Milford, Mass.**—The Milford & Uxbridge Street Railway, Milford, has asked the Council for a franchise to extend its tracks in Milford.

**Springfield, Mass.**—The Berkshire Street Railway, Pittsfield, has been granted a franchise by the Board of Aldermen to connect the Pittsfield Street Railway on the south side of the park in Springfield and at Coltsville. The franchise states that grooved rails shall be used in place of the T-rail.

**Saginaw, Mich.**—The Saginaw-Bay City Railway has asked the City Council for a franchise to build a loop and extend its tracks in Saginaw.

**Duluth, Minn.**—The Duluth Street Railway has been granted a franchise by the Council to extend its track on Grand Avenue in Duluth to Fond du Lac via Ironton, Smithville and New Duluth.

**Union, N. J.**—The Public Service Railway, Newark, will apply for a franchise to the Council to build its railway on Stuyvesant Avenue in Union.

**Suffern, N. Y.**—The North Jersey Rapid Transit Company, Paterson, N. J., has asked the Council for a franchise to build its tracks in Suffern.

**Waterloo, N. Y.**—The Geneva & Auburn Railway has been granted an extension of time of its franchise by the Council permitting the substitution of new track in West Main Street in Waterloo.

**Chattanooga, Tenn.**—D. J. Duncan and associates have been granted a franchise by the City Council to build an interurban railway in Chattanooga. This is part of a plan to build an interurban railway between Chattanooga and Cleveland. [E. R. J., July 9, '10.]

**Austin, Tex.**—The Austin Electric Railway has accepted the terms and conditions of the franchise granted by the County Commissioners to build an extension of its tracks in South Austin.

***Kenosha, Wis.**—J. K. Orvis will ask the City Council for a franchise to build an electric railway in Kenosha. It is planned to continue this proposed railway to Lake Geneva.

## TRACK AND ROADWAY

**Glendale & Eagle Rock Railway, Glendale, Cal.**—This company has perfected its Verdugo Park branch by adding turnouts, switches and putting in 2 miles of feed wire for additional power.

**Los Angeles-Pacific Railway, Los Angeles, Cal.**—This company is reballasting its entire line to Hollywood and to Venice.

**Visalia (Cal.) Electric Railroad.**—This company has begun work on the 3-mile extension of its tracks to Woodlake. The grading contract has been awarded to Buckman & Sons, Visalia.

**Denver & Greeley Interurban, Greeley, Colo.**—This company is reported to be considering plans for building an electric railway to connect Denver, Fort Lupton and Estes Park. J. D. Houseman, general manager. [E. R. J., July 17, '09.]

**Atlanta & Carolina Railway, Atlanta, Ga.**—This company has resumed the construction of its proposed railway to connect Atlanta and Augusta, and with a possible extension to Columbia or Charleston, S. C. James W. English, Atlanta, president.

**Fairburn & Atlanta Railway, Fairburn, Ga.**—This company has applied for authority to the railroad commission to issue $75,000 of common capital stock and $50,000 of first mortgage bonds. The construction of the road from Fairburn to College Park is progressing rapidly, and it is thought that by the first of the year cars will be in operation. This line runs from Fairburn to Union City to College Park.

**St. Clair Traction Company, Belleville, Ill.**—This company, recently incorporated, has made surveys for its proposed 7-mile electric railway between Belleville and Freeburg. It will begin construction when the necessary capital has been secured. E. L. Thomas, Belleville, president. [E. R. J., Sept. 17, '10.]

**Illinois Traction System, Champaign, Ill.**—This company, it is reported, will begin building interurban lines out of Atchison next spring. It is proposed to build an interurban railway to St. Joseph, going up the Kansas side of the Mississippi River; another line to Leavenworth and one to Topeka.

**Alton, Jacksonville & Peoria, Jerseyville, Ill.**—This company has begun work on the extension of its line from Alton to Godfrey. It is expected to have the railway completed by Jan. 1.

***Springfield, Ill.**—Press reports state that a new electric railway will be built soon to connect Cantrall, Athens, Petersburg and Sweetwater. Officers: Honer J. Tice, Greenview, president; George L. Harnsberger, Springfield, vice-president, and Samuel E. Prather, Springfield, secretary and treasurer.

**Evansville & Eastern Electric Railway, Evansville, Ind.**—This company is reported to have surveys under way for building an extension of its railway to New Albany.

**Evansville, Mt. Carmel & Olney Electric Railway, Evansville, Ind.**—This company advises that it will begin on Nov. 1 the construction of its proposed 65-mile interurban railway to connect Evansville, Ind., and Mt. Carmel and Olney, Ill. Officers: Aden Knoph, Olney, Ill., president, and E. Q. Lockyear, Evansville, Ind., secretary. [E. R. J., July 2, '10.]

**Atchinson Railway, Light & Power Company, Atchinson, Kan.**—This company has been authorized to increase its capital stock from $900,000 to $1,500,000. The stock is to be sold, and the money thus derived is to be used for improvements and extensions.

**Kentucky & Tennessee Traction Company, Hopkinsville, Ky.**—This company, recently incorporated, advises that progress is being made with the preliminary arrangements and contracts will soon be let for building its proposed 25-mile railway to connect Hopkinsville, Salubria, Sulphur, Mineral Springs, Pembroke, Trenton and Guthrie. It is the intention to extend the line into Nashville, Tenn., and to the coal fields of Christian and adjoining Counties north of Hopkinsville, and ultimately it will reach Evansville, Ind. Charles Van den Burgh, Hopkinsville, general manager. [E. R. J., Oct. 1, '10.]

**Milford & Uxbridge Street Railway, Milford, Mass.**—This company is considering plans for building a 11-mile extension of its line from Uxbridge to Whitinsville, East Douglas and Manchaug. This extension would give a direct street railway connection with Boston. Surveys are now being made.

**Berkshire Street Railway, Pittsfield, Mass.**—This company has filed with the railroad commissioners a petition asking that the board give its approval to an extension of the company's railway southward from Great Barrington through Sheffield to Ashley Falls.

**Lake Michigan & Kalamazoo Railroad, Kalamazoo, Mich.**—Incorporated in Michigan to build an interurban railway from Kalamazoo to Benton Harbor. Capital stock, $25,000. William C. Klumb, Kansas City, secretary and treasurer, and John H. Notley, Kalamazoo, attorney. [E. R. J., Oct. 1, '10.]

**Lake Michigan & Kalamazoo Railroad, Kalamazoo, Mich.**—This company advises that it will begin construction when it has succeeded in securing financial backing. Rights-of-way have been acquired between Benton Harbor and Coloma. Seven miles of grading have been completed. The line will connect St. Joseph, Benton Harbor, Coloma, Watervliet, Hartford, Lawrence, Paw Paw and Kalamazoo. Capital stock, $25,000. Officers: William A. Blake, Coloma, president; William C. Plumb, Paw Paw, secretary, and John H. Notley, Kalamazoo, treasurer. [E. R. J., Oct. 1, '10.]

**Mexico (Mex.) Tramway**—This company has received concessions for a period of 99 years from the Mexican government for the construction of two electric interurban railways. One will connect Mexico City and Pueblo, a distance of 129 miles, and the other will be a 32-mile line connecting Mexico City and Toluca. Construction will be begun at once. It is expected to have the both lines completed within 3 years.

**Granite City Railway, St. Cloud, Minn.**—This company, it is said, will extend its tracks to the Northern Pacific station and also on St. Germain Street in St. Cloud this fall.

**St. Paul Railway Promotion Company, St. Paul, Minn.**—This company has begun surveying for its proposed network of interurban lines radiating from St. Paul to Mankato, Eagle Lake, Faribault, Northfield and other Southern Minnesota cities. W. L. Sontag, St. Paul, general manager. [E. R. J., Oct. 8, '10.]

**Metropolitan Street Railway, Kansas City, Mo.**—This company has decided on plans for constructing a new line in Kansas City, Kan., to extend from Twelfth Street and Minnesota Avenue south to Orville Avenue, west on Orville to Thirteenth Street to Central Avenue.

**St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.**—This company is making plans for building an extension of its track from Twenty-sixth Street to the state hospital with a view to building a double-track electric railway to River Street in St. Joseph.

**Nebraska Traction & Power Company, Ralston, Neb.**—This company, with the Commercial Club as a financial backing, proposes to extend its railway to Lincoln, thus giving Omaha its first interurban electric railway.

**Elmira, Corning & Waverly Railroad, Elmira, N. Y.**—This company has begun active work on the construction of the Corning branch. It is expected to have the road between Elmira and Corning completed this fall.

**Long Island Railroad, Long Island City, N. Y.**—This company has filed plans with the State Public Service Commission for the elimination of all crossings on the Flushing main line between the creek and Broadway, Flushing, L. I. The plans call for the elevation of the road over Lawrence and Main and its depression under Union, Bowne, Parsons, Wilson and Boerum, and overhead at Broadway. Twenty-second is to be diverted or closed. The cost is estimated at $1,077,000.

***Wilson, N. Y.**—S. M. Conent, president of the Conant-Bryant Company, is promoting the building of a 2-mile electric railway to connect the New York Central Railroad station in Wilson with Island Lake Park and Sunset Beach on Lake Ontario.

**Wheeling, Cadiz & Tuscarawas Traction Company, Cadiz, Ohio**—This company, which is building a proposed 60-mile electric railway to connect Wheeling, Cadiz, Uhrichville and Cleveland, recently organized by electing the following officers: R. P. Scott, president; W. W. Wright, vice-president, and W. A. Holmes, treasurer.—[E. R. J., July 2, '10.]

**Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.**—This company is making plans to double track its line as far as Willoughby Park immediately and through to Willoughby within a short time. The company contemplates double tracking its entire line in the spring.

***Youngstown, Ohio.**—Press reports state J. R. Curtiss and George H. Carpenter are considering plans for building a proposed electric railway between Painesville and Youngstown. Rights-of-way have been secured and actual work will be started in the near future.

**Oklahoma Union Traction Company, Tulsa, Okla.**—This company has increased its capital stock from $100,000 to $400,000. It expects to build a bridge across the Arkansas River and extend its railway to West Tulsa in the near future. L. Cox, superintendent.

**Guelph, Ont.**—On Sept. 26 the ratepayers of Guelph carried by large majorities two by-laws, one granting a franchise to the People's Railway and the other authorizing the city corporation to subscribe for $85,000 worth of stock in the company. According to the franchise the entire railway connecting Guelph with Berlin, Elora, Fergus, Arthur, Hespeler and Puslinch Lake is to be completed by July, 1912. A. W. Bugg, secretary of the company, states that the contractors will commence work at once grading the right of way on the line between Guelph and New Germany, while the line from Berlin to New Germany is under way. At a meeting at Berlin on Sept. 19 a permanent board of directors of the company was chosen as follows: George Clare, Preston; J. G. Reiner, Wellesley; J. C. Holman, New Dundee, and Andrew Steele, Fergus, George Wanless, W. J. Moody, David Moody, William Pieper and W. A. Bugg, Berlin.

**Toronto & York Radial Railway, Toronto, Ont.**—This company, it is said, has had surveys made near Mimico for the purpose of double tracking a portion of its line.

***Berlin, Pa.**—H. G. Kaylor, Johnstown, and associates are said to be making surveys and considering plans for building a proposed electric railway to connect Berlin, Somerset and Garrett.

***Pittsburgh, Pa.**—H. M. Rodgers and C. B. Reeves are said to be making preliminary arrangements and will soon begin the construction of a proposed electric railway to connect Pittsburg, Wellsburg and Wheeling.

**West Penn Railways, Pittsburg, Pa.**—This company is reported to be considering plans for building an extension of its railway from Fayette City to Donora.

**Memphis (Tenn.) Street Railway.**—This company, it is reported, will construct at once a double track cross-town line on Cleveland Street in Memphis.

**Cache County Amusement Company, Logan, Utah.**—This company, recently incorporated to build an interurban railway to connect Wellsville, Hyrum, Logan, Hillville and Providence, has organized by electing the following officers: Job White, president; J. E. Wiscomb, vice-president; Leo Nielsen, treasurer, and W. J. Phillips, secretary. George A. Hansen is the additional director.—[E. R. J., Sept. 24. '10.]

**Sheridan Railway & Light Company, Sheridan, Wyo.**—This company will start construction at once on its proposed 13-mile interurban railway from Sheridan, Wyo., to the Government reservation near the city. Ernest Boehme, West Alzer Avenue, Sheridan, is the engineer in charge of the work. Emanuel & Sullivan, Dayton, Ohio, promoters. [E. R. J., Sept. 10, '10.]

## SHOPS AND BUILDINGS

**Northern Electric Railway, Chico, Cal.**—This company has purchased a site in Live Oak upon which it will build a new depot.

**Pacific Electric Railway, Los Angeles, Cal.**—This company will build a 6-story depot and hotel building at Long Beach. The structure will be 135 ft. x 175 ft. of reinforced concrete construction. Plans are under way to begin work within the next few weeks.

**Illinois Traction System, Champaign, Ill.**—This company will build a new addition to its station on Ninth Street and Monroe Street in Springfield. The building will be one story, of brick construction, and will be used for office purposes.

**Northern Illinois Light & Traction Company, Ottawa, Ill.**—This company has begun work for the construction of its new repair shops near Ottawa. The structure will be 50 ft. x 300 ft. The steel for the building will be furnished by the Joliet Steel Company. L. W. Hess, general manager.

**Beech Grove Traction Company, Indianapolis, Ind.**—This company will receive bids at once for building a car house in Indianapolis. The structure will be of brick construction, one story, 60 ft. x 80 ft. C. F. Schmidt, Ætna Building, Indianapolis, secretary.

**Wichita Railroad & Light Company, Wichita, Kans.**—This company is said to have awarded the contract to the Sanders Brothers Manufacturing Company for building its new repair shops in Wichita. The structure will be 62 ft. x 300 ft. The frame will be of heavy steel and the walls will be of brick. It will be so constructed that additions may be made at any time. Estimated cost is about $30,000.

## POWER HOUSES AND SUBSTATIONS

**Holley Electric Railway, Springville, Cal.**—This company has recently bought a site near Springville on which it will build a power plant.

**Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.**—This company advises that it has recently placed contracts for one Hamilton Corliss cross-compound engine, 1500-hp. 80 r. p. m., to be direct connected to a 1000 kw G. E. generator; Stratton steam separator; Cochrane oil separator and Wheeler & Edwards condenser and air pump. It is also erecting two 420-hp. Sterling boilers with superheaters. It is the intention to replace its present steam header with a 15 header designed for superheated steam.

**Ottumwa Railway & Light Company, Ottumwa, Ia.**—This company is building a new power plant on South Jefferson Street in Ottumwa. The structure is 112 ft. x 34 ft. of brick and concrete construction.

# Manufactures & Supplies

## ROLLING STOCK

**Second Avenue Railroad, New York, N. Y.,** is in the market for 200 new motor equipments.

**Fairmont & Clarksburg Traction Company, Fairmont, W. Va.,** has ordered two closed cars of the Jewett Car Company.

**Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky.,** is reported to be considering the purchase of 20 new cars.

**United Railways & Electric Company, Baltimore, Md.,** has ordered from The J. G. Brill Company 60 30-ft. 8-in. semi-convertible pay-as-you-enter cars, mounted on Brill No. 27, GE-1 trucks.

**Boston (Mass.) Elevated Railway** has asked for bids for 100 semi-convertible surface cars. Mention was made in the Electric Railway Journal of Aug. 20, 1910, of the fact that this company was considering the purchase of this equipment.

**United Railroads, San Francisco, Cal.,** has placed an order with the Standard Motor Truck Company for 160 type 6-50 trucks. These trucks will be used on the 80 cars on order with the Jewett Car Company. GE-210 four-motor equipments have also been specified for these cars.

**Galveston-Houston Electric Railway, Galveston, Tex.,** has ordered, through the Stone & Webster Engineering Corporation, ten interurban passenger and two express cars from the Cincinnati Car Company. The passenger cars are 52 ft. over all, and will seat 54 passengers. They are for single-end operation, and have smoking compartments. They will be mounted on Baldwin M. C. B. trucks, having Symington ball-bearing center plates and steel wheels with a wheelbase of 6 ft. GE-73 equipments, with automatic relay type M control, will be used. The air brakes will be of the Westinghouse A. M. M. type. The equipment of the express cars will be similar, but they will be designed for double-end operation.

**Tri-City Railway, Davenport, Ia.,** which was noted in the Electric Railway Journal of Sept. 17, 1910, as having purchased seven double truck closed pay-as-you-enter cars from the Cincinnati Car Company, has specified the following details for these cars:

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| Bolster centers, length, 19 ft. | Curtain material...Pantasote |
| Length of body...30 ft. 8 in. | Destination signs....Hunter |
| Over vestibule....43 ft. 8 in. | Fenders ..... Providence |
| Over posts at belt..8 ft. 4 in. | Gongs..two 14 in. foot gongs |
| Sill to trolley base..8 ft. 5 in. | Hand brakes, |
| Height from top of rail | operated by 12 in. handles |
| to sills.....30 in. | Heaters ..... Consolidated |
| Body ..... composite | Headlights ..... Dayton |
| Interior trim..quartered oak | Motors ..... 4 GE-80 |
| Underframe ..... composite | Push button signal...Consol. |
| Bolsters, body..built-up steel | Roofs.....Monitor deck |
| Bumpers, | Sanders, |
| Faced with 6 in. x ⅜ in. | 2 per car, air operated |
| steel plate | Seats, Hale & Kilburn, rattan |
| Car trimmings..solid bronze | Step treads, C.C. Co. compos. |
| Couplers.....C. C. Co. radial | Trucks.....Standard 0-50 |
| Curtain fixtures, | Ventilators, |
| Nat. Lock Washer Co.'s | ordinary deck sash |

## TRADE NOTES

**W. H. Schott Company, Chicago, Ill.,** has moved its office to suite 1805-09, 39 Jackson Boulevard, Chicago.

**Kean, Taylor & Company, New York, N. Y.,** announce that Richard L. Morris has become associated with them in charge of their bond department.

**Massachusetts Chemical Company, Walpole, Mass.,** has appointed Charles A. Baldwin manager of its New York office, to succeed Henry E. Cozzens, who has resigned.

**Burton W. Mudge & Company, Chicago, Ill.,** have elected Robert D. Sinclair as secretary and treasurer. Mr. Sinclair was connected previously with the First National Bank of Chicago for many years.

**W. H. Finley,** signal engineer of the Chicago Great Western Railroad, at Chicago, has resigned to become associated with the Chicago sales office of the Union Switch & Signal Company, Swissvale, Pa., effective Oct. 15.

**Shur-On Trolley Guard Company, Buffalo, N. Y.,** has been incorporated, with a capital stock of $25,000, to manufacture all kinds of appliances for electric cars. The incorporators are H. J. Tiedt, F. J. Nolan and H. J. Young, of Buffalo.

**P. H. Wilhelm,** who has been connected with the American Steel & Wire Company for some time, has been appointed general railway representative of the Boston Wove Hose & Rubber Company, Boston, Mass. Mr. Wilhelm's headquarters will be at Boston.

**Scofield Engineering Company, Philadelphia, Pa.,** has been retained by the Browning Manufacturing Company, Cleveland, Ohio, to design and supervise the construction of a cantilever material handling bridge, which is to be built near Lockport, N. Y. Plans are in progress and work will start immediately.

**W. W. Wheatley, Chicago, Ill.,** representative of the Edison Storage Battery Company and the Federal Storage Battery Company, has associated with him in this representation Lucien Wheatley. W. W. Wheatley was formerly general manager of the Kansas City Railway & Light Company. Lucien Wheatley has been president of the Charleston City Bank, of Charleston, Ill.

**Canton Culvert Company, Canton, Ohio,** reports a recent sale of several hundred lineal feet of 60-in. diameter "Acme" (nestable) corrugated galvanized No-Co-Ro metal culverts to a prominent engineering and contracting concern in New York City for use as an intake from a crib to an electric power house on the bank of the Connecticut River. Upon investigation the engineer in charge found it a practical and simple matter, by reason of the characteristic construction of the "Acme," to calk the lateral flange points with an inexpensive waterproof cement, making the culvert sand-suction tight, and also facilitating installation through the convenience of setting up the culvert in 20-ft. break joint lengths on the river bank, transporting these on a scow and lowering them for divers to join these together under the water. This is a feature worthy of consideration by engineers having similar projects in view.

## ADVERTISING LITERATURE

**Economy Oil Cup Company, Augusta, Ga.,** is mailing a circular which illustrates and describes the economy oil cup.

**Western Electric Company, New York, N. Y.,** has issued booklet T-206 describing its composite telephone and telegraph system for railway service. This system has been devised for the purpose of enabling telephone and telegraph messages to be transmitted simultaneously over grounded telegraph lines. The book contains 54 pages, and is profusely illustrated.

**Wheeler Condenser & Engineering Company, Carteret, N. J.,** has issued a 24-page pamphlet entitled "Condenser for Small Central Stations," in which is reprinted a lecture delivered before the Missouri Gas, Electric & Street Railway Association. It contains a number of useful tables, charts and curves relating to the operation and economy of condensing machinery.

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George Carson, claim agent of the Seattle Electric Company, following the inauguration of his series of meetings and lectures for the benefit of trainmen of the street railway service, looking toward minimizing the accidents on the line and the consequent reduction of claims for injury against the company, is conducting an accident campaign in the public schools of Seattle, where addresses for the benefit of teachers and pupils alike are being given.

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The Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has let the contract to the Gadsen Construction Company, of Savannah, Ga., for constructing the foundation for the new power plant in Charleston. The structure will be 120 ft. x 120 ft. The equipment of the new plant will consist of 300-hp. Babcock & Wilcox boilers, 1-1000 kw turbine generator in addition to the one in the old plant now being used, 2-2000 kw turbine generators, 3-500 kw railway motor generators, 2-100 kw exciters, 1-35 kw motor generator. All of the above machinery has been ordered, together with the necessary equipment. The plant when completed will cost about $200,000.