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STANDARDS IN CAR DESIGN

The communication signed by "Car Builder," which appears on another page of this issue, raises several interesting and logical points in connection with Mr. Gonzenbach's recent appeal for standardization as a means for reducing the cost of electric railway cars. All of the writer's comments contain food for thought, but it is, perhaps, unfortunate that he should have cited, as a reason for preventing the establishment of standards, the fact that a great number of radical innovations in car design have been introduced during the past three years. Certainly these widely different designs possess individual points of great merit, and certainly none of them will ever become a universal standard. But this is by no means an argument against standardization. Would the Hedley-Doyle car be any worse if its side-post spacing were changed by the fraction of an inch necessary to make it correspond with that of the Jones car or the Brinckerhoff car or any of the special types mentioned by our correspondent? And would the Birney design be fatally handicapped if a roof contour were imposed upon it similar to that on the car which proudly bears the name of "Peatwit"? We cannot conceive that it would. Of course, it is a long cry from standardization in details to a single universally-standard body. Yet the former is certainly possible to-day, and if the car builders really want uniformity, as our correspondent says, they can make an initial step toward it by the simple process of standardizing a few details and encouraging their establishment by charging less, even if it is only $5 per car, whenever they are used.

PRESENTING DATA IN WAGE ARBITRATIONS

A noticeable feature of recent arbitration hearings has been the use of charts for impressing data upon the minds of the arbitrators. An example of such use was furnished by the Bay State Street Railway arbitration. Charts used in these hearings were reproduced on page 708 of the issue of the ELECTRIC RAILWAY JOURNAL for April 10, 1915. We have been fortunate in securing copies of a number of the exhibits used in connection with Prof. A. S. Richey's testimony, referred to on page 645 of last week's issue. These are reproduced herewith, on page 664. The charts are self-explanatory and they contain data well worthy of study. One chart which proved very effective at the hearing was that showing the rapid increase of wages of conductors and motormen with an actual decrease in the work of each man as indicated by the number of passengers carried per car-hour and the corresponding revenue. Another was that giving a comparison of the wages paid on the Rhode Island system, expressed in various ways, with the union wages paid in other trades, using data for the latter taken from government bulletins. This chart also compared the above with the cost of living made up from components shown on a third chart. The use and publication of data like these must have a cumulative value and effect. If the general public and the employees are convinced of the accuracy of the data they can have no reasonable justification for obviously excessive demands. Professor Richey and other students of economic conditions who present the results of their investigations in such convincing fashion deserve the thanks of both parties concerned in wage controversies.

RAILWAY PAPERS AT INTERNATIONAL CONGRESS

The intimate relations of electric railroading to all branches of engineering is shown very conspicuously by the appearance of papers on electric railways in nearly all of the sections at the International Engineering Congress recently closed. Thus the important papers on London traffic by Sir Albert Stanley and on utilities by Dr. Humphreys, not to mention others, were assigned to the section of municipal engineering. The railway engineering section included the paper on track construction by George H. Pegram, chief engineer of the Interborough Rapid Transit Company of New York, and the papers on heavy electric traction by Messrs. McHenry and Hood. In the same way, the papers on motor vehicles and on power station design, with the exception of that by Dr. Parshall, were assigned to the mechanical engineering section, while that paper and the one by Mr. Eaton on the mechanical problems of the electric locomotive were put in the electrical engineering section. Finally, the electric railway engineer who is interested in the chemistry of rails and of special work must search for the matters which interest him in the metallurgy section. The consequence is that the papers on electric railway engineering, like the electric railway exhibits at the fair, are scattered by being placed in some half a dozen or more different places, and their value in a sense is somewhat lost by this plan. We hope that at the next International Engineering Congress the precedent established at the Turin International Engineering Congress will be followed by the establishment of a special electric traction section, and that at the next international exposition the importance of the electric traction industry will be recognized by the collection of the electric railway exhibits in one building instead of being distributed among several. Surely the industry is of sufficient importance to warrant this.

THE HEALING POWER OF PUBLICITY

Rousseau once made the pessimistic remark that the pain from the prick of the rose thorn more than counteracts the pleasures of a thousand rose smells. Unfortunately the same principle is applicable to the easily irritated patrons of the electric railway, but with care and good judgment the situation can often be met in a way to justify another remark that the removal of one thorn from the flesh often makes the other thorns seem like roses. This latter mental phenomenon was recently illustrated in Pennsylvania, where a certain local railway company was receiving from its riders an unusual number of criticisms of various kinds, but among them complaints about flat wheels and infrequent service were perhaps most pronounced. The manager realized it was important to do something, so he remedied the first complaint and turned or ground all of the flat wheels. As soon as this work was done the railway issued special announcements calling attention to the improvement in equipment effected. This frank publicity not only won ready appreciation from the public but such was its effect that frequent comments were now overheard regarding the general improvements which the company was providing, although no other betterment had actually been made at that time. Of course, if the character of service had continued to be poor the effect of the mental cocaine of satisfaction administered the public by the one improvement would soon have worn off. We do not recite the above illustration, therefore, in order to suggest a cloak for half-hearted or incomplete practices but to show an example of the general mental healing power of publicity when applied at the right psychological opportunity.

5000-VOLT DIRECT CURRENT

In this issue is recorded another step, one might almost say jump, in the climb of voltages for d.c. railway equipment. The Michigan United Traction Company, already famous for its pioneer work in electric railway engineering, stands sponsor for a 5000-volt installation on one of its lines. At present the equipment is considered to be hardly clear of the experimental stage, as emphasized by N. W. Storer in his description of the motors and control which we publish elsewhere. But judging from the astonishing results obtained on the 2400-volt Butte, Anaconda & Pacific installation which was regarded hardly two years ago with considerable trepidation on account of the high voltage, this qualification may perhaps be due to super-modesty on the part of those who have made such a notable advance. In so far as concerns the voltages impressed upon the motor commutators there is nothing startling to be found—a characterization that, however, by no means applies to the design—because the line emf. is split up by permanently coupling the four motors in pairs, and in addition, building each motor with twin armatures in series. Thus across each commutator there are normally but 1250 volts. As a whole the equipment is a marvel of ingenuity in the application of familiar principles. Among the most interesting elements are the double-break switches with chilling pieces to kill the arcs, the storage battery charged from the ground side of the circuit which supplies the auxiliaries and thus eliminates the frequently-troublesome motor generator set, and last but by no means least the mercury vapor converter by means of which the three-phase power is transformed to the d.c. form. As the rectifier has unquestionably had considerable influence in making the 5000-volt equipment a commercially attractive proposition the disclosure of its remaining weaknesses and peculiarities, which must necessarily follow its use in such a conspicuous installation, will be awaited with interest.

METHODS OF CHECKING SERVICE

In close connection with the series of articles by F. W. Doolittle on the general subject of traffic surveys, recently appearing in this paper, lies the question of selecting the proper method for checking the measure of service. Obviously it is not easy to formulate a detailed plan applicable to all traffic checks, for in some cases the controlling factors can be easily located and sufficient information obtained from a single check to determine whether the transportation is satisfactory, while in others the question of the extent of service cannot be answered without an examination at many points determined by local conditions. In regard to the service checks for any particular city, however, the difficulty of establishing a general yet definite rule does not seem insuperable. It should be possible to determine the approximate number and general character of strategic points that would be adequate for checking the service as well as the duration of the checking operations. Any rule that is drafted along this line, however, should state definitely only the main provisions of the checking method, and latitude should be allowed for the accidental variations, both in service and in the location of strategic points, that are certain to be effected by the seasons and by changes in routes.

In general, there are three checking methods—by points, by routes, and by groups (the comparative efficiency of using stationary or riding observers not being herein considered). All are useful and sometimes all may be necessary, depending upon the character of the service rendered and the investigation to be made. Checks at points are made only at particular points where the traffic has seemed to be unusually congested. For such a study they are valuable, but obviously such checks are not a measure of the service of the whole street or route. Checks by routes are made at several controlling points, either on lines served by only one route or on a trunk line served by several routes, the purpose being to determine the adequacy of service on the one or on each separate route. The chief function of route checks is in connection with streets covered by only one route, and the real problem arises when one tries to adapt this method of checking to trunk-line service. In most cities of considerable size certain streets in the downtown districts are traversed by several lines, which enter the trunk line at one or various points and run on it for varying distances. Such a

service would seem to require the group plan of checking, which is also made at several controlling points but measures the number and loading of all cars, regardless of route, that run over the common track.

Those who favor a combination of route checks in measuring such composite service take the point of view that if the various routes operating over the trunk line are checked separately and are found to be furnishing satisfactory service on that line, it is a reasonable inference that all the routes together are furnishing sufficient trunk-line service. The existence of any short-haul traffic which both originates and terminates on the trunk line between the points where the lines branch is believed to be reflected in the ratio of seats to passengers on the several routes. It is true that in most cases not much traffic drops off the route lines, but to the extent that it does the amount of such purely trunk-line traffic is not shown by the route checks. Furthermore, the route checks on the trunk line fail to take into account the transfer of passengers between routes when the turn-off points are reached. On the other hand, if a group check is made on a trunk line, an accurate measure of the traffic, both long-haul and short-haul, on this line is secured, but no accurate data are obtained for dividing the trunk-line service among the several routes so as to satisfy the route services beyond the points of divergence.

For these reasons neither the route nor the group method seems self-sufficient in checking composite service. We believe that the logical plan is to check by the group method at the controlling points the combined loadings of all cars that serve the trunk line, irrespective of their routes. This gives a measure of the total trunk-line service needed. To determine the proper division of this service, however, route checks should be made on each route at its controlling points beyond its turn-off from the trunk line. When the trunk-line continues past the turn-off point of one route line instead of splitting up into several routes, a check should also be made on the trunk line beyond the point of divergence in order to ascertain whether the service offered has been decreased in the same proportion as the number of passengers. If the combined services of the routes, thus determined, fail to satisfy the trunk-line service as established by the group method, the existence of a short-haul trunk-line service is proved. In such a case a special shuttle service could be installed on the trunk line to handle this short-haul traffic, whereas without the route-method figures the service on one of the long contributing lines might be increased, at much greater cost, to make up the deficiency. In short, the combination of the two methods permits the recognition of transfer passengers at the points of divergence, a division of the service on a trunk line between it and a diverging route or among diverging routes so as not to lower the seat ratio on any line, and the ascertainment of the amount of short-haul trunk-line traffic, which, once known, can be handled efficiently.

The greatest difficulty in using the group method of checking composite service seems to be the determination of what part of any trunk-line street must be covered by a route before that route can be considered as supplying part of the trunk-line service. This question recently arose in Chicago, the objection being raised that some route cars would turn off the trunk line before they had passed all the checking points. Some argued that cars should be required to run over two-thirds of the trunk-line mileage checked before they would be considered as giving trunk-line service. It was asserted that this arbitrary provision was proper in the case of Chicago because most of the route lines in that city cover this distance before they branch off, but it would undoubtedly be an unwise precedent for other cities. In our opinion, if the distance which any car runs on the trunk line is greater than the distance which the average passenger will walk in preference to taking a car, say from a quarter to half a mile, that car unquestionably adds to the service on the street and should be considered in a group check.

THE BAY STATE EQUIPMENT DEPARTMENT

Elsewhere in this issue is described the organization of the equipment department of the 1000-mile Bay State Street Railway. This organization is represented graphically by an effective form of organization chart which is easy to produce and easy to read. A noticeable feature of this organization is the concentration into the hands of the superintendent of equipment of a variety of duties that are usually divided among subordinate or sub-department heads and the unusually high proportion of the working time of foremen to their supervising time. In studying this organization it should be remembered that the Bay State Street Railway not only spreads over an enormous area but that the city of Boston breaks it up into two physically unconnected groups of lines north and south of Boston. Therefore, to maintain efficient supervision, the superintendent of equipment must spend a large part of his time in traveling over the property. Fortunately, the automobile is available to bring such supervising time down to a minimum.

The physical separation of the Bay State lines explains in large measure the dual character of the departmental family tree, but over and above this, the organization is singularly flexible in its provision for the performance of special services by men peculiarly qualified for particular tasks. Here is no excessive adherence to symmetry of organization for its own sake, but rather an arrangement of staff responsibility which confers upon some subordinate officer duties which in some measure are his alone. At the same time a wide gap exists between the head of the department and his staff, for unlike other mechanical departments he has no sub-departmental heads like an engineer of car construction, of electrical equipment, of maintenance, of structures, etc., but must handle these duties alone. That such arrangement has worked out well on this large property is a compliment to the executive ability shown in directing the numerous activities of the equipment department from design to maintenance.

Operating with 5000-Volt Direct Current

The Michigan United Traction Company Has Placed in Service, on Its Jackson-Grass Lake Line, Motors with Two 2400-Volt Armatures Mounted in One Frame and Connected in Series, Power Being Drawn from a Trolley Supplied by Mercury-Arc Rectifiers

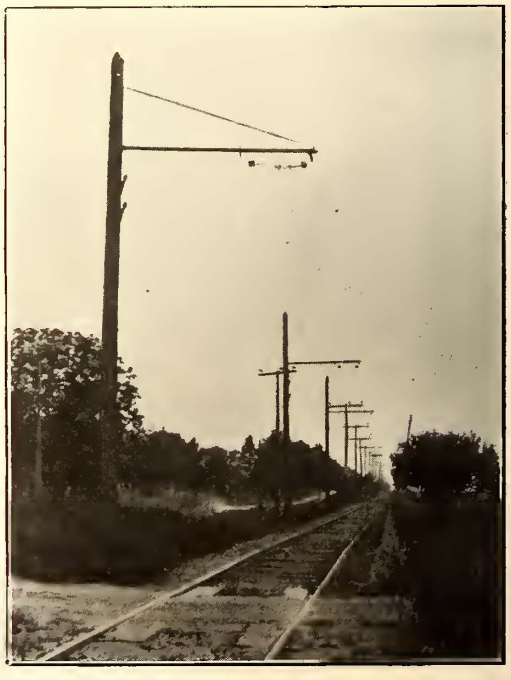
BY N. W. STORER, GENERAL ENGINEER WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Ten years ago a proposal to equip an interurban car with motors and control apparatus to operate from a 5000-volt direct-current trolley would have fallen on deaf ears. No one would for one moment have considered such a proposition seriously. But to-day such a car is in daily service and as the equipment has experienced several months of actual service, it is permissible to give a description of the principal features. The equipment was designed and built by the Westinghouse Electric & Manufacturing Company primarily for the purpose of determining, if possible, the practicable limit to which voltages for direct-current railways could be carried. Five thousand volts was selected as the initial limit, as this is high enough to make easily possible the collection of current for the largest locomotive from an overhead wire. It is also high enough to lessen the amount of line copper and the number of substations, and to secure a good load factor and efficiency with reasonable cost.

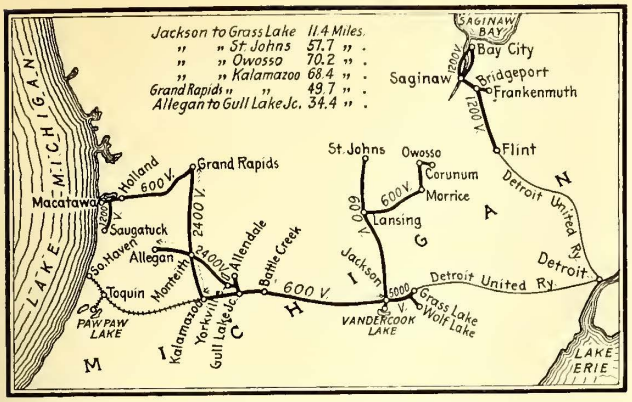
The initial experiments involved the design and construction of two 2400-volt motors and the necessary control equipment, which were mounted on a car and tested on the interworks railway at East Pittsburgh in the spring of 1914. The equipment was first arranged for series-parallel control with voltages of from 2400 to 3000 on the trolley. Then the two motors were connected permanently in series and the equipment operated at a trolley voltage of 4000, which was gradually increased until the equipment was finally tested with 7000 volts on the trolley.

The results were such that the company decided to place a complete four-motor equipment in service. Through the influence of the late W. A. Foote and Frank Silliman, who are well-known pioneers in the use of high voltages both for transmission and for traction purposes, J. F. Collins, vice-president of the Michigan United Traction Company, agreed to co-operate with the Westinghouse Company in the test, and he offered the use of a branch line extending from Jackson, Mich., to Grass Lake and Wolf Lake for the purpose of giving the equipment a test in service. This line is about 12 miles in length and the high-voltage section extends to Page Avenue, which is about 2 miles from the center of Jackson. The car must, therefore, operate over the 600-volt line within the city limits. The trolley line was reinsulated and space was allotted in the substation at Grass Lake for a mercury-arc rectifier equipment which was installed to furnish high-voltage current. A complete car equipment, consisting of four 100-hp. motors with control and auxiliaries, was installed under the direction of R. C. Taylor, superintendent of equipment, on one of the Michigan United cars, the completed car weighing approximately 40 tons.

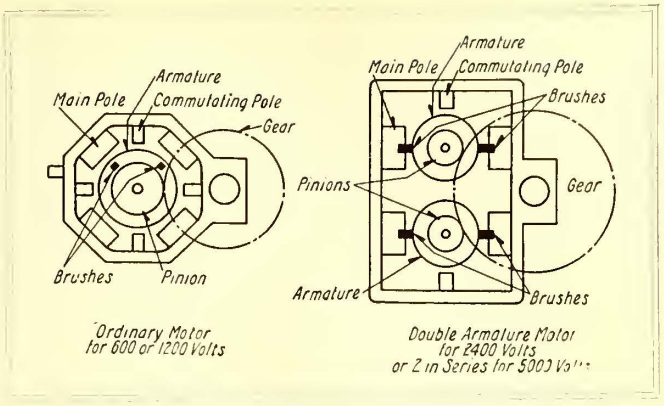
On June 1 of this year preliminary tests were begun after the regular service had been completed for the day. They continued for a few nights until it was certain the equipment was in proper condition, and the car was then put in daily service for the last two or three round trips between Jackson and the Lakes, which could be handled by a single car. Since that time the operation has been fairly regular for these trips, and up to date it has continued without a single interruption to the service due to the car equipment. It has not been necessary to change any detail in the equipment since service began, and the car has always been ready for operation when line and power were available. Considering the radical increase in voltage over



5000-VOLT D.C. EQUIPMENT—CARS AND OVERHEAD CONSTRUCTION ON GRASS LAKE (MICH.) LINE



5000-VOLT D.C. EQUIPMENT—MAP SHOWING VOLTAGE AND MILEAGE OF MICHIGAN UNITED RAILROAD LINES



5000-VOLT D.C. EQUIPMENT—COMPARISON OF STANDARD MOTOR AND 5000-VOLT MOTOR

anything previously undertaken and the small size of the motors, this result is remarkable.

MOTORS

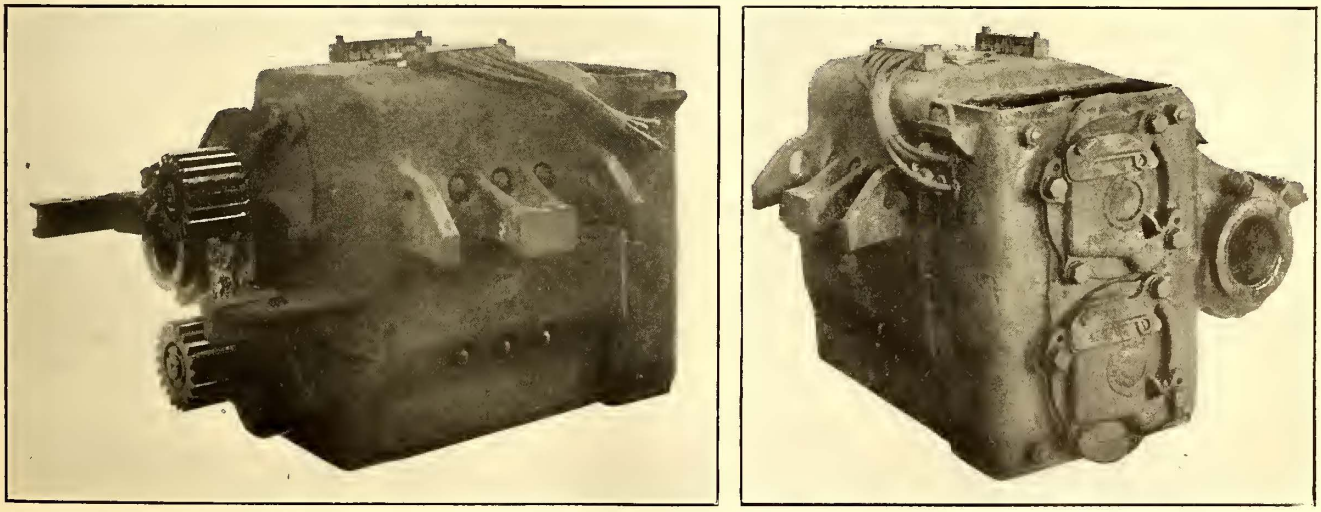
Of course, the most difficult part of the equipment would appear to be the motors. It is well understood that, in order to secure the maximum benefits from electrification, a railway must be able to operate not only locomotives but multiple-unit car service. Consequently, any system of electrification that hopes for recognition for heavy traction purposes must be suitable for operation on passenger cars. It is not so difficult to secure space for the necessary number of commutator bars and the creepage surface for insulating large locomotive motors for high voltages, but it has been a serious problem to secure these requisites for a motor of the size required for ordinary interurban cars without exceeding commercial limits for weight, cost and dimensions. For that reason the design of the motor was undertaken first as being the most difficult. One of the first of these is shown in the accompanying illustrations. This motor, it may be said, is on exhibition at the Panama-Pacific Exposition. The arrangement of parts is shown in section in the cut at the top of the next column.

The motor is known as the twin-armature bi-polar type and it has many advantageous features for high voltage work. A bi-polar design permits the use of double the voltage on a given commutator that is possible with a four-pole motor. The twin armatures make the weight but litttle more than that of a corresponding four-pole motor. Fewer field coils are required than are used with the four-pole motor, and the two armatures, being geared to the same axle, act as one unit and cut the pressure on the gear teeth in half. The two armatures are connected in series, and consequently, the voltage on each is reduced to lower limits. The form of motor lends itself readily to a very effective type of insulation, and the mechanical construction is simple and rugged.

The performance of the motors has thus far been all that one could ask. There has yet to appear the first defect in any motor that has been built. The commutation is sparkless, and the stability of the motor, as shown by its absolute freedom from flashing, is perfect. Large creepage surfaces are supplied, both on armatures and brush-holders, in order to give immunity from grounds. One characteristic that will assist in the maintenance of the insulation is the fact that the current is small, being only 30 amp. for each 100-hp. motor, and that only a few small brushes are required. Thus with the excellent commutation, there is very little wear either on brushes or commutators, and consequently the amount of carbon and copper dust originating in the motor is small. It is fully recognized that upon the permanence of the insulation depends the success or failure of the experiment, and this is something that time alone can determine.

CONTROL

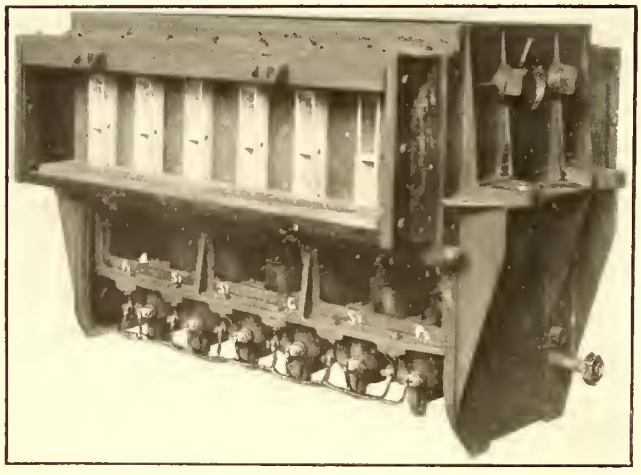
Next to the motors, the control is the most important feature of the equipment, since the switches must close and open the high-voltage circuits properly and must be insulated to stand continuously the maximum



5000-VOLT D.C. EQUIPMENT—FRONT AND REAR VIEWS OF TWIN MOTOR

voltage to ground in all kinds of weather. In order to secure a relatively large number of breaks in series without increasing the number of switches unduly, each switch is made with two breaks in series.

High-Voltage Switches—The switches are very similar to the standard Westinghouse electro-pneumatic switches, but have some special features, due to the small current and high voltage. The main ideas governing the design of the switch group were safety and reliability in opening the high-voltage circuits and most effective distribution of insulation. The design adopted has both of these desirable features and, in addition, is extremely simple and rugged. The frames of the switch group are grounded and the interlock wiring is thoroughly protected, in order to isolate the high-voltage current from the control wiring and master controller. One of the novel features in the switch is the use of an "arc splitter," consisting of a piece of soapstone placed in front of the switch jaws in the path of the arc. The effect of the magnetic field is to blow the arc against this along its entire length until the arc is broken. This greatly increases the length and at the same time chills the arc, and the result is highly satisfactory. The operation of the switch groups has been fully as reliable as that of the motors. The circuits are opened



5000-VOLT D.C. EQUIPMENT—SWITCH GROUP WITH COVER REMOVED

with ease and the appearance of the switches shows scarcely a trace of their having been in service.

Starting Resistance—Practically the only other part of the control equipment that is subject to the line voltage is the starting rheostat. This is composed of cast alloy grids in a number of frames. These frames are insulated from ground by triple insulation and from each other by double or quadruple insulation. This insulation has thus far proved entirely adequate.

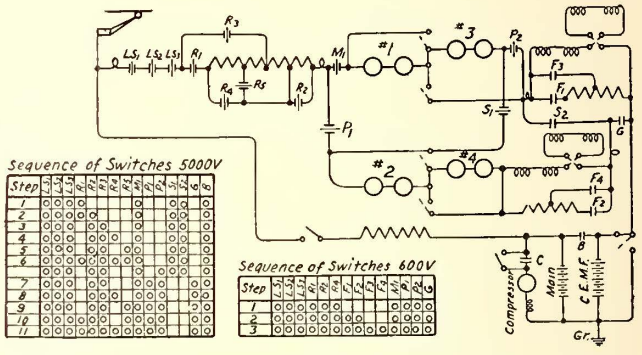
Changeover Apparatus—Inasmuch as the equipment is required to operate through the city of Jackson on 600 volts, a changeover switch is provided which connects the four sets of armatures in parallel. This apparatus consists of two triple-pole, double-throw disconnecting switches with the contacts mounted on porcelain insulators immersed in oil. They are connected together so that they are operated by a single lever, which also operates a small drum that changes a few of the contactor magnet connections.

Low Voltage Switch Group—One group of switches is provided to effect the necessary changes on the ground side of the equipment and the auxiliaries. This is a standard group which is used ordinarily for small 600-volt car equipments, and it needs no description.

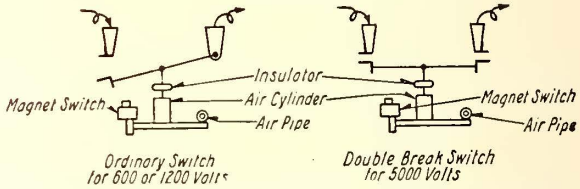
Reverser—A standard type of electro-pneumatically operated two-motor reverser is used to reverse the connections of the motor fields, the fields being always connected on the ground side of the armatures so that no extra insulation is required.

AUXILIARY EQUIPMENT

Not of least importance is the apparatus needed for furnishing current for control, lights and air-compressor motor. It is well known that the small high-voltage machine known as the dynamotor which is used for this purpose on 1200-volt and 1500-volt equipments is the least reliable part of the equipment. This is necessarily the case, since the usual compound winding on the field makes it far more susceptible to flashing troubles, and its small size makes the insulation problem and the armature winding much more difficult. While these 1200-volt and 1500-volt equipments are giving excellent results, it was felt that it would be not only very desirable, but necessary, to eliminate the dynamotor from higher voltage equipments, especially for cars, since it would be quite reasonable to expect



5000-VOLT D.C. EQUIPMENT—SCHEMATIC CONTROL DIAGRAM



5000-VOLT D.C. EQUIPMENT—SCHEMATIC DIAGRAM OF DOUBLE BREAK SWITCH

the difficulties to be multiplied with the voltage. For this reason the entire auxiliary equipment of the 5000-volt car is operated at 150 volts. The scheme adopted is as follows:

A 150-volt storage battery, to which all of the auxiliaries are connected, is placed in the main motor circuit between the motors and ground. All of the main motor current, therefore, either goes through the battery and charges it, or through the auxiliary circuits which may be connected to the battery at the time the motors are working. By the application of a simple device, the air compressor does practically all of its work when the main motors are operating, and thus simply diverts a part of all of the main motor current as required, so that the battery is relieved from furnishing the current to the compressor motor and at the same time does not receive the high charging currents that would otherwise be imposed on it during acceleration. The battery has thus a very light duty to perform and can be made up of small cells. A set of counter-emf. cells parallels the battery during charging periods to prevent overcharging and excessive charging rates.

The voltage of the battery for such an equipment is determined by the amount of power required for the

auxiliaries. The average current required by the auxiliaries should, in order to leave a satisfactory margin, be not more than 80 per cent of the average current taken by the main motors. The use of 150 volts for the battery in this case indicates that the auxiliaries are expected to use less than 3 per cent of the total power taken by the car.

The main schematic wiring diagram is shown in the line cut on page 662 in which the double-break switches are indicated by three parallel lines across the circuit and the single-break switches by two lines. It will be seen that twelve of the former and ten of the latter are required for this equipment. Considering the fact that these switches control not only the main motor circuits for both 5000-volt and 600-volt operation, but all of the auxiliaries as well, the equipment is very simple. Very satisfactory operation on 600 volts is secured by shunting the fields of the motors.

As before stated, power for operating this car is obtained from three mercury-arc rectifiers, which receive power from a 60-cycle, three-phase system and are operated in series. Connecting the three phases of the system in series gives not only a smooth current wave, but balances the load on the three phases of the transmission system. This is believed to be the first time mercury-arc rectifiers have been used in this way to furnish so much power for high-voltage work.

CONCLUSION

It is fully recognized that the tests have not continued long enough to draw any definite conclusions as to the future use of 5000-volt direct current for railways. All that can be stated at this time is that the preliminary tests are extremely satisfactory, and the fact that no difficulties in the car equipment have appeared to date indicates that there is ground for the hope that the 5000-volt direct-current railway is a possibility. In any case the amazing fact remains that a commercial car equipment of 100-hp. motors has been designed, built and tested in commercial service and has a perfect record for the operation to date.

Second Philadelphia Report Issued

Department of City Transit Presents Modifications in Recommendations—Record of Methods Employed in Traffic Survey Is Included

The Philadelphia Department of Public Works has issued the second report of A. Merritt Taylor, director of the department of city transit, outlining the present status of new subway and elevated construction in Philadelphia and calling attention to various detailed modifications and enlargements of the original recommendations. This report is for the calendar year 1914. Abstracts of the preceding report, containing the salient construction, traffic and financial points of the enlarged Philadelphia system, were published in this paper on Aug. 9 and Oct. 4, 1913, and Jan. 10, 1914.

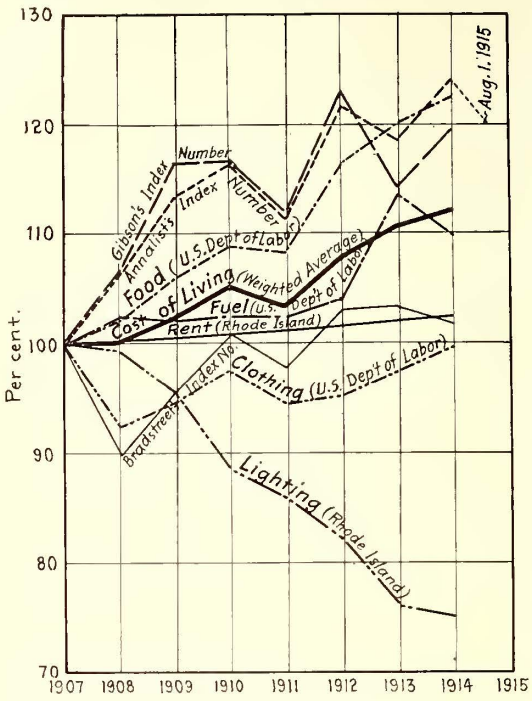
The 1914 report prints in full in Appendix A the co-operative program for transit development that was agreed to on May 27, 1914, by the Philadelphia Rapid Transit Company, providing among other things that when the city builds the three high-speed lines recommended for immediate construction at a cost of approximately $46,000,000, the Philadelphia Rapid Transit Company will equip them at a primary cost of about $12,000,000 and operate them in conjunction with its present system. The transit company has stated that it will have to rely upon the Union Traction Company to aid in securing such funds as will be required for the normal extension of the existing system, but the latter company has not agreed to this proposition and has informally expressed its dissent. If the Union stockholders refuse to accept the terms of the program, both they and the Philadelphia Rapid Transit Company, Mr. Taylor states, should forfeit the protection afforded them by the co-operative program against loss of net income diverted to the high-speed lines and against loss of exchange ticket revenue, and the city would be justified in establishing the proposed high-speed system with an independent operator.

The modifications that have been found desirable since the submission of the transit commissioner's report on July 24, 1913, include the following items: (1) Location of west side of delivery loop in Broad Street instead of Fifteenth Street to save distance and curvature and avoid serious engineering problems. (2) Provision of a connection on the loop for the Parkway subway, which should be built in the near future, this provision involving an extra expenditure of about $1,750,000. (3) Designing of North Broad Street subway below Ridge Avenue so as to allow space for the proposed subway to be built by the Pennsylvania Railroad, making a connection between the New York division and Broad Street Station partially via Broad Street. (4) Location of south side of delivery loop in Locust Street instead of in Walnut Street in order to enlarge the central business district, allow a station to be located between Chestnut and Walnut Streets and permit more favorable grades and curves. (5) Formulation of alternative elevated and subway locations for branches of the north Broad Street subway. (6) Provision under the co-operative program for free transfers in a forward direction between the surface system of the Philadelphia Rapid Transit Company and all high-speed lines at every station on the latter where surface lines intersect. (7) Determination that, if an independent operator is secured for the high-speed lines, such a corporation must build and equip the Camden tube.

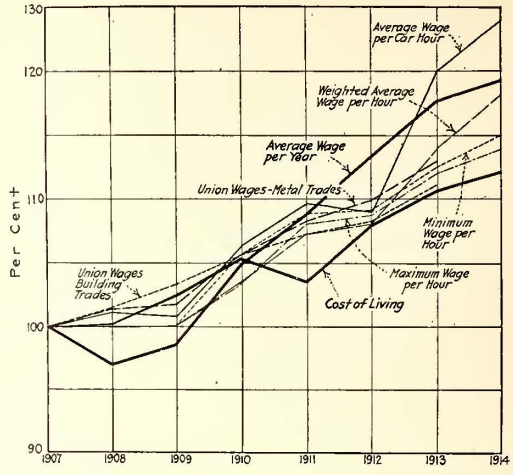
In order to fix the relation of the 8-cent exchange system and its elimination to the problem of rapid transit development, the department of city transit has made an exhaustive investigation of the limits imposed by the system and of its application to various parts of the city. In this connection the range of travel for 5 cents, 8 cents and 10 cents was determined for seventy-two sections of the city, covering practically all settled parts. The department has added to its report in Appendix E a series of maps illustrating the ranges of travel for these fares from each separate section to all others, thus showing the accommodations provided and collecting all cases of discrimination in the application of the 8-cent transfer system.

Appendix C is undoubtedly the one of most general interest to electric railway operators, for herein is presented a detailed record of all the methods employed in collecting the traffic survey and other information and in working out the enlarged system described in the 1913 report of the transit commissioner. For example, calculations are inserted to show how the figure of 179 cars passing the maximum load point for the maximum hour was obtained, as well as ratios of 83.5 per cent for cars required in operation as compared to those passing the maximum load point at the maximum hour and of 40 per cent for the service factor used in determining car-hours. With its illustrative tables and maps, this appendix constitutes an admirable and lucid description of the detailed work necessary in traffic surveys.

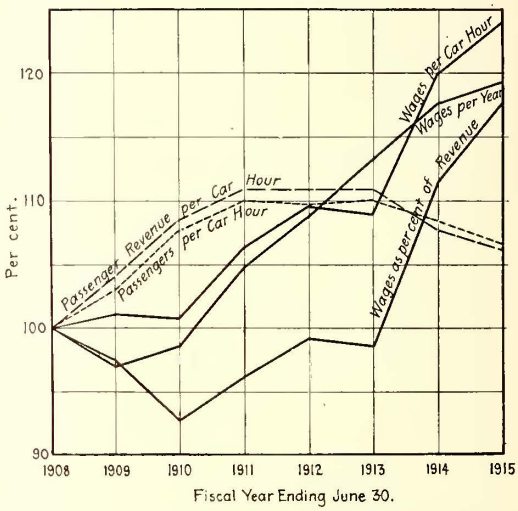
Appendix B contains the estimated financial results to the city from the operation of the recommended rapid transit lines, both under the proposed arrangement with the Philadelphia Rapid Transit Company and with an independent operator. Appendix D is a reprint of the Pennsylvania Supreme Court Case No. 691 in re the city's borrowing capacity.



Analysis of Living Costs by Years

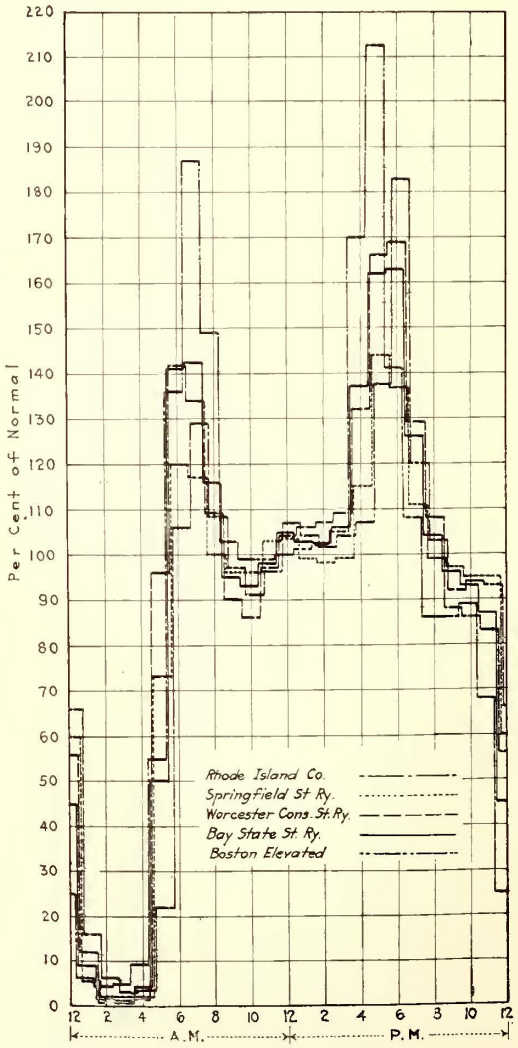


Comparison of Wages and Living Costs by Years

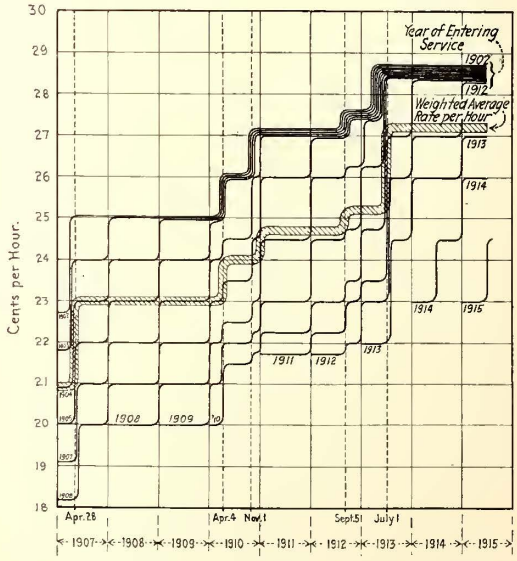


Fiscal Year Ending June 30.

Comparison of Wages and Unit Revenue by Years



Cars in Operation at Different Hours of the Day



Comparison of Average and Individual Wages by Years

Charts exhibited in Rhode Island Company wage arbitration hearings (originals on sheets about 17 in. x 22 in.) showing labor conditions on its system. See editorial comment on first page. These charts were prepared by Prof. A. S. Richey of the Worcester (Mass.) Polytechnic Institute.

Graphs, Charts and Statistics as Aids to Administration*

Critical Discussion is Made of These Devices for Keeping Executives in Touch with Operations—Specimen Comparative Forms are Included in This Article

BY E. C. STOTHART, CHARLESTON, S. C.

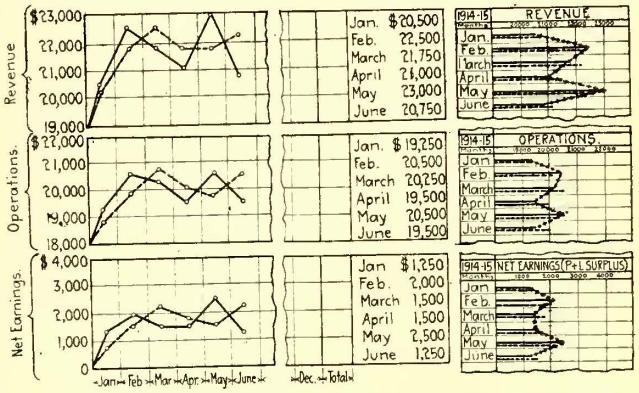
The basic terms used in this article may be defined as follows: "Graphs" are statements of results written or delineated in a vivid, forcible and striking way, "a picturization of facts." "Charts" are maps of results or facts, similar to but more complex than graphs. "Statistics" are collections of facts tabulated numerically or a group of facts brought out by collecting numbers. The term also applies to the science which treats of subjects as elucidated or illustrated by enumeration of facts.

Graphs, charts and statistics all serve to bring the executives of an organization in touch with the operations of its various branches where a personal contact would be a physical impossibility. They convey quickly, accurately and intelligently the results of each department and the organization as a whole. Many executives, including heads of departments or branches, know that they are not getting all the profits or returns they should get, and yet are unable to put their fingers on the weak spots, owing to lack of condensed and comprehensible data. In nine cases out of ten there is something wrong with the organization of the business. Possibly there is no one prominent fault, but simply room for general improvement in organizing and standardizing the plant, machinery, equipment, office, sales and working forces, etc. Sometimes there are defects in the structural organization—that is, in the relations of the concern to its customers or competitors or to the sources of its raw materials.

In order that the chief executive may determine whether the organization is efficient and the results the best attainable, or whether there are leaks which must be remedied in order to obtain proper returns on investment, he must be in possession of all data pertaining to the operation of the organization. These must necessarily be in concise yet comprehensible form, as the present-day business executive's time does not permit his searching through a volume of detail. The results of operations of each and every department must be in his possession as soon as possible after the expiration of the period under consideration, and in such form as to allow a thorough understanding of conditions with the least possible delay. The individual employees and departmental heads should therefore exert every effort to formulate and devise such reports as will best serve the purpose of the executive, showing in unmistakable form data essential for economic operation but eliminating all superfluous and confusing details.

For the purpose of comparing reports compiled in graphic, chart and statistical forms, the accompanying illustrations are submitted. Form I shows fluctuations in revenue, operations and net earnings in both chart and graph form, as well as the ordinary data. While the illustration covers but one division for the current period, by use of different colored inks and enlargement of forms the same could show as many divisions as necessary for any comparative periods. It should be noted that the graph can be converted into chart form by joining the points, as shown in the right-hand section. The chart shows fluctuations in a more connected manner than does the graph, the comparisons of the latter being more difficult to follow.

The data in Form I are probably the first to be observed by executives, as they are able to determine therefrom whether or not the business as a whole is making returns commensurate with the investment involved. Yet from this form they are unable to ascertain whether different branches are obtaining efficient results, and similar subsidiary data may be necessary. Moreover, the fact that a profit has been effected does not suffice, the questions foremost in the mind of the executive being, "What can be done to increase the profits? Are there leaks in operation? If so, where?



ADMINISTRATION AIDS—FORM I—SHOWING CHART, ORDINARY EXPRESSION AND GRAPH FOR REVENUE, OPERATIONS AND NET EARNINGS (PROFIT AND LOSS SURPLUS)

Can revenues from transportation, sales, etc., be increased, and if so, how?" In answering these and similar questions, however, probably the first thing to consider would be the cost of operation, for most frequently restricted or decreased profits can be attributed to increased and very often unnecessary expenditures, rather than to limitations of revenue. Hence a comprehensible statement of operating costs is essential, for by it the source of loss can be readily discovered and remedied.

Form II shows both the ordinary and the graphic style of presenting operating costs. The former, taken from the trial balance, is used by clerks in preparing graphs for presentation to executives. The expenditures in dollars and cents represent nothing of value, so far as results are concerned. It is the standard set on unit costs that reveals the true conditions. While expenditures might show an increase, the car-miles operated determine whether or not the increase is warranted. While the unit costs per car-mile are shown only for total operations and general accounts, the subaccounts would be shown in making up the regular completed statement. This comparative statement may be used for any and all divisions, and also for any

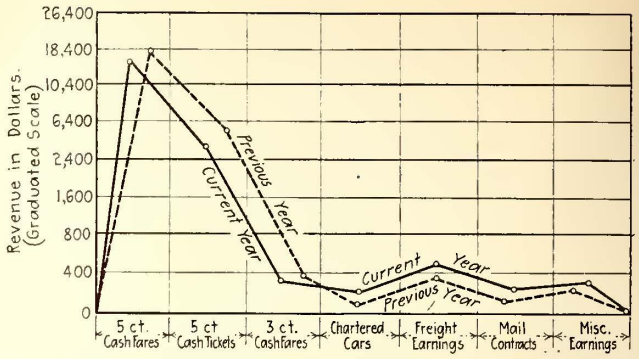
*Abstract of prize paper in American Electric Railway Accountants' Association correspondence course. For notice of award see ELECTRIC RAILWAY JOURNAL of Sept. 18, 1915, page 594.

periods, by inserting the proper titles of accounts and changing unit cost requirements, such as cost per 1000 cu. ft. and cost per kilowatt-hour for the gas and electric divisions respectively. It will be noted that while the above statement shows comparisons in dollars and cents and unit costs, it does not give increases and decreases in percentages, which are by far the most comprehensible. Such information could, of course, be obtained by inserting additional columns, but as a rule it is shown on statistical data sheets.

The cost of current would enter into this statement, but as railway companies do not usually operate power stations for production of current for car operation exclusively, it may be assumed that current is purchased from the electric division at production cost. The cost of current production in such cases would be taken up in considering operating costs of the electric division, and a pro-rata share of the expense based on the output charged to the railway.

The graph section of Form II can be adapted to any or all divisions by merely substituting titles of accounts and rescaling, and also to any number of years by allowing additional account spaces for the number required. With the graph form comparisons of months, periods and years for each account are possible and are more comprehensible than the mass of figures necessary to produce the same results. The increases and decreases can be determined by a casual glance at the graph, whereas in ordinary figure form a careful study of each set of figures is necessary. In compiling data for the graph the clerk relieves the executive of detail, for in order to obtain essential data from a mass of figures the executive must form a mental graph of conditions.

To save the executive the trouble of going through the comparative blocks shown in the graph of Form II, to determine in which accounts losses were sustained and gains affected, check (√) columns are provided, wherein the clerk preparing the graph places checks opposite the accounts showing increases. The executive is then in position to call for analyses of accounts so as to compare expenditures made for the current period with those of preceding corresponding periods. An analysis of certain accounts might well accompany the general graph. By this method leaks in operation are



Class of Revenue	1914	1915	Change
5 cent cash fares	$16,750	$15,125	—$1,625
5 cent cash tickets	5,425	4,050	— 1,375
3 cent cash fares	400	375	— 25
Chartered cars	200	150	— 50
Freight earnings	400	500	+ 100
Mail contracts	150	200	+ 50
Miscellaneous earnings (rents, etc.)	175	250	+ 75
Gross earnings	$23,500	$20,650	$2,850

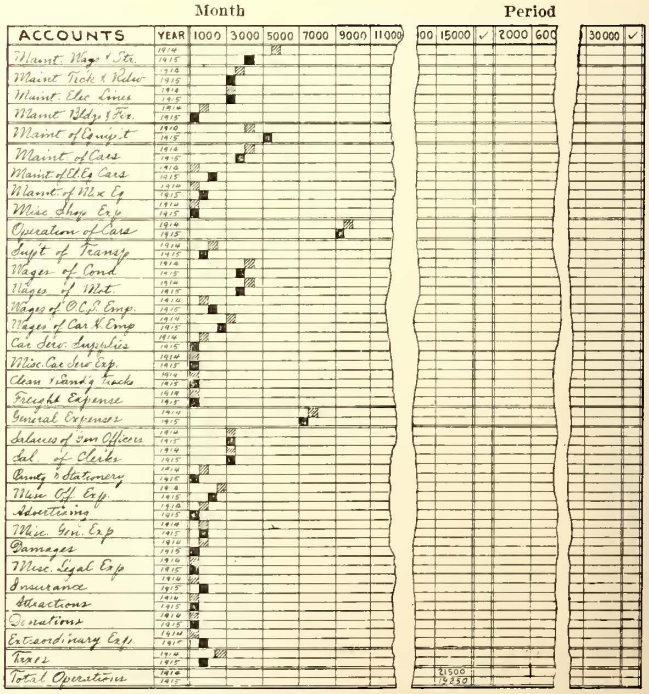
ADMINISTRATION AIDS—FORM III—SHOWING COMPARATIVE CHART OF REVENUE DETAILS FOR RAILWAY DIVISION AND ORDINARY FORM OF DATA USED

very frequently discovered, which enables the executive to confer with heads of departments and discuss intelligently the accounts wherein savings might be effected. The data herein involved might also be shown in chart form, but where so many accounts are concerned, the chart would be rather complex and very difficult to trace.

If after the investigation of operating costs savings are not effected to increase profits sufficiently, it becomes necessary to observe the sources of revenue in order to determine wherein lies the trouble. Form III will assist very materially in locating such sources of loss. This form shows where increases and decreases occur, and assists executives in determining the most effective course to pursue to increase revenue from the various sources—such as more rigid inspection, both regular and special; offering of prize redemption coupons to passengers; changes in schedule, etc.

Having now determined and corrected the sources of decreased profits by investigation of revenues and opera-

1914 COST PER CAR MILE	1915 COST PER CAR MILE	MONTHS 1914	MONTHS 1915	ACCOUNTS	PERIODS 1915	PERIODS 1914	1915 COST PER CAR MILE	1914 COST PER CAR MILE
.171	.109	3350 00	2500 00	Maint. of Way & Structures				
		1750 00	1050 00	Maint. of Track & Roadway				
		1500 00	1300 00	Maint. of Electric Lines				
		500 00	150 00	Maint. of Bldgs & Fixtures				
128	142	2800 00	3250 00	Maint. of Equipment				
		2400 00	2000 00	Maint. of Cars				
		250 00	750 00	Maint. of Elec Equip Cars				
		100 00	300 00	Maint. of Misc Equipment				
		50 00	200 00	Misc Shop Expenses				
366	327	8000 00	7530 00	Operation of Cars				
		600 00	500 00	Supt of Transp				
		2450 00	2250 00	Wages of Conductors				
		2450 00	2250 00	Wages of Motormen				
		450 00	750 00	Wages C.C. Car Emp.				
		1350 00	1100 00	Wages Car House Emp				
		300 00	150 00	Car Service Supplies				
		150 00	250 00	Misc Car Service Expense				
		50 00	150 00	Cleaning & Sanding Tracks				
		200 00	100 00	Freight Expense				
272	.228	5950 00	5250 00	General Expenses				
		1200 00	1200 00	Salaries of Gen'l Officers				
		1450 00	1500 00	Salaries of Clerks				
		400 00	250 00	Printing & Stationery				
		900 00	750 00	Misc Off Expenses				
		400 00	200 00	Advertising				
		450 00	400 00	Misc General Expense				
		300 00	250 00	Damages				
		100 00	50 00	Misc Legal Expenses				
		250 00	300 00	Insurance				
		200 00	100 00	Assessments				
		50 00	150 00	Donations				
		250 00	100 00	Extraordinary Expenses				
.036	.033	1000 00	750 00	Taxes				
.983	.839	21500 00	19250 00	Total Operations				
—	—	21875	22950	Car Mileage				



ADMINISTRATION AIDS—FORM II—SHOWING ORDINARY AND GRAPHIC FORMS OF STATEMENT OF OPERATION

tions, the executive has other matters requiring attention. Are efficiencies being obtained at the power station, gas works, etc.? Are electric lines and mains in bad condition, resulting in line loss and leakage? Is the company overstocked on materials and supplies that will deteriorate, and can such stocks be reduced and the money involved be expended to better advantage? In this case, of course, there is another question to be considered—namely, if stock materials can be purchased at a declined rate, will the saving between purchase price and price when market is up be equivalent to the revenue derived from the investment of a like amount in a different way?

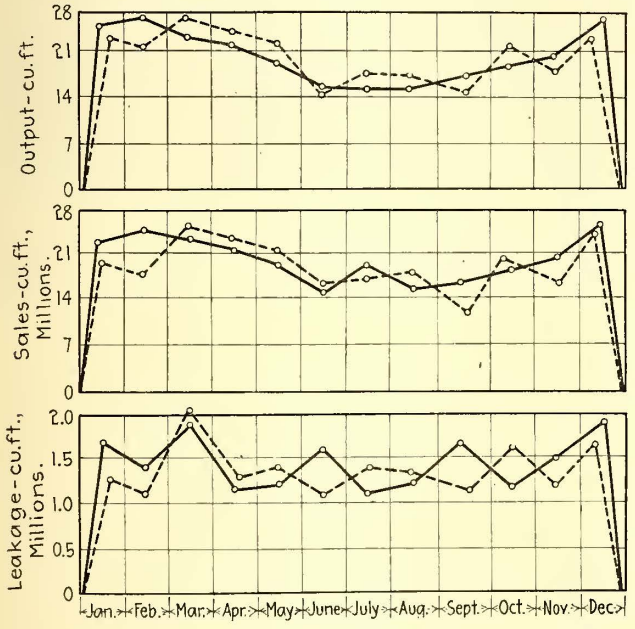
The solutions to the foregoing questions quite frequently might be brought to the attention of the executive more forcibly by means of charts or graphs. For example, Form IV shows a valuable chart of output, sales and leakage, which may be used for both gas and electric divisions. This can also be used for showing purchases, disbursements and balances of store stock or other material.

The uses to which charts and graphs might be put are so numerous that one might continue to compile them and explain their advantages indefinitely. Before passing to the subject of statistics, however, the writer will only mention a few mechanical charts, such as graphic meter charts, pressure gage charts, steam and flue gas charts, stack draft charts, recording watt and volt charts, feed-water temperature and rate of feed charts, car speed and mileage charts, etc., all of which are of inestimable value to the operating departmental heads as efficiency guides.

Statistics comprise statements exhibiting results obtained by process of elimination—that is, the boiling down of a voluminous report of details to a concise and intelligible statement of facts. To an executive the statement that $15,000 was spent on car operation, electric production, gas manufacture, etc., has no value unless he knows the number of car-miles operated, the kilowatt-hours of electricity produced and the cubic feet of gas manufactured. Nor does the statement that $20,000 was received from transportation and sale of gas and electricity mean anything, unless he has the car-miles and the number of passengers carried, etc. With information as above, he is in a position to determine the revenue and the cost per car-mile operated and passenger carried, per 1000 cu. ft. of gas and per kilowatt-hour of electricity. A comparison of these results with standards previously set shows whether or not there is any improvement. A statistical statement for a railway division that embodies information essential for a comparison with standards is one containing on the left-hand side four columns for a particular month, showing the month's record in the preceding year, in the current year, the increase or decrease in dollars, and the increase or decrease in percentage, and on the right-hand side four similar columns reversely arranged for a series of months. The center of the statement contains the following list of miscellaneous statistics:

Passengers (revenue).
Passengers (mail carriers).
Passengers (complimentary).
Passengers (employees).
Total passengers carried.
Passengers (transfers).
Per cent of transfers to passengers carried.
Total car-hours.
Average car-hours per day.
Number eighteen-hour cars operated.
Average number eighteen-hour cars per day.
Average passengers per day.
Average passengers per car per day.
Car mileage (passenger and freight).
Car mileage (chartered cars).
Total car mileage
Average car mileage per day.
Average car mileage (chartered cars).
Average car mileage per eighteen-hour car.
Operating expenses per car-mile.
Net earnings per car mile.
Platform expenses per car-mile.
Earnings per revenue passenger.
Operating expenses per revenue passenger.
Net earnings per revenue passenger.
Earnings per passenger.
Operating expenses per passenger.
Net earnings per passenger.
Platform expenses per passenger.
Daily average earnings (passenger and freight).
Daily average earnings (other sources).
Daily average earnings from operation.
Daily average operating expenses.
Daily average net earnings from operation.
Percentage of operating expenses to earnings (including taxes).
Percentage of operating expenses to earnings (excluding taxes).
Percentage of claims and expenses of claim department to earnings from operation.
Cost of power per kilowatt-hour used.
Kilowatt-hours used.
Kilowatt-hours used per car-mile.
Cost of power per car-mile.
Miles of track operated.
Car-miles per mile of track.

This statement gives comparative statistical data for months and periods for both current and preceding years, showing increases and decreases and percentages of same, the percentages being the basis of arriving at accurate and definite conclusions. Since it shows only the results obtained by the organization as a whole, similar statistical statement may be made giving the results of each individual branch or department. The statement described, however, is considered sufficient for executives having general supervision of entire operations. While the information appearing thereon is deemed enough, additions and omissions might be made according to the requirements of the executive. Statistics of a similar nature might be prepared for gas and electric divisions.



1914	Output in cubic feet	Sales in cubic feet	Leakage in cubic feet
January	25,300,000	23,700,000	1,600,000
February	26,200,000	24,800,000	1,400,000
March	24,800,000	22,900,000	1,900,000
April	22,700,000	21,500,000	1,200,000
May	20,500,000	19,100,000	1,400,000
June	19,750,000	18,200,000	1,550,000
July	18,200,000	17,000,000	1,200,000
August	16,400,000	15,100,000	1,300,000
September	17,500,000	15,800,000	1,700,000
October	18,600,000	17,400,000	1,200,000
November	20,450,000	18,950,000	1,500,000
December	27,500,000	25,750,000	1,750,000
Year	257,900,000	240,200,000	17,700,000

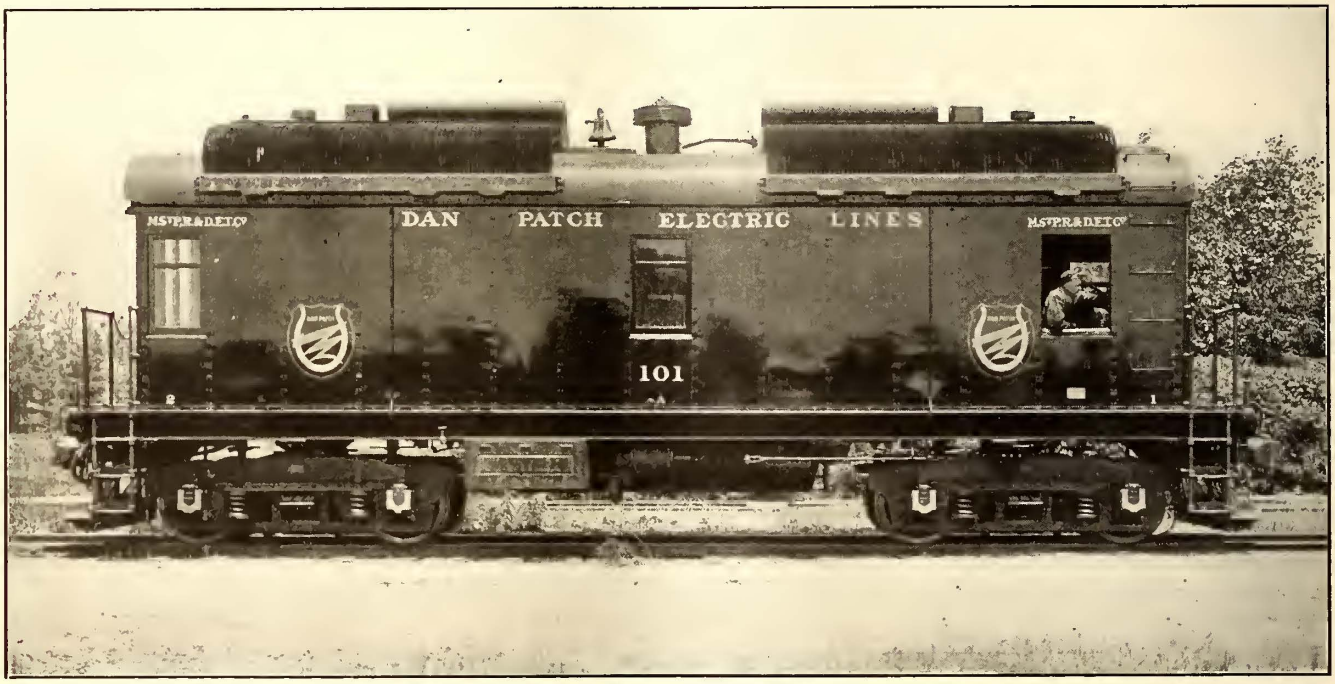
ADMINISTRATION AIDS—FORM IV—SHOWING CHARTED AND ORDINARY GAS DATA, SAME FORM BEING APPLICABLE TO STOCK ACCOUNTS

An English contemporary, in commenting on the fact that most of the railway lines between France and Belgium intersect the trenches and are thus prevented from running regular trains, states that the German army is operating the lines with storage-battery cars run singly, the purpose being to remove the wounded from the front and to bring supplies to the men in the trenches.

Gas-Electric Locomotives for Dan Patch Line

This Railway, Which Is the First to Have Been Operated Throughout with Gas-Electric Equipment, Has Recently Placed in Service Three 60-Ton Locomotives, the Largest Machines of the Type Ever Built

The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, operating what is popularly know as the "Dan Patch" electric line, has recently placed in commission three 60-ton gas-electric locomotives for freight, passenger and terminal service, these being the largest machines of the type ever built. They are somewhat similar in design although more powerful than the 57-ton gas-electric locomotive which has been in successful operation for the past year on the company's lines from Minneapolis to Mankato, Minn., and the four gas-electric locomotives, together with the thirteen gas-electric motor cars which the railway has purchased to date, constitute a complete equipment for mixed traffic which is unique in the history of interurban railroading. The Dan Patch line, in fact, is said to be the first railroad in the world to have been operated entirely with gas-electric service.



"DAN PATCH" LINE LOCOMOTIVES—GENERAL VIEW OF 60-TON GAS-ELECTRIC LOCOMOTIVE

Characteristics of Line and Traffic

The line extends south from the company's terminal building in Seventh Street, Minneapolis, to Mankato, a distance of 107 miles. About midway of the line a branch runs northeast from Northfield to Randolph, 7 miles distant. Another extension is contemplated from Fairibault southeast to Albert Lea, Dodge Center, Rochester and beyond, having Dubuque, Iowa, as its objective terminal point. The fine rolling section of Minnesota thus traversed, with productive grain fields, dairy and truck farms, and numerous thriving towns and cities of varied industrial activity, is one of the most prosperous in the State. The territory presents few difficulties in road construction, the severest grade on the present line being 2 per cent.

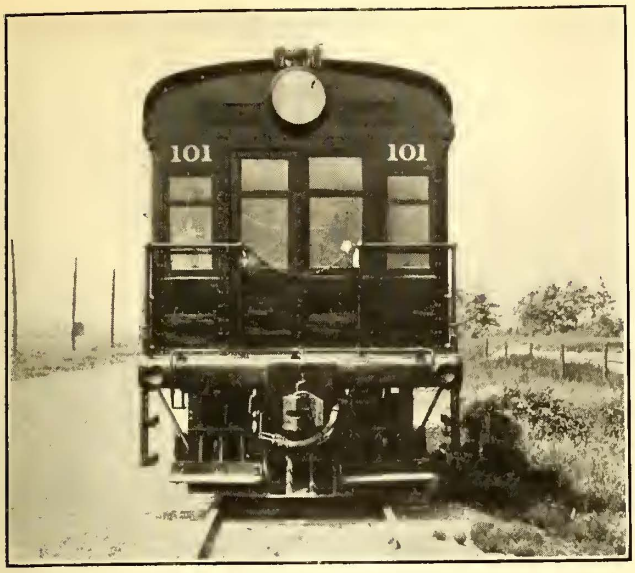
The roadway was built and improvements are being constructed with a view to permanent stability, reinforced concrete being frequently used in the work. Substantial stations, similar to those used by steam railroads, are located at the various cities and towns along the route, and smaller stations have been erected every few miles at rural stops to afford protection to the traveling public from inclement weather.

About 25 miles south of Minneapolis, at Orchard Gardens station, several thousand acres of farm land have been divided into 5-acre and 10-acre tracts by the company, and these are being sold to residents of Minneapolis and St. Paul, many of whom have erected houses and travel to and from their places of business in the city each day on the railway. There are also many attractive lakes along the route, affording excellent facilities for boating, bathing and fishing, and bringing thousands of city dwellers out into the open country during the summer months. Antlers Park, a summer resort and recreation park 30 miles south of Minneapolis, is owned and operated by the traction company.

Four through trains daily each way, one of which is a limited parlor-car train, constitute the normal passenger schedule of the road. The limited train makes the run of 107 miles, including four stops, in three hours and twenty-five minutes, while the other trains require four hours and five minutes for the trip. This service is supplemented by local trains between certain points of the line and the terminals, and by excursion trains during the summer season as occasion requires. One 70-ft. gas-electric motor car, seating eighty-nine passengers, normally makes the run. When travel is somewhat heavy a trailer is added, and for excursions and extra heavy traffic a train is made up of trail cars drawn by a gas-electric locomotive.

Locomotive Power Plants

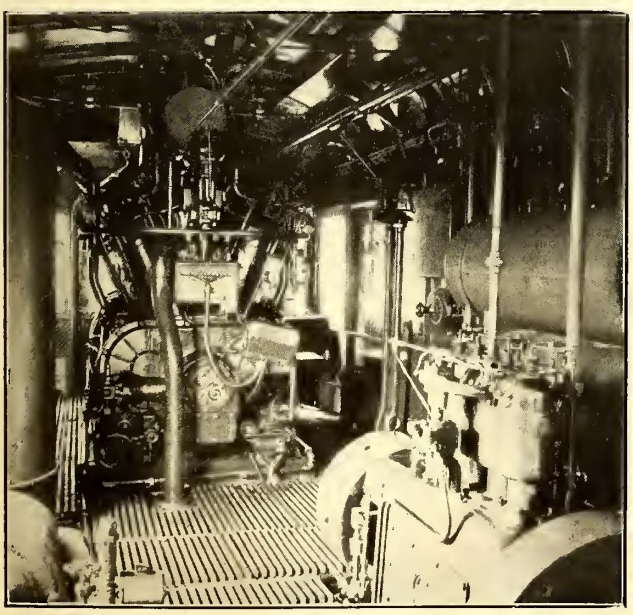
The new 60-ton locomotives are double ended, being built with the box type of cab extending nearly the en-



"DAN PATCH" LINE LOCOMOTIVES—END VIEW

tire length of the underframe and having all the weight on drivers. The wheels are 33 in. in diameter, and each locomotive is equipped with four 100-hp. motors. The truck clearances allow for 100 ft. minimum radius of curvature. The power plant consists of two 135-kw. generating sets similar to the one used in the gas-electric motor cars, only one engineer being required for its operation. The locomotives were designed and constructed complete by the General Electric Company.

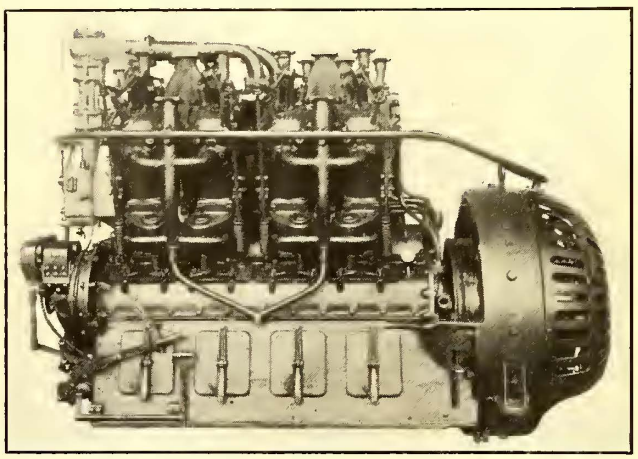
Each of the two gas-electric generating sets for the power plant equipment is composed of a 175-hp., 550-r.p.m., eight-cylinder, 4-cycle gasoline engine of the "V" type, which is direct-connected to a 600-volt, commutating-pole, compound-wound electric generator with an outboard bearing supported by brackets bolted to the magnet frame. The cylinders are 8-in. bore and 10-in. stroke. Ignition is accomplished with low-tension magnetos and the sets are started by air pressure, in the same way as in the gas-electric motor cars, with the additional feature that after one set is running, the second may be started electrically from the first. The control is so arranged that either one or both of the generating units may be used to operate the locomotive from either end, in accordance with the needs of the trailing train load. Compressed air for starting is taken from the main reservoirs of the air-brake system, these being built with surplus capacity. The two main single-cylinder air compressors which are driven from the crankshafts of the main engines have a displacement of 22.5 cu. ft. of free air per minute at the rated speed and are fitted with automatic governors to maintain a constant pressure.



"DAN PATCH" LINE LOCOMOTIVES—INTERIOR OF CAB

Great flexibility of control and economy of operation result through electrical transmission of the energy. The engines can rotate at normal speed irrespective of the speed of the locomotive and deliver their maximum power at all times, a feature of great advantage on grades, in case of snow storms, or other emergency conditions involving sudden, heavy current demands.

The locomotive is provided with an auxiliary gas-electric set to furnish power for lighting the cab, headlights and train coaches, and for pumping an initial charge of air to fill the tanks and start the main engines. This set is started by hand. It consists of a vertical, 750 r.p.m., four-cylinder, 4-cycle gasoline engine, which is direct-connected to a 5-kw., 65-volt, commutating-pole, compound-wound, electric generator. The cylinders are 3-in. bore and 6-in. stroke, and ignition is



"DAN PATCH" LINE LOCOMOTIVES—OPERATING SIDE OF EIGHT-CYLINDER, GAS-ELECTRIC GENERATING UNIT

effected by a high-tension magneto. The air compressor on the 65-volt circuit is of the two-cylinder, motor-driven railway type, and has a piston displacement of 25 cu. ft. per minute when pumping against a tank pressure of 90 lb. per square inch.

Air for all compressors is taken from the cab interior through screens and is delivered to the three reservoirs, each 87½ in. x 18 in., installed at one side of the cab in the center and connected in series, thereby affording an opportunity for radiation of heat and condensation of moisture before entering the brake cylinders. After starting the main engines, the governor cuts out the motor-driven set, and all air is supplied by the air compressors on the main engines.

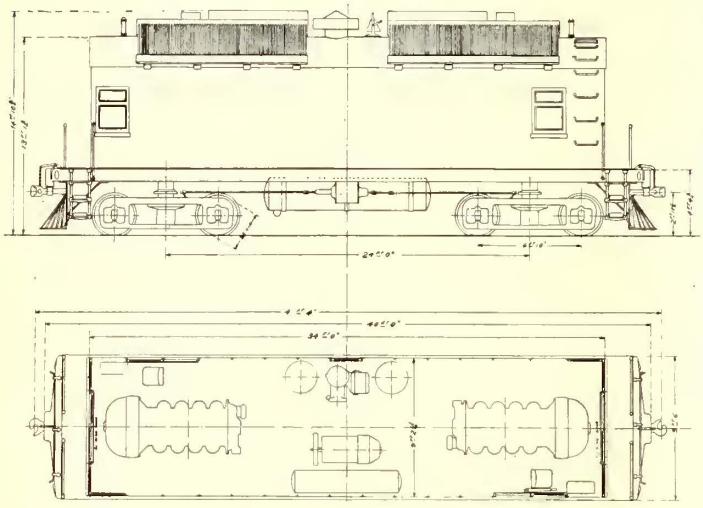
MOTORS AND CONTROL

Mounted on the axles with nose suspension are four GE-205-D, 600-volt, series-wound, commutating-pole, box frame, railway motors having an hourly rating of 100 hp. each. All four axles are therefore driving axles. The gear ratio is 17 : 58, a reduction of 3.41, which is especially adapted for freight and terminal switching service, as it affords maximum tractive effort for starts and for low speeds. The motors are ventilated by a special vacuum system operated in conjunction with the engines. The performance of the locomotive is approxi-

mately such that a tractive effort of 16,000 lb. is provided at 5 m.p.h. and 3500 lb. at 30 m.p.h.

The control of the motor equipments is similar to that of standard gas-electric motor cars, a type P-53 controller being installed in each end of the cab. The motors are, however, connected permanently in pairs in parallel, and the two pairs, operated like single motors, are placed progressively in series and parallel. The controller provides seven running steps in series and six in parallel, without rheostats in the main circuit. There are also two additional points for shunting the series fields, making a total of fifteen efficient running points.

Inasmuch as electrical energy is transmitted directly, there are no losses through the intervention of mechan-



"DAN PATCH" LINE LOCOMOTIVES—DIMENSION OUTLINE

ical change-speed gearing. To produce smooth and rapid acceleration, the speed changes of the motors are effected by governing the voltage through varying the strength of the generator fields, this being accomplished by the movement of one handle on the controller. Separate handles are provided for throttling the engine and for reversing the motors. The latter operation is accomplished by changing the motor connections in the usual manner and without stopping the engines, which always rotate in the same direction. This, in an emergency, allows the train to be brought quickly to a halt independent of the brakes.

A 300-gal. gasoline storage tank, fitted with filler and filter, is installed underneath the underframing of the locomotive. The radiators are the fin-tube type and are mounted on each end-section of the cab roof, the cooling water being circulated by the thermo-syphon system. There is also a radiator draining system, the tanks being situated at one side in the central section of the cab, and a suction type ventilator is mounted in the roof between the radiators.

The principal data and dimensions applying to the locomotives are as follows:

Total net weight	120,000 lb.
Weight per axle	30,000 lb.
Maximum tractive effort	32,200 lb.
Length between knuckle faces of couplers	42 ft. 4 in.
Length over cab	34 ft.
Height over all	14 ft. 10¾ in.
Width over all	10 ft. 2 in.
Total wheelbase	24 ft.
Rigid wheelbase	6 ft. 10 in.

Electric current for the entire operation of the Oakwood Street Railway, Dayton, Ohio, is now being furnished by the Dayton Power & Light Company, pursuant to the execution of the contract, into which the two corporations entered on May 8.

Fair Treatment of Public Utilities*

Proper Regulation by Commissions Is Advantageous Alike to the Public and to the Utilities—Financial Aspects of Regulation

BY A. B. LEACH, PRESIDENT A. B. LEACH & COMPANY, NEW YORK

Through the activities of a large number of the members of the Investment Bankers' Association of America, the development of the public utility companies of this country, the building of water and steam power plants and the construction of urban and interurban railways have given to our land a great impetus. Cities and villages have been improved, urban life has been made comfortable and convenient, rapid communication between communities has added to the comfort of travel. The changes in the character of the service and the form of equipment from the days of the horse car to the modern motor, the changes from the earlier developed plants and equipment for electric lighting and power, have been astonishingly rapid and have caused constant expenditures by these companies to keep abreast with the trend of the times.

These developments have been made possible through the issuance of bonds, of preferred and common stocks, distributed to a large range of investors through the investment banking world. In a large number of the states public service commissions or similar bodies have been organized. The best thought, both of the public service companies and the banking world, is that public service commissions, when properly organized and named, are a benefit not only to the community served, but also to the public service companies, and an added assurance and security to the investor in the securities of the companies supplying this kind of service.

It was considered that with the coming of the public service commissions it would be found that regulated monopoly was the most efficient and economical method for the development of these great industries. In a great many of the states, however, the public service commissions have seemingly felt that it was their province to grant the demands of the public for lower-priced service, for increased service, without giving due consideration to the rights of the public service companies and to the holders of their securities. As in the railroad world, a great amount of discussion has taken place as to the physical valuation of these properties, and here and there on these valuations an interest return has been computed which, when forced upon the companies, leaves a great many of these properties practically stranded.

What has been said in regard to the change in the character of the industry has a very great bearing to-day upon the actual valuation of these properties as going concerns. If a careful engineer's report is to be made on the actual properties now in use by the public service companies of this country, there should be added to this amount an adequate and reasonable sum for going values. The method of computation, the basis upon which this is to be allowed, may be one on which there may be a difference of opinion, but the fact certainly is that without this no just valuation of these properties can be had. In rate making, in view of the hazard of the business, 6 per cent allowed on a reduced valuation of the public utility property means bankruptcy; it means that new capital is not available.

In this connection, the cry of public ownership is heard. The most expensive, the most unsatisfactory, the most disastrous financial experiment that the Amer-

*Portion of president's address delivered before convention of Investment Bankers' Association of America in Denver on Sept. 20, 21 and 22.

ican cities could undertake would be public ownership of their public utilities, but unless the public utility companies are to receive fair treatment by the public service commissions, unless the public service commissions are to cease being the champions and advocates of lower rates and greater service and become guardians not only of the public but also of the public service companies, a great disaster to the investments in this country and the public service companies and a great reduction in the service which these companies bring to the public are sure to follow. This warning is the fruit of a careful lookout on the things that have taken place in the public utility world in recent months. What the American people demand is good, progressive service, developments that will keep in step with and ahead of the growth of the cities and towns. This is not possible or probable unless the public service companies of this country are met in a broad, liberal, reasonable spirit by the public and the public service commissions.

How Bay State Railway Maintains 2751 Vehicles with 680 Men

An Unusual Organization Which Effectively Cares for the Maintenance of Rolling Stock, Shops and Buildings on the Largest City and Suburban System of the United States

The system of the Bay State Street Railway embraces almost 1000 miles of track in eastern Massachusetts, New Hampshire and Rhode Island, and its equipment department handles 1020 closed passenger cars, 1095 open passenger cars, 248 plows, 148 service cars, thirty-two express cars, 208 horse vehicles and snow sledges, and 5662 electric motors. Yet the department employs only 680 men, of whom 365 work in the operating houses, 245 at the shops and on building repairs, and seventy on the preparation of material and in construction activities. There are sixteen operating divisions, with thirty-six operating carhouses and thirty-eight storage houses.

The system is divided into lines north and lines south of Boston, two grand divisions, with their own shops and carhouses, being formed in each group. In general charge of all employees and work in the department is the superintendent of equipment, whose duties are broad supervision of the maintenance of rolling stock, shops and buildings, and the design and construction of new rolling stock.

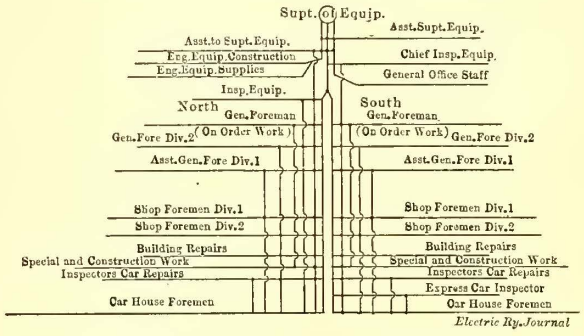
The superintendent of equipment also follows the inspection and testing of supplies, promotes standardization, confers with car engineer representatives of specialties, confers with the general foremen and inspectors of equipment upon the progress of employees as to promotion, ability and discipline, and sees any of the employees and local grievance committees. His offices are in Boston and Chelsea, Mass., and his work is carried on by dealing directly with a general assistant, a chief clerk and a special assistant, the inspector of equipment, three acting inspectors of car repairs and one acting and one general foreman on the lines north of Boston.

The inspector of equipment as well as one acting and one general foreman cover the lines south. There are, also, a special general foreman on order work, and engineers of equipment construction and of tests and supplies. An automobile assigned to the department enables the superintendent to devote a greater part of his time to supervision and a much smaller part to traveling than by use of railroads or electric cars.

The assistant superintendent of equipment supervises the work done at the Boston office and performs much of the detail. He is specially assigned to all work requiring co-operation with the claim department and is held responsible for the correctness of the records of equipment. He follows the summarization of various reports for the superintendent of equipment, reads all correspondence, looks up data and confers with assistants in other departments.

The chief inspector of equipment acts as general assistant to the superintendent of equipment on the lines south of Boston. His duties cover the supervision of carhouses and shops, including the general care of the car equipment, repairs of buildings and heating plants, instruction of carhouse foremen, and following up of men as to ability and discipline. He recommends changes of location, pay and class of men, checks and approves bills and follows shop work.

An inspector of equipment has direct charge, on the lines north of Boston, of the carhouse foremen and the men in the carhouses. He confers with the general shop foremen on the routing of cars needing shop attention and supervises the changes of equipment in the spring and fall. He reviews all reports of accidents and collisions, changes of equipment and hiring of men, as well as the reports of inspectors of car repairs.



BAY STATE ORGANIZATION CHART

The general foreman of grand division No. 2, north, has general charge of the shops at Lowell, Mass., and is responsible for all repair work in carhouses on the division. An assistant general foreman supervises all the work done at the Chelsea shops, where he is stationed, and that of the paint shop at Lynn, these shops serving grand division No. 1, north.

The general foreman for grand division No. 2, south, has charge of car repairs in the Fall River and Newport division at the carhouses at Stafford Road, Bowenville, Fall River and at Newport. The assistant general foreman for grand division No. 1, south, is at Campello and has general supervision of the shop at that point.

The engineer assistant on equipment construction is stationed at the Chelsea office of the superintendent of equipment. His work is confined largely to construction matters, making up drawings of new equipment and assisting the superintendent of equipment in the design of the latter. The engineer assistant sees that specifications are carried out in detail, works on the standardization of equipment, on redesigning with improvements as the object of the work, and in connection with the shops checks up patterns, castings, etc., and makes drawings and sketches for tools and machinery.

BAY STATE STREET RAILWAY—EQUIPMENT MAINTENANCE COSTS FOR FIVE YEARS

	1914	1913	1912	1911	1910
Total maintenance expense	$759,134	$846,030	$757,748	$769,061	$775,618
Operated car mileage	30,864,039	31,641,875	30,094,113	30,322,589	29,915,956
Total cars	2,509	2,445	2,391	2,391	2,381
Cost per car per year	$303	$346	$317	$322	$326
Cost per 1000 car-miles	$24.60	$26.80	$25.30	$25.40	$25.90

There is also an engineer of equipment supplies who inspects and tests all kinds of materials, including material delivered at the four main storerooms of the company in Fall River, Campello, Chelsea and Lowell. He inspects scrap stock and prepares engineering data such as maintenance costs of various equipment parts, reports various items such as armatures, wheels, etc., and co-operates in the standardization of equipment.

The duties of the general foremen on order work are obvious, as are also those of the inspectors of car repairs. There are twenty-nine carhouse foremen, and the inspectors are assigned among the carhouses so that the work of each is approximately equivalent.

Manila Company Submits Service Brief

Case Before Board of Public Utility Commissioners Involves Adequacy of Car Service of Manila Electric Railroad & Light Corporation in Three Districts of Manila

The Electric Railway Journal of Sept. 4, 1915, page 395, contained a tabulation of traffic data taken from a count made by the Manila Electric Railroad & Light Corporation, Manila, P. I., during the six weekdays of the week from May 21 to May 27, to determine whether the service during the rush hours on certain lines in the Pasay, Malate and Ermita districts was adequate. These data were collected for use in a hearing ordered on June 15, 1915, by the Board of Public Utility Commissioners on its own motion, after it had turned down on June 7, 1915, an "unreasonable" demand made a year before that the company double the number of cars on all its city lines. Since the publication of these data, the company's complete brief in this new case, holding that it is not responsible for the so-called inadequacy of service or over-crowding of cars so long as reasonably adequate service is furnished, has been received, and the main points thereof are abstracted below. As service regulation is becoming more common, it has been thought that an outline of the defense offered would be of interest.

Service Furnished

The car service furnished the Pasay district by the company on the lines in question, during rush-hour periods (from 6 to 8 a. m., 12 m. to 2 p. m., and 3.30 to 7.30 p. m.), consisted, at the time of making the count of passengers, of eight regular cars per hour, operated on a seven-and-one-half-minute headway. That the company has more than fulfilled its obligation to reserve for the use of second-class passengers a minimum of 60 per cent of car space is conceded. A further obligation imposed upon the company by its franchise is at all times to furnish cars or compartments of both classes sufficient to satisfy the public demand and to carry comfortably all the members of the public desiring to ride thereon. In determining whether this part of the franchise is being complied with, great weight should be given to the fact that not a single user of the service appeared at the public hearing to make complaint, to testify or to furnish information to the board.

Reasonable Average of Service

If the board, however, carries the inquiry further to determine whether the accommodations furnished are, apart from any public demand, sufficient to carry riders comfortably, according to standards to be fixed by the board, it is assumed that the occasional overcrowding of cars will not be considered as evidence of inadequate service, but that regard will be had to the service as a whole, and that a reasonable average of service throughout the whole period under investigation will be deemed sufficient. In Fisher et al. vs. International Railway, quoted in Public Service Commission Reports, Second District of New York, Vol. III, page 146, the New York board did not attempt to define with precision what would, in its judgment, constitute overcrowding. It did, however, lay down the rule that questions of overcrowding should be determined not by the conditions found in individual cars but by examination of a number of cars, operated during a reasonable period, and the number of passengers riding in those cars, and that if it should be found that during such period headway was reasonably maintained and sufficient cars furnished so that the average car was not overcrowded, the service could not be held to be inadequate.

Peculiar Conditions in Manila

One peculiar condition is the furnishing of two classes of accommodations. Should the service furnished by this company be judged upon the basis of entire cars, without regard to first and second-class divisions, there would be no necessity for argument. As it is, the company more than meets the requirements of its franchise and the demands of the public. The problem of providing for both classes is worked out by the company's employees arranging the division between the first and second-class compartments in such manner as to provide for the amount of traffic which experience has shown may be expected on the different lines, always allotting more than 60 per cent of the space to second-class passengers. Yet accommodation must also be furnished for possible first-class passengers, who frequently do not materialize in numbers sufficient to fill the seats provided, with the result that much waste space is carried. This condition, resulting in increased expenses, should be considered.

Manner of Use

Another factor worthy of notice, beyond the control of the company, is the way the public uses the service as regards voluntary standees and overcrowding for short distances. In a typical fifteen-minute period, affecting five cars of the lines in question, car No. 105, of the Pasay-San Juan line, arriving at the counting point at 6.01 a. m., contained fifty-seven second-class passengers, with seats for twenty-eight, and four first-class passengers, with seats for eight. At 6.10 a. m., or nine minutes later, car No. 117 of the same line came along, also with twenty-eight second-class seats and carrying forty-eight passengers, and with the same number of first-class seats and passengers as car No. 105. This seems to indicate a somewhat crowded condition of the second-class compartments of these two cars at the counting point, but such crowding was not the fault of the company. At 6.11 a. m., or one minute after car No. 117 and ten minutes after car No. 105, car No. 109 passed the counting point carrying only fourteen second-class passengers, but with the same number of seats as the preceding car. Four minutes after car No. 109 came car No. 39, with but three second-class passengers to a seating capacity of twenty-six and carrying eight first-class passenger seats, but not a single passenger of this class. To turn back on the schedule, car No. 37 at 6 a. m., preceding car No. 105 by one minute, carried but eleven second-class passengers, with seats for twenty-six, and three first-class passengers, with seats for eight. With an average of the five cars mentioned covering a period of fifteen minutes, or one car every three minutes, it will be seen that the total number of second-class passengers carried was 133, with seats for 136, an average of more than a seat per passenger, during one of the heaviest rush-hour periods.

It may be suggested, however, that three out of the

five cars referred to were of different lines than the two cars carrying an excess of passengers to seats, and that the runs of the three cars showing underloading did not extend to the entire length of the Pasay line. This is true. It is also true that a very large, if not the greater, part of the traffic on the Pasay line originates between Malate loop and Switch No. 2 (0.75 mile out), but that many passengers probably boarded cars Nos. 105 and 117 between Malate loop and the counting point. At Malate loop all five of the cars mentioned became available. On the Pasay line cars at the Malate loop there was 17 per cent of seats in excess of the number of passengers carried, and considerable unused accommodation was carried in the form of first-class seats. On the assumption, however, that there were some passengers standing when the car reached the loop, this fact in itself does not constitute overcrowding and implies no discomfort, and it is certain that this condition had existed over but a very short portion of the journey. Moreover, there were two remedies open to such passengers as were not satisfied with the conditions—to take first-class accommodation, at an additional cost of only 2 centavos, or to transfer to other cars with an excess of accommodation. The company having provided more than the 60 per cent of second-class accommodations required by its charter, these remedies are not deemed unreasonable. As to passengers boarding the Pasay line cars between Malate loop and the counting point, they did so voluntarily with other cars available within a reasonable time. The accommodations on the various lines are adequate, and the appearance of overcrowding is caused by the manner in which the public uses the service.

Reducing Standing Passengers

The brief states that a very interesting and instructive article, entitled "Traffic Characteristics," appeared in the Electric Railway Journal for May 15, 1915. The following paragraph is quoted to show the difficulties and dangers arising from an effort to fit car operation, with its inelastic unit of seat-miles per round trip of one car, to an inelastic standard of service:

"The diversity of loading observed on a certain line was such that it was believed that the furnishing of 33 per cent more seats would insure no standing except by preference. At the time the original survey was made, the company was furnishing during each fifteen-minute period a seat per passenger at the point of maximum loading, but owing to the diversity of loading some cars had vacant seats and others had standing passengers. Under the circumstances, 4.2 per cent of the passenger-miles were being made by passengers who could not find seats. After the service (seat-miles) was increased by one-third, it was found that 3.8 per cent of the passenger-miles were made by standing passengers. Thus to increase by 0.4 per cent the number of seated passengers, it was necessary to increase the seat-miles furnished by 33 per cent."

Comparative Service

For the whole period under consideration, 12,353 second-class passengers were carried, with seats for 10,806, or an average of seats per passenger of 0.87—or 13 per cent of passengers standing to the total number carried, and 14.3 per cent of passengers in excess of seats. The comparison between these accommodations and the standards in six American cities is most favorable to the local company. In all but one case, that of the period from 6 to 8 a. m. for in-bound cars, the result shows a service much superior to that required in these cities. The excepted case is that of in-bound cars for the period from 6 to 8 a. m., showing 56.2 per cent of passengers standing to seats. This excess, however, is caused by no fault of the company. A reasonable use of the service by the public would distribute the traffic over these lines in such manner that excess of passengers to seats would be about the same for every period, which, with due allowance for the difference between the length of the period used as a standard and the periods taken in the American cities, would be well within the limits of adequate service. If the exact facts could be ascertained, it probably would be found that the number of passengers standing, in excess of seats provided, would be little, if any, in excess of the voluntary "standees." The Federal District Court in Washington, commenting upon a decision of the Public Service Commission of that State (Public Utility Reports, 1915 B, page 810) intimates that an excess of 33 1/3 of passengers over seats, during certain hours of the day, would indicate a congested condition requiring a remedy. The line under consideration was a suburban line in Seattle, with a large number of passengers standing for about 4 miles. In Manila, however, the excess of passengers over seats is relatively small, and the conditions are such that, if the public made reasonable use of the service, the number of involuntary "standees" at any stage of the run would be negligible, and this over infinitesimal portions of the journey.

Added Service

While convinced that the service furnished between May 21 and May 27 was adequate, the company has materially increased this service by extending the run of certain cars beyond the Malate loop into the Pasay district as far as Switch No. 2. Eight cars are thus operated during the rush-hour period from 6 to 8 a. m. These cars provide seats for forty passengers, which means, for the additional service, a capacity of taking up 320 passengers per day or 1920 passengers for a six-day period. This additional service during the rush-hour period adds about 50 per cent to the accommodations provided during these hours, and changes the average of seats per passenger on this line from 0.74 to 1.15. This additional service, however, is so far in excess of what should be required of the company under all the circumstances, that its discontinuance would be warranted, in view of the decrease in earnings.

Operating Costs for Omnibuses in Sheffield, England

The *Tramway and Railway World* in a recent issue submitted the following results of the omnibuses operated in the town of Sheffield, England, by the Sheffield Corporation Tramways, the figures covering the fiscal year 1914-1915. Expenditures are given in cents per bus-mile:

Superintendence	0.03
Platform wages	4.39
Other traffic employees' wages	0.18
Cleaning and oiling	0.86
Miscellaneous traffic expenses	0.56
General expenses	0.74
Repairs to chassis	1.69
Repairs to body	0.40
Repairs to wheels and tires	1.57
Repairs to tools	0.03
Repairs to buildings and fixtures	0.09
Miscellaneous repairs	0.05
Sundry road expenditures	0.11
Gasoline	3.37
Total operating expenses	14.07

Fares averaged about 2 cents for a distance of about 1.12 miles, the longest omnibus route being 6.5 miles. The receipts amounted to 20.94 cents per bus-mile. There was set aside for depreciation 2.15 cents per bus-mile, for interest and sinking fund 1.09 cents, and for income tax on profits 0.13 cent.

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 to 8, 1915

American Association News

ANNUAL CONVENTION SAN FRANCISCO OCTOBER 4 TO 8, 1915

"Red Special" Itinerary Works Out Well—Details Are Given Herewith—Chicago Section Conducts Novel Suggestion Contest and Sends Winner to San Francisco—Best Suggestions Are Outlined Below

ON THE TRAIL OF THE "RED SPECIAL"

Supplementing last week's brief note regarding the "Red Special," the following notes bring the history to the JOURNAL'S press hour. After a stop of one and a half hours in the city of Chicago, the train left for National Glacier Park. There were fifty ladies and eighty men aboard.

The train reached Glacier Park at 2 o'clock on Sunday afternoon and left for Spokane on Monday evening. During the stay the party visited St. Mary's Lake and the encampment of Blackfeet Indians located in the park. Here Messrs. Pierce, Gale and McConnaughy were admitted into membership of the Indian tribe with appropriate ceremonies. The party reached Spokane at 9 a. m. Tuesday and was met at the station by the following representatives of the Washington Water Power Company: Vice-President Bleeker, General Manager MacCalla, Secretary Steele, Superintendent Wilson, Claim Agent Aston and Chief Engineer Uhden. Next morning the party took three-car trains of this company on its interurban line to the suburbs, where a very successful inspection test was made of the Wilson automatic stop. Then the party took lunch at the hotel and enjoyed automobile drives in the afternoon. A separate lunch was given to officers of the association and a few others at the Chamber of Commerce Building by the Chamber of Commerce. After this luncheon speeches were made by C. Loomis Allen, Charles L. Henry, William J. Clark, W. F. Ham and Charles C. Pierce. All discussed the needs of the electric railway, the importance of electric railways in the development and prosperity of the cities, the need of more liberal and fairer treatment of the electric roads and the desirability of co-operation on the part of chambers of commerce and other bodies of public-spirited and influential citizens. At the close of the meeting the president of the Chamber expressed the appreciation of his organization at the opportunity of hearing these remarks. The local papers in the evening editions gave considerable space to the addresses.

The departure of the special train from Spokane in the evening was delayed several hours so that the train would go through the Cascade Tunnel of the Great Northern Railway by daylight. Seattle was reached by Wednesday noon.

The "Red Special" party spent Wednesday in Seattle as guests of the Puget Sound Traction, Light & Power Company inspecting the system and touring the city in automobiles.

Thursday was spent in Portland, the travelers being the guests of the Portland Railway, Light & Power Company. The party was taken by electric cars to the principal points of interest. Several members also attended a farewell luncheon which was extended on this day at noon by the Portland Chamber of Commerce to F. W. Hild. Mr. Hild recently resigned as general manager at Portland to become vice-president and general manager of the Denver Tramway System, succeeding John A. Beeler, resigned. At the luncheon C. Loomis Allen, W. F. Ham and Charles C. Peirce addressed the members of the Chamber on the electric railway problems of the day. President Griffith then paid a tribute to the ability of the retiring manager, who replied in a fitting speech. The train left Portland for San Francisco exactly on schedule at 8.15 Thursday evening via the Southern Pacific Railway.

The trip has proved a very delightful one, and the number of passengers has grown to 131, including fifty-two ladies.

The committee in charge of the train, headed by Frank H. Gale, master of transportation, and H. G. McConnaughy, secretary of the Manufacturers' Association, had most carefully planned all details, and provided surprises each day, in the way of flowers for the ladies and other attentions.

CHICAGO SECTION SENDS TWO MEN TO CONVENTION

At the first meeting of the Chicago Elevated Railroad section following the summer vacation two members were elected as delegates to the San Francisco convention. One of these delegates was elected by a popular vote of all the members of the section and the other was selected because he submitted the best suggestion for improvement in the elevated railroad service, which at the same time would effect a considerable money saving. A. H. Daus, assistant master mechanic, was elected a delegate in a very close contest, winning by only eight votes. Mr. Daus began service as an armature winder in the shops of the elevated railroads in 1898. He was successively advanced to various positions in the mechanical department and was appointed assistant master mechanic in 1913. For the employee submitting the most meritorious suggestion, C. E. Shaw, Metropolitan division foreman of signals and interlocking, was selected. Numerous suggestions were submitted, and the rather unusual thing about the winning suggestion was that it applied to the train service which was entirely out of the winner's department. The winning suggestion, as well as other suggestions of merit, follow:

Winning Suggestion

A means of cutting down operating cost while running trains at same interval from 9.30 a. m. to 4.30 p. m., and from 7 p. m. to 12 midnight—twelve hours out of twenty-four. Every other train from the four branches to run express on track No. 3 east from Marshfield Avenue to Franklin Street without stop—and express west on No. 1 track from Franklin Street to Marshfield Avenue without stop. Trains that run express east to run local west, and trains that run local east to run express west, thus saving four minutes running time on each round trip. Two minutes more can be taken from the relay at the terminal, making six minutes, the interval of trains, which will allow one train to be taken off of each branch, thus saving the cost of running four trains for twelve hours out of each twenty-four hours.

Charles E. Shaw,
Foreman of Signals and Interlocking.

Winner of Second Place

A suggestion for reducing maintenance cost on electrical equipment:

The introduction of a fusible element into an electrical circuit so installed that the temperature of coil or apparatus will melt the fusible element and automatically open the electric circuit before high temperature has affected the insulation and caused the apparatus to become short-circuited, thereby saving the cost of rewinding, plus that

of material. The fuse can be installed on the most accessible parts.

Test made with fusible element:

Temperature at which enamel covered wire will carbonize and cause short-circuit	450 deg. Fahr.
Temperature at which fuse will melt	320 deg. Fahr.
Highest operating temperature of coil in service	200 deg. Fahr.

This fusible element can be introduced into circuits of pilot motor, reverser and pump motor on South Side cars, and of reverser, current relay, reset coil on Type M cars on Northwestern Elevated cars.

Number of roasted pilot motors due to jamming, per month, twelve

Cost of rewinding armature, field and brake coils	$9.40
Cost of renewing fuse	.50
Net saving on repairs	$8.90
Total saving per month based on average number of failures on pilot motor	$108.80
Average cost of repairing roasted reverser coils	5.00
Net saving on repairs to coil	4.00
Total saving per month based on six failures	24.00

The introduction of a fusible element will not reduce the number of failures, but will only reduce cost of repairs.

A. H. DAUS, Assistant Master Mechanic.

OTHER MERITORIOUS SUGGESTIONS

After a careful study of trains in operating at Kimball Avenue terminal I find we can reduce the number of hours in the tower from twenty-four to ten per day, except Saturday, which should be fourteen hours on account of adding and cutting cars. At present they are working a twenty-four-hour trick, but the following schedule should apply:

Daily (except Saturday), 6 a. m. to 11 a. m., and 3 p. m. to 8 p. m.

Saturday from 6 a. m. to 8 p. m., fourteen hours.

Sunday—No work at all.

The present practice requires 720 hours, $244.80 per month, or $2,937.60 per year. The saving would be 276 hours, $103.84 per month or $1,245.08 per year.

JOHN MANNION, Dispatcher.

A fund providing for sickness, disability and old age might be established by the Chicago Elevated Railways on a co-operative basis, the company and the employees to contribute to the fund in an equitable manner. A committee composed of officers and employees of the company should be appointed to investigate thoroughly all organizations related in any way with such a plan and then submit the result of their investigation, together with their recommendations, to a mass meeting of all employees and officials of the company.

The establishment of such a fund and its proper control will do more to advance the interests of the company, and engender a spirit of faithful service than anything I know of. A contented and efficient set of employees is the greatest asset of a corporation. "Co-operation First."

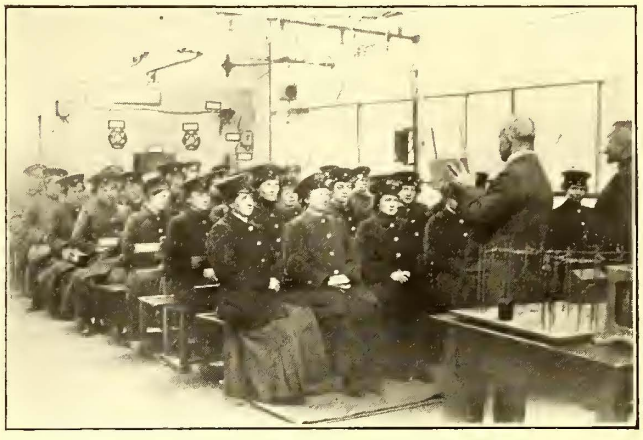
JOHN MCINTOSH, General Superviser of Service.

At this meeting of the section 160 members were in attendance, and the secretary reported twenty new applications, which makes the total membership 188. In the program which followed H. A. Otis, engineer in the office of the master mechanic, spoke on the value of coasting. He explained what coasting is, the many benefits to be derived from it, and the measures that have been taken by electric railways throughout the country to encourage the motormen to do more coasting. He also described the various methods employed to increase coasting and outlined a scheme of installing coasting boards on the elevated railway system to increase coasting. He said that after carefully experimenting and testing the service the general supervisor of service had selected locations for these boards. In addition to this the supervisor spends his entire time in instructing the motormen and their immediate instructors in the proper method of train operation, paying particular attention to coasting.

J. T. McIntosh, general supervisor of service, spoke on "The Efficient Motorman." He discussed his subject by taking his audience, in imagination, on the trip from one end of the road to the other, during which he outlined what the efficient motorman would do at each particular point and in every conceivable circumstance or emergency. Mr. McIntosh stated his belief that much could be accomplished to increase coasting by instructing the motorman. He felt that work in this direction was as important as the installation of instruments for recording the amount of coasting.

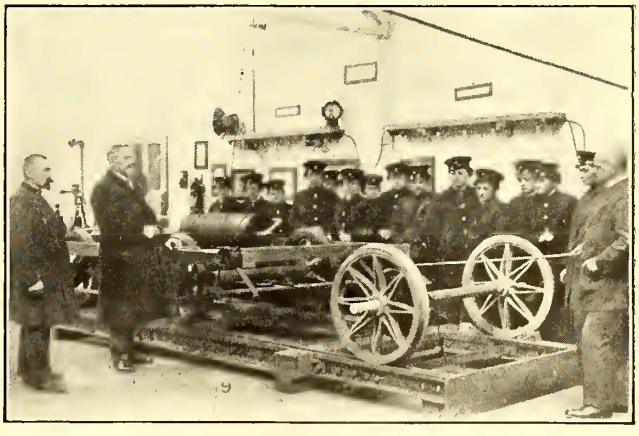
Women Conductors in Berlin

As noted in the ELECTRIC RAILWAY JOURNAL for April 24, 1915, the Grosse Berliner Strassenbahn (Great Berlin Street Railway) had already found it necessary to employ more than 600 women as conductors to take the place of men called to the front. At that time more than 50 per cent of all the employees had already been called to the colors. It is very likely that this percentage has since been greatly increased because the government has made further levies, and because it is the practice of German railways in hiring men to favor those who have already been in the army.



WOMEN CONDUCTORS IN BERLIN—A LECTURE ON PLOW COLLECTOR AND OTHER CAR DETAILS

The accompanying illustrations were recently taken in the inspection room of this railway. One of them shows a class of women being instructed in the use of the plow collector and other details. It will be observed also that the room contains parts of overhead equipment, it being customary to instruct platform employees in the correct names of line fixtures. An illustration taken in another part of the same room shows a demonstration of truck and track equipment; also the application of trolley catchers and headlights.



WOMEN CONDUCTORS IN BERLIN—STUDIES IN TRACK AND TRACK EQUIPMENT

COMMUNICATION

Standards in Car Design

New York, Sept. 22, 1915.

To the Editors:

Mr. Gonzenbach's communication under the title "Cars at Less Than Cost" in the Sept. 11 issue seems to contain the following inferences: (1) Each car builder should make only one standard type of car. (2) Car builders' overhead expenses are too high. (3) He suggests a remedy.

As car builders have been fighting for years for standardization and the Electric Railway Journal has published editorials urging the same, it is encouraging to have a manager of Mr. Gonzenbach's prominence at last fall into line—in theory at least. Numberless cars have been designed and patented by railway men and manufacturers in the confident belief that they would be generally adopted as standard. Recently we have the Hedley-Doyle car, the Jones car, the Adams car, the Mitten car, the Brinckerhoff car, the Birney car, the "Peatwit" car, etc. All have great merit. But none has been nor will be adopted as standard.

If these men, who are familiar with all requirements, have failed to produce a standard car, what hope is there that car builders can design one which will be acceptable to all? Cars will continue to be built to suit local conditions, and automobiles will be designed for general conditions.

While a standard car would prove a blessing to the car builders, it is a question whether the railways could afford to confine themselves to it for any extended period. Without the initiative and courage exercised by the above-named men and other men equally courageous, we still would to this day be riding in bob-tail "hay-burners" over strap rails.

As to overhead expense in car building, I venture to say that it is kept much lower than the average in other lines of manufacturing of equal volume. A considerable percentage of this overhead burden is selling expense, and for this the railways are to some extent responsible. I have known several cases where a dozen or more high-salaried salesmen and engineers were detained for from one to two months by frequent postponements on the part of railway companies in letting contracts for cars. Doubtless the purchaser thought this was costing him nothing and that impatience and nervous exhaustion among the supply men might result in concessions which could not be obtained earlier. But selling expense is a legitimate part of manufacturing cost and ultimately the consumer pays for it. How many purchasers appreciate that they are paying the expenses of the men they keep waiting in anterooms and hotel lobbies?

A real saving in the cost of cars and real competition, also, could be effected by receiving sealed proposals at a stated time, opening them in the presence of the bidders, announcing the prices publicly, and awarding the contract to the lowest responsible bidder.

Now, as to Mr. Gonzenbach's remedy, I quote as follows from his communication: "Let them produce a standard car at a standard price, based on an output of 100,000 cars a year, or something like that." There are about ten active electric car builders. This would mean a total output of 1,000,000 cars per year. However, the average number of cars purchased per year during the last eight or ten years was approximately only 5000, and this shows clearly the impossibility of making a production proposition out of car building along the lines that have been applied to automobile manufacture.

Car Builder.

Commerce Commission Hears Principles of Valuation Discussed

Depreciation proved to be the chief bone of contention on Sept. 30, the first day of the three-day conference called by the Interstate Commerce Commission to discuss the fundamental principles of valuation. W. G. Brantley, speaking for the carriers, reiterated his argument made at the conference last May, that the use of the component parts in the complete railroad should govern, and that therefore there should be no depreciation deducted unless there was deferred maintenance. For instance, he would consider track as a whole, and not as individual ties and rails. Questions put by the director and several of the commissioners indicated that they doubted their authority to do this under the valuation act.

About 100 men attended the sessions. The carriers' arguments were presented by four of counsel, G. S. Patterson, Pierce Butler, Sanford Robinson and Mr. Brantley. They indicated at the start that they would need at least two days. They had already filed a 544-page brief with the commission, printed copies of which were available. As the State commissions had not held any meeting to formulate an argument, the members present indicated that they would confine themselves to the filing of briefs.

The carriers had divided their argument into nine sections. Mr. Patterson discussed the first—the purposes of the valuation act. He cited seven reasons, including bases for rate-making, taxation and capitalization.

Mr. Butler, discussing cost of reproduction new, brought out briefly the main points hitherto presented by the carriers relative to the determination of quantities and the overhead allowances. Mr. Robinson discussed separately the fixing of unit prices, asking the exercise of the best judgment and the consideration of prices for a ten-year period.

Mr. Brantley's topic was "Appreciation and Depreciation." He began with the latter, and had not finished when the conference was adjourned for the day.

Flange Oiling

At the recent convention of the Traveling Engineers' Association it was stated that the wear on the wheel flanges of steam locomotives was one of the greatest sources of annoyance and expense in maintaining the machines in service, but it was estimated that, by the use of a flange oiler, the mileage between tire turnings for flange wear would be increased from three times to four times the original figure. Also, the rapid wear of rails can be eliminated to a certain extent by the use of flange oilers that positively deliver jets of asphaltum oil against the flanges of the wheel. On one division of the Erie Railroad the saving in rails on curves was reported to be 66 per cent. On the Delaware, Lackawanna & Western Railroad the saving on curves alone warranted the expense of flange-oiling equipment, and in addition, the saving on the tires was more than 60 per cent. It was stated that proof had been given by a number of roads that the flange oiler does prevent derailment. The impression that any crude oil would do to use with a system of flange oiling was common, but several experiments have proved that results cannot be obtained unless the oil contains from 40 per cent to 60 per cent of asphaltum in solution, and is low in grease and paraffine. All oils that are low in asphaltum and high in grease and paraffine will run down onto the thread of the wheel, causing slipping and tending to defeat the purpose of the device.

Equipment and Its Maintenance

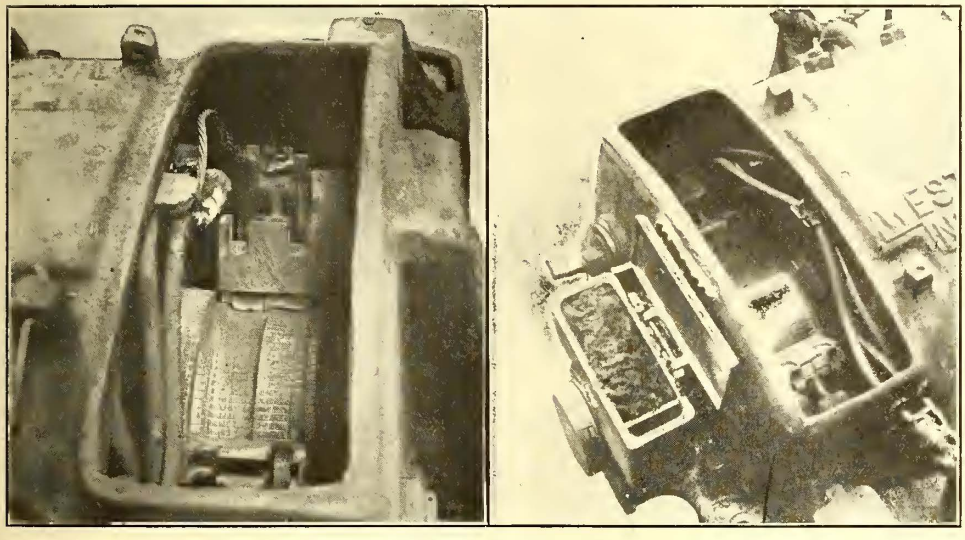
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Good Results from Old Motors in Atlantic City

BY GEORGE F. FABER, GENERAL SUPERINTENDENT ATLANTIC CITY AND SHORE RAILROAD

The problem of getting maximum efficiency out of the older types of motors, such as Westinghouse No. 68, of which we have forty two-motor and one four-motor equipments, has been a difficult proposition in Atlantic City, especially for the reason that these motors are used during the heavy-service summer months and on an average line voltage of about 575, with severe surges at times due to the starting and stopping of the heavy trains run by the West Jersey & Seashore Railroad from which this company buys its power. In addition, the heavy riding season in Atlantic City continues for but ten to twelve weeks, necessarily involving the employment of a large force of inexperienced men to operate the cars, and just about the time when these men are becoming thoroughly competent in their work the season is over, and off they go. Thus, green men handling old equipment with high and irregular voltage make a bad combination for efficient operation and low maintenance charges, and our shop forces have been kept very busy.



GOOD RESULTS FROM OLD MOTORS—WESTINGHOUSE 68-C MOTOR BEFORE AND AFTER REMODELING

The most unsatisfactory feature of the old type of motor was the poor design of oiling device. To remedy this condition we have installed cast-iron lubricating oil boxes like those shown in the accompanying illustration, which make waste-feeding oil boxes equal to those on modern motors. We are using solid armature bearings with openings for oil feed only at the top, and are also cutting out the openings in the bearings to nearly twice their original size to give more contact surface between the waste and the armature shafts. We are still using babbitted, iron-shell armature bearings, but are now figuring on eliminating these gradually and replacing them with solid bronze bearings.

In the overhauling of these motors, which are nearly twenty years old, we find that the housings in the motor frames have become worn. We have not rebored them, as at present we have not the facilities to do this work, but have shimmed them up with hard fiber shims. Some roads have designed a special machine for reboring motor shells, which is the only proper way to get correct results, but we could not undertake this all-important operation at this time. We have also slotted the commutators, and have changed the motor connections to make all the motors field-fed. The top covers have been left off, and the bottom inspection covers have been perforated to allow more ventilation and to get rid of the carbon and copper dust. This formerly was quickly deposited on the armature and in the case, and was the cause of many of the flash-overs in the motors of Types 68 and 68-C.

Since we have thoroughly overhauled all open-car equipments we are getting excellent results, not only in commutation but in good lubrication of bearings, and have not had a car taken out of service for a grounded armature since the cars were placed in service in April. With the improvement in the motors and careful inspection, together with the fact that we test everything thoroughly before it gets into a car, our maintenance cost has decreased materially and I believe it will continue to do so.

Many roads would recommend scrapping such old equipment, believing it to be more costly in the end to make these improvements than to purchase the newer types of motors, but I find the Westinghouse 68 and Westinghouse 68-C motors are very economical from a power consumption standpoint and feel now that we are getting very satisfactory results.

Indexing Car Equipment Data

BY NORMAN LITCHFIELD, M. E.

The indexing of data has been the subject of much study in all classes of knowledge, engineering or otherwise, and many systems have been evolved in the attempt to obtain one which would make the data instantly available when needed. Outside of the many valuable handbooks each engineer must, of necessity, collect information pertaining to his particular line of work, and as time goes on and the mass of material assumes considerable proportions some system of filing and indexing becomes imperative. In the choice of one suitable to the nature of the information lies the success or failure of the collection of data.

One of the most successful index forms is that known

as the Dewey decimal system, which is in use by many large libraries and industrial concerns. It consists essentially of the division of the subject data to be classified into nine chief subdivisions, each being numbered one of the integers from 1 to 9. Each subdivision is then again divided into nine further classes, the first being numbered, 1.1, the second 1.2, the third 1.3, etc. Still further subdivision may be used, as 1.21, 1.22 or 1.31, 1.32, etc. This has many advantages over other systems, such as the alphabetical, and lends itself readily to car equipment data.

The following nine main subdivisions are suggested, having been found in practice to cover the ground conveniently and thoroughly.

1—Office.
2—Weights.
3—Costs.
4—Progress.
5—Equipment data.
6—Transportation and traffic.
7—Specifications.
8—Dimensions and capacities of cars.
9—Other information.

Under the first heading may be grouped matter concerning the office and needed for ready reference, such as addresses, rates of pay, records of service, etc. The second and third classes are selected because it was found that if the weight of an article such as a brake-shoe was listed under a detailed subject heading it might be found either under "brake," "shoes" or "truck details." Again, many parts are called by different names—thus, a "swing hanger," "swing-motion hanger" or "swing-link" all denote the same part. Obviously the same principle is equally true in regard to costs.

With the Dewey system as applied in the foregoing if the weight of a part is desired, one first looks over the short list of nine main divisions, which the eye scans readily, and instantly selects the division under which the desired item is most likely to be found. One then turns to the page of the catalog headed "weights," at the top of which is found the following list of chief subdivisions.

2—Weights.

2.1—Cars, complete on trucks.
2.2—Car bodies and parts of body structure.
2.3—Trucks and parts.
2.4—Equipment complete.
2.5—Brake parts.
2.6—Control parts.
2.7—Motor and parts.
2.8—Other electric and pneumatic equipment.
2.9—Miscellaneous.

If the article looked for does not fall in any of the first eight classes one turns to the page headed 2.9 where there may be found:

2.9—Miscellaneous.

2.91—Draft rigging
2.92—Seats, cushions and backs.
2.93—Doors.
2.94—Pneumatic devices.
2.95—Windows.
2.96—Hardware.
2.97—Hand holds.
2.98—Destination signs.
2.99—Other parts.

The same or a similar subdivision is applicable to Division No. 3, covering costs.

The fourth division, "progress," is intended to cover important dates and amount of work accomplished on jobs which require particular attention. The fifth division, or "equipment," covers main items such as number owned, date of manufacture and other general information, the subdivisions being the same as those under "weights."

Division No. 6 includes data in regard to operation of cars and other data upon transportation. Division No. 7 gives lists of all specifications and any notes thereon. Division No. 8 gives chief car dimensions and capacities which are apt to be distributed over several drawings and are brought together here for ready reference.

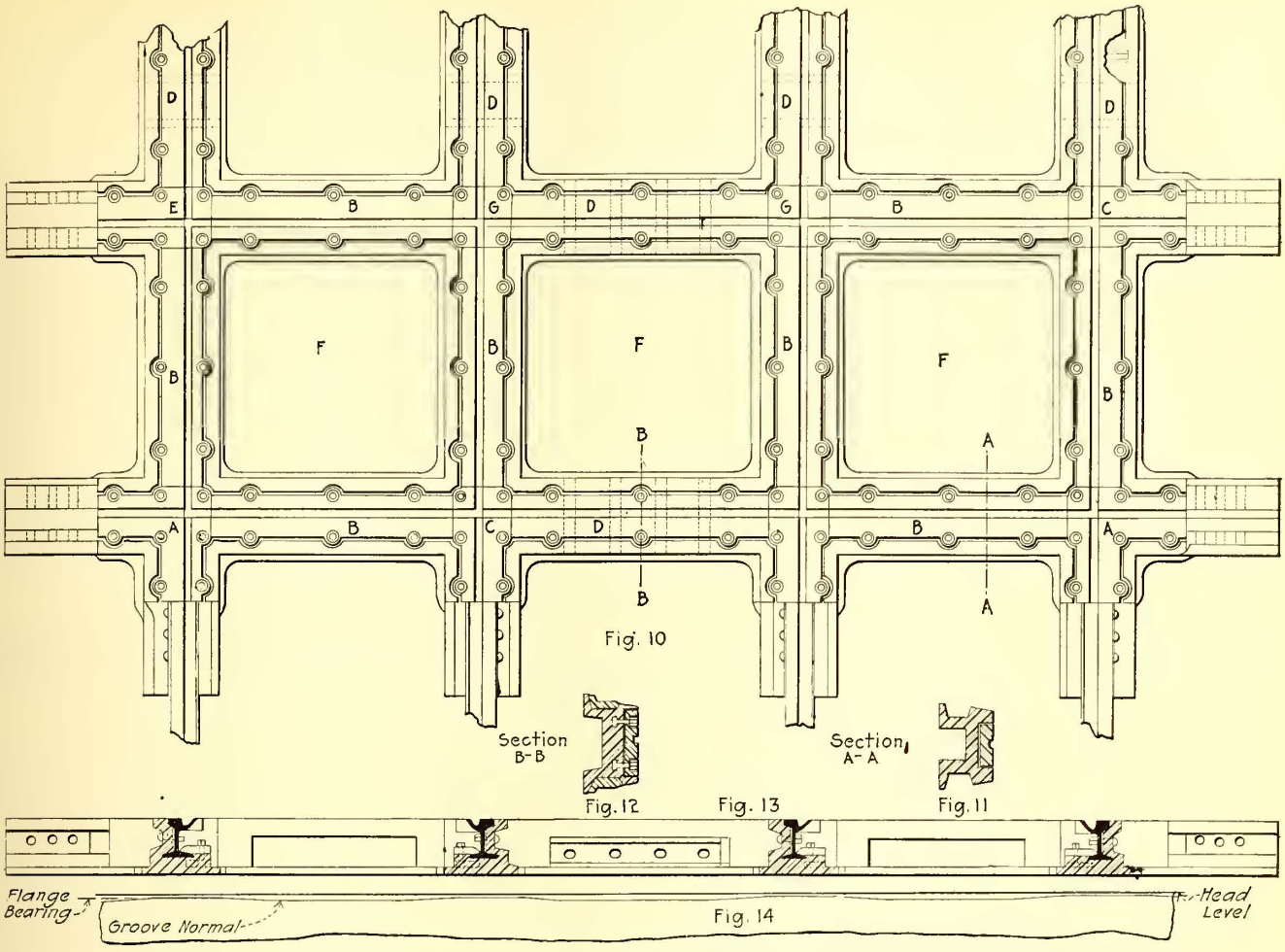
One of the chief advantages of this system is that it permits of indefinite expansion without disturbing or rearranging the data already collected and indexed. It has been found applicable not only to sets of file cards, but, in a modified form, to the filing of tracings. In the latter case, all tracings are numbered serially, the latest revisions being denoted by the subscrip *A*, *B*, *C*, etc., and listed in a catalog classified under the Dewey system, one copy being kept in the drafting and file room and another in safe deposit to guard against loss by fire of the office copy or otherwise.

Practical Views of Special Work—II—The Crossing

BY R. P. WILLIAMS, INSPECTOR OF SPECIAL WORK
BROOKLYN RAPID TRANSIT SYSTEM

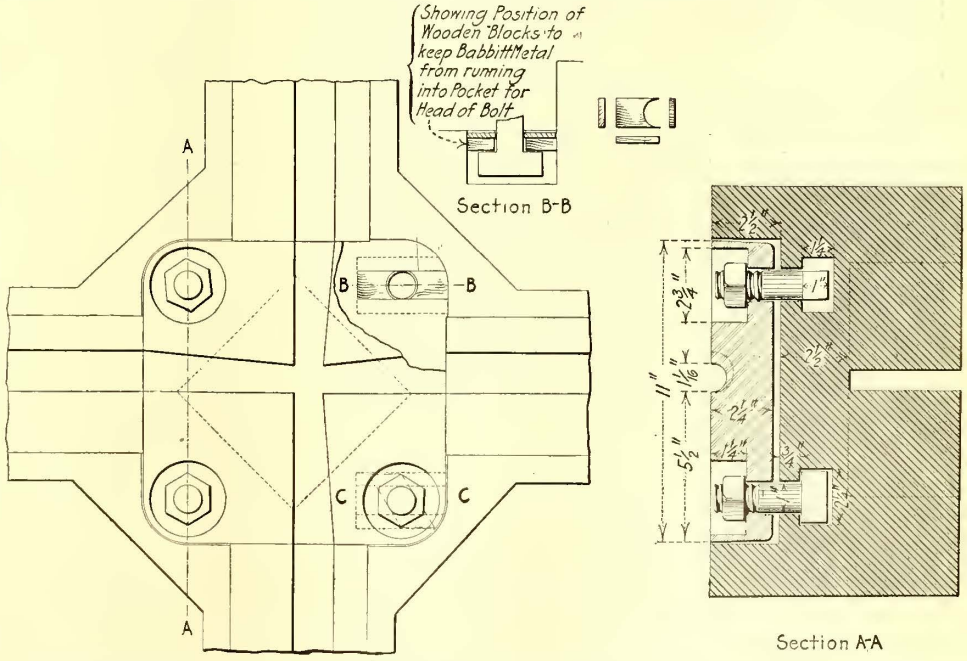
In the article published in last week's issue it was stated that the present design of special work is wasteful. Take the case of a double-track branch-off and assume that 75 per cent of the wear is confined to one run. When that side is worn out, all of the frogs must be thrown away with over half their life still in them, and with the tongue switch and mate having one-third of the wearing surface in good shape. With solid manganese the percentage of waste is increased. The writer advocates a practical change of design so that the worn portion may be discarded, and new parts installed without disturbing the pavement. This has been the ideal in connection with all special work construction. The crossing being the hardest proposition in maintenance, it will be interesting to see if this plan is feasible, and if it is feasible in the crossing, the same principle may be used in the tongue switch, mate and frogs.

In Fig. 10 is shown a rough drawing of one-half of a 90-deg. crossing with an entirely renewable top, the whole being within the lines of the present accepted conditions. There is not one renewable part as big as a manganese tongue-switch bed, while in the present design of branch-offs and complicated layouts there are many larger pieces designed for renewability. The writer showed a similar plan to a prominent manufacturer, who said, "The plan is good, it is feasible and sound. The point will be to impress the necessity for a good foundation." And that is the point; if the plan is accepted, it should be with the consideration of an all-steel permanent tie bed. Referring to the drawing, it will be noted that the crossing consists of four main interchangeable iron castings, *F*, 10 in. in depth. These would, of course, be better and lighter if made of steel. The renewable parts, *A*, *B*, *C*, *D*, *E* and *G*, are also interchangeable, calling for seven patterns. The complete crossing consists, all told, of fifty-two pieces, counting the eight joints, as against the present design which requires 104 pieces, counting the joints sixteen in number, all subject to wheel wear. In the new design there are no such joints. *D* is one piece reaching across the devil strip, and bridging the joint of the substructure. This is the only piece which would have to be babbitted in the field, the balance being fastened in the main casting, *F*, at the factory. The only unsatisfactory feature is that the cavity for the bolt head is one-half in each of the castings, *F*. This might be made so that there would be eight holding-down bolts, the center ones being shifted so that four would be in each arm. That is to say, one of the center bolts could be staggered so that there would be one on each side of the joint. The cross-section, Fig. 12, shows the fish-plate arrangement



SPECIAL WORK—FIGS. 10 TO 14, PLAN, VERTICAL SECTION AND CROSS-SECTIONS OF IMPROVED 90-DEG. GIRDER CROSSING

allowing of this change. Fig. 13 is an end elevation showing the method of connecting to the straight rail. Fig. 14 shows the possibilities of flange bearing as against the present unsatisfactory short bevels in renewable centers. The renewable portion will not run over 85 lb. per yard as against the present heavy guard section. If properly made and installed, the sub-structure is capable of outlasting several top renewals, and when scrapped will bring a higher price, being in short lengths. Another feature which must not be lost sight of is that there is no high-priced girder rail used in its construction, therefore the bidding field is larger, for it is within the possibility of manufacture in any iron foundry. The design lends itself to any one of three forms used in insert construction, the all-machined, the partly-machined, or the all-babbitted form, but the partly-machined seems to be the best form. The whole scheme is built about the fastening system, and while this is a patented device, the patent was obtained to safeguard our company so that it might not infringe on any device now in use, and not for profit, individual or collective. This fastening has been tried out in Brooklyn under all kinds of traffic, and of some 250 centers installed, covering a period of two years, only one has loosened up. Investigation showed that to have been due to faulty work in the factory. The all-babbitted style



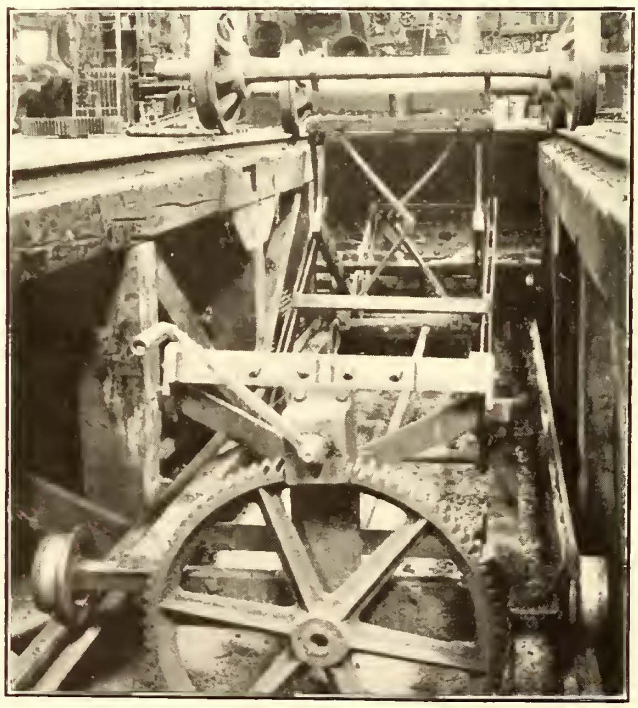
SPECIAL WORK—FIGS. 15 AND 16, PLAN AND CROSS-SECTION OF SQUARE CENTER FOR GIRDER CROSSING

was used and one of the posts was 1/16 in. low. Without disturbing the babbitt, the center was removed, a liner of the proper thickness was inserted, and the center was bolted back with the same nuts. Fig. 15 is a plan view of the fastening referred to, the detail at *BB* showing strips in place to prevent babbitt or dirt entering the lower chamber.

In the cross-section *AA*, Fig. 16, the bolt at the bottom is shown turned as at *CC* in the plan, while the one at the top is shown turned ready to be lifted against the bottom of the babbitt for removal. If no babbitt is allowed to enter the lower chamber or to mount up along the bolt (and by this is meant that the lower chamber must contain nothing but the bolt head), the nuts may be loosened at any time, and the bolts turned back as at the top in Fig. 16, then lifted and a pry inserted under the nut, thus removing, at once, bolts, babbitt and center. With this type of fastening used in constructing the tongue switch shown in Fig. 2 of the article in last week's issue, the problem of repair, even in the present form of construction, would be solved.

A Safe Wheel-Changing Jack

Safety and flexibility are the essential features of the novel wheel-changing jack used in the shops of the Sioux City (Iowa) Service Company's shops. This jack is 15 ft. in over-all length and employs the pantograph principle. It is manually controlled through a crank, gear and pinion. The changing mechanism is mounted on a truck equipped with roller-bearing wheels, which in turn rest upon a track extending the full length of the repair pit. The roller-bearing wheels were adopted so

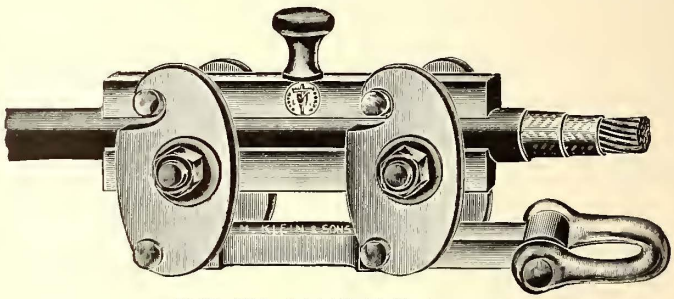


SIOUX CITY WHEEL-CHANGING JACK

that the jack carrying a car wheel could be readily moved from beneath a car by one man. The parts of the pantograph or folding-jack mechanism are made of ⅝-in. x 3-in. steel bars with pin bearings. A swiveled saddle supports the axle of a pair of wheels at two points, and the range of the jack is such that as soon as the wheels are released from the track rails the axle may be swung in line with the track and the wheels lowered to clear the underside of the truck. The man at the operating crank is 6 ft. away from the wheel, consequently well in the clear if any accident should occur. A view of this unique wheel-changing jack is shown in the accompanying illustration.

Quickly-Adjustable Feeder Grip

A tool for handling feeder cables from 250,000 to 500,000 circ. mil capacity, lead-covered cables and steel messenger wire, is being marketed by Mathias Klein & Sons, Chicago, Ill., and is shown in the accompanying illustration. The main body construction of the grip is of substantial steel casting. Pivoted side plates control the action of the upper and lower jaws. The upper jaw is removable to facilitate application of the cable.



GRIP FOR LARGE-SIZE CABLES

It is merely necessary to disengage lugs from the notches in the side plates in order to remove the upper jaw before or after using the grip. The manufacturers claim the grip to be rapid in application and release, and automatic in action, thus embodying an improvement over the old troublesome chain and ring method of stringing large size cables. Its hold is in direct ratio to the pull exerted. The grip is made in two sizes, one for ⅝-in. strain and the other for cables of 250,000 to 500,000 circ. mil.

In a recent test by a large operating company, 19,500 ft. of 500,000 circ. mil insulated feeder cable was pulled in place without the slightest slippage or damage to the insulation.

Pole-Guy Anchor Tests

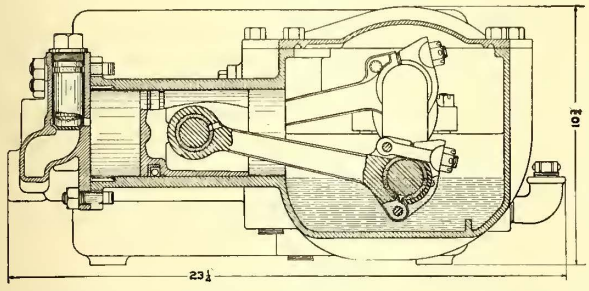
The Faultless Anchor Company, Fostoria, Ohio, recently conducted an elaborate test upon several different sizes of anchors in order to obtain data bearing upon the holding strain of the devices and also to determine the ultimate strain required to break the anchor or to pull it from the ground. In the test the load was tied to the anchor by connecting it through a dynamometer with a double set of large blocks and a heavy-duty chainfall to a heavily-guyed pole of normal height. A substantial initial strain was first applied and a mark made on the anchor rod to indicate its initial position. The creeping of the rod was measured from this initial margin, the load being added in increments of from 500 lb. to 1500 lb. Measurements for creep were made between each loading, and an interval of five minutes without strain was allowed between each pair of loads.

The result of these tests was as follows: A two-blade, 16-in.-spread anchor with ½-in. rod held without creep at 5500 lb. pull and broke in the rod at 6600 lb. A two-blade, 18-in.-spread anchor with ⅝-in. rod held without creep at 4800 lb. when one blade broke because of a flaw in the casting. The capacity of this anchor is said to be about 9000 lb. A three-blade. 18-in.-spread anchor with ¾-in. rod held without creep at 12,800 lb., the blade bending down at 13,200 lb. pull. A four-blade. 24-in.-spread anchor with a 1-in. rod had its blade bent down at a pull of 5200 lb. without any creep having been previously apparent. This type of anchor is newly

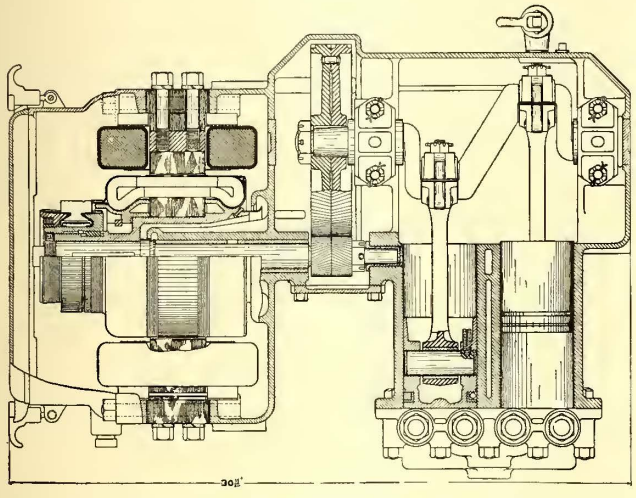
designed, being intended to hold a load of 16,000 lb. without creep in dead-end and cable-strain service, and as this test was the first to which the new design was subjected, it proved that the fins require more metal.

Compressor for Light-Weight, Low-Floor Cars

Reductions in weight and decreased clearances incident to low-floor cars have created a demand for a light-weight minimum-dimension air compressor, and such a design has recently been developed by the National Brake & Electric Company, Milwaukee, Wis., the new machines being exhibited in the company's booth at the San Francisco Exposition. This compressor is known as the National Type MW-1. It embodies all the latest improvements in air-brake compressor design, including an improved method of preventing the loss of oil or escape of oil vapor from the casing. Ease of access to all working parts, and a quick and easy method of mounting and dismounting by means of three-point suspension straps, are also distinctive features.

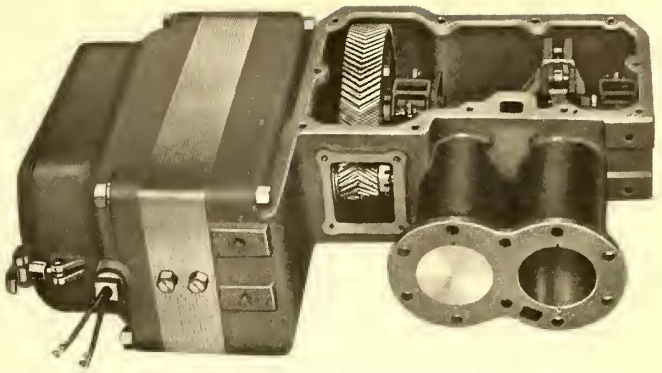


LIGHT-WEIGHT AIR COMPRESSOR—CROSS-SECTION OF COMPRESSOR



LIGHT-WEIGHT AIR COMPRESSOR—HORIZONTAL SECTION OF COMPRESSOR

The motor is of the four-pole, direct-current, series-wound type, and it is completely inclosed, equipped with two field coils and designed to operate with its frame grounded. Important features provided in the motor construction are a slotted commutator, improved commutation, increased creepage surfaces, low temperature rating, spring plates for holding field coils rigidly in place, laminated field yoke and pole faces, protection for armature winding and brush-holders mounted in fixed position on the frame. A simple method of adjusting the brush pressure is used, and provision is made for easy removal of the armature. In general, the construction is compact and rugged, and the design obtains a high efficiency.



LIGHT-WEIGHT AIR COMPRESSOR—VIEW WITH COVER AND CYLINDER HEAD REMOVED

The compressor has a displacement of 10 cu. ft. per minute when operating against 100-lb. pressure. It has an over-all height of 10¾ in., and it weighs 400 lb., or 420 lb. with the suspension irons, brackets and bolts included. The compressor is of the gear-driven, single-acting, duplex, horizontal type.

Both the motor and the compressor form a complete, compact, dustproof unit. The cylinders, crankcase, motor housing and bearing brackets are cast in one piece, which provides rigidity and insures perfect alignment. A handhole in the front or cylinder side of the crankcase gives access to the pinion, and a hinged cover with positive locking devices on the motor end of the compressor provides access to the armature, field coils and brush-holders. Two sectional drawings shown in the accompanying illustrations give the dimensions and detailed arrangement, and a halftone illustration shows the air compressor with the cover and the cylinder head removed.

Electric Shovel for Railway Work

In 1903 the Thew Automatic Shovel Company, Lorain, Ohio, manufactured its first electric shovel, and this proved to be so successful that another type was brought out, this being similar in fundamental design, but modified in many respects to adapt it to the particular requirements of electric railway service. This shovel likewise was a success and at the present time many of the larger city and interurban lines of the country use it to handle all their excavating.

The horizontal "crowding" motion which is one of the features mainly responsible for this shovel's success, has proved to be ideal for digging shallow cuts, track trenching, grading interurban roadbeds, and for speed in performing the various kinds of work encoun-

AUTOMATIC ELECTRIC SHOVEL

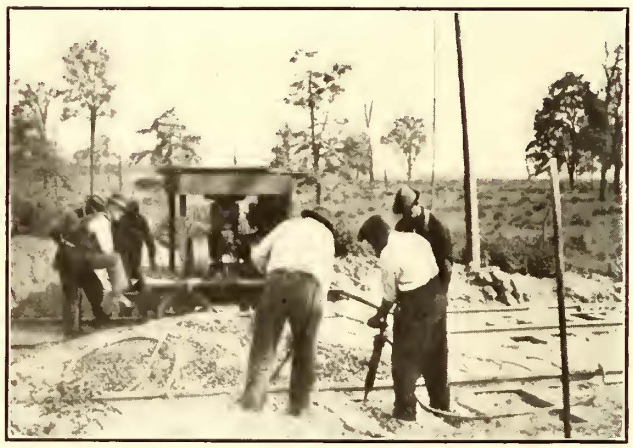
tered in city and interurban lines. By reversing the crowding motion, an extremely powerful prying action is obtained which affords the most economical method known for tearing up concrete and track ballast, the shovel being frequently used for removing old rails and ties.

It is of the full-circle-swing variety and is very compact, features of great advantage in through-cut work or places of limited working space, and it also has a special jack-knife boom that will swing under trolley wires. In addition to handling all kinds of excavating, the shovel can be used for loading coal from stock piles, for handling pile drivers and for limited crane service. It is self-propelling, operated by one man, mounted on traction or car wheels or both and has proved to be a very profitable investment for even the small railway that has comparatively little excavating work to do.

Ballasting Economy

The replacement of hand labor with machines has become the fixed policy of nearly every up-to-date electric railway company. This has led to the development among other devices of the "Imperial" pneumatic tamping machine, which is manufactured by the Ingersoll-Rand Company, New York, and which has proved to be the means of materially reducing the cost of track ballasting and maintenance.

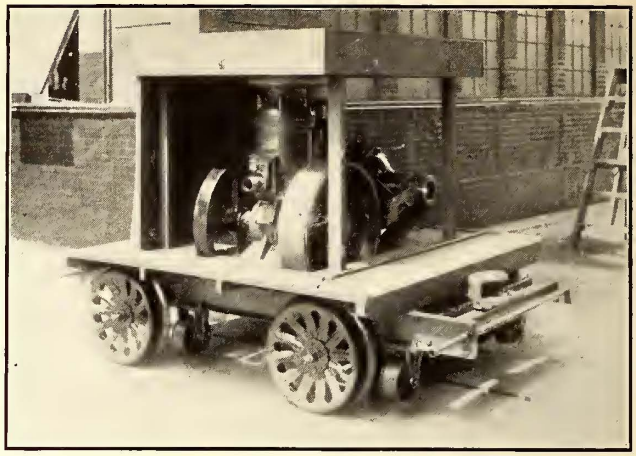
The tampers are operated in pairs, one on each side of the tie. The operation of the tool is a rapid hammer



TAMPING OUTFIT ON CLEVELAND RAILWAYS

action on the tamping bar, which in turn compacts the ballast and forces it down and under the tie. It is the practice to tamp each tie for a distance of about 18 in. on either side of the rail. Observations made on a railroad where new track was being raised from 2 in. to 3 in. on stone ballast showed an average of 240 ties tamped per nine-hour day, at a total cost of 2 cents per tie. One of the particular advantages in the use of pneumatic tampers is the ease with which they operate in cramped quarters such as around switches, frogs and cross-overs. These are places where hand tamping, to be well done, is a very difficult and in most cases practically impossible task.

For operating the tie tampers the manufacturer builds a special "Imperial" compressor unit in two styles, the ordinary outfit being the electric motor-driven type. This consists of a hand car mounted vertical air compressor with reservoir cooling system "short-belted" to an electric motor. Electric current is obtained from the trolley line, a suitable air receiver and piping being included. This compressor is designed to operate two tamping machines.



MOTOR-DRIVEN AIR COMPRESSOR FOR OPERATING TWO TIE TAMPERS

For operation where electric current is not available a gasoline engine-driven self-propelled unit may be used. This, except for the motor, is essentially the same as the compressor shown in the accompanying illustration. Gasoline-motor-driven units in use on the New York Central Railroad have effected an average saving of $150 per mile of track.

While no extensive cost data are yet available covering operation on electric roads it is to be assumed that the savings effected are well worth while. The manufacturer states that track tamped with "Imperial" tie tampers will be more evenly ballasted, that the ballast will be more firmly packed and that settlement of track will be much less and far more uniform than in the case of hand work. The machines handle stone, cinder or other ballast with equal effectiveness.

In a paper read before the Engineering Section of the British Association at Manchester recently, there were described the effects of the weather on wires of various materials. The test pieces were exposed to the London atmosphere on the roof of King's College. Commercial aluminum increased its electrical resistance by 17.2 per cent in thirteen years, and during the same time copper-aluminum alloys became so corroded as to be useless and a copper-manganese alloy increased its resistance about 10 per cent. Copper-manganese-magnesium alloys increased their resistances only 9.6 per cent in four years but had become brittle, while copper-nickel and copper-zinc-nickel alloys increased their resistance somewhat.

PNEUMATIC TIE TAMPERS IN OPERATION

LONDON LETTER

Experimental Working on the North-Eastern Railway—Regular Service on Line This Month—Additional Facts on Women Conductors

(From Our Regular Correspondent)

Experimental working on the electrified portion of the North-Eastern Railway from Shildon to Newport has commenced, and it is hoped that the whole length of what is known as the Simpasture branch from Shildon to Erimus sidings, Newport, near Middlesbrough, will be opened for traffic during October. This is the first experiment in the British Isles in handling heavy freight by electrical locomotives. The system differs from that of the electrified passenger lines on Tyneside. The current is collected by the overhead system and conducted by two bows to the locomotives. Ten engines will be employed. Nine of these machines have been completed, and have made experimental runs. They have eight wheels, each pair of wheels motor driven. The cab is in the center. The locomotives were designed by Vincent Raven, the chief mechanical engineer of the North-Eastern Railway, and were built at the Darlington works. Each locomotive is capable of hauling a load of 1000 tons. The line falls slightly from Shildon to Erimus, and average loads of 1000 tons will be taken on the outward journey. The average return load will be about 575 tons. The steepest gradient on the line is 1 in 100. The electrical equipment has been designed and carried out under the supervision of Charles A. Harrison, who recently retired as chief engineer of the company. The power is supplied by the Newcastle-on-Tyne Electric Supply Company and the Cleveland and the South Durham companies, which have erected the substations.

Investigations made by municipalities lately on the subject of female labor for tramways have resulted in eliciting the fact that throughout England there are only three large towns—Liverpool, Leeds and London—which are now not employing women as conductors on tramway cars. The reports generally are to the effect that the women are doing the work in a thoroughly satisfactory manner. In Liverpool and Leeds there seems to be some local feeling against the employment of women on tramcars. In London the County Council and the other tramway authorities have no option, because the Commissioner of Metropolitan Police objects to the employment of women, and his word is law on the matter. It is probable that but for this restriction women would in some cases be acting as conductors. Perhaps an appeal may be made to the Home Office should the scarcity of male conductors increase. If permission to employ women were granted it would probably be under restrictions as to hours, because most of the cars in the Metropolitan area are very large, so that the work of collecting fares is correspondingly arduous.

The Manchester tramways committee recently gave permission to the general manager to appoint a few women as conductors, and to report on the results. Mr. McElroy has stated that the scheme is simply an experiment. In all 602 guards have enlisted, and it has become increasingly difficult to obtain the right class of men to fill their places. Men have been engaged temporarily from the ranks of those above military age or physically unfit to join the army, but these sources are almost exhausted. Many of the older guards have been at work seven days a week, and some have given up their holidays. They cannot go on any further under existing conditions. Mr. McElroy proposes to experiment with two or three women as guards. While there is no question of the ability of women to collect fares and perform similar duties, some doubt exists as to their physical endurance, especially under adverse weather conditions.

It is now some months since the experiment of employing women as tramguards in Salford was first tried. Starting with a comparatively small number of women, the Salford authorities have gradually increased the number, until now there are fifty in the service. So far the experiment has proved a success.

The Underground Railways and the London General Omnibus Companies have in course of preparation a series of illustrated booklets dealing with notable features of London and its environs. Among the twelve subjects to be touched upon are the Tower, zoological gardens, city churches, Hyde Park, the markets and St. Albans. The first two booklets, dealing with the Tower and the zoological gardens, are ready, and may be had free of charge on application to the station masters at the Underground stations, or to the advertising manager, Electric Railway House, Broadway, Westminster, London, S. W.

All the horses of the London County Council tramways department have been disposed of, and the London County Council is abolishing the position of horse superintendent. Mr. Wilcox, who has held this office since 1903, has been transferred to the cartage department.

The Brighouse Corporation has agreed to a proposal by the Huddersfield Corporation for a postponement of the scheme whereby the latter proposed to connect its system with Brighouse and Bradford by the construction of a new line through Rastrick. It was arranged to deposit the necessary bill in the forthcoming session of Parliament, but it has since been decided by both the authorities that the scheme shall be delayed until the session of 1917.

The new trackless routes of the Mexbro' & Swinton Tramways have been inspected by the Board of Trade and formally opened for public service. The two sections extend from Mexbro' to the Manvers main colliery on the west, and to Elm Green, Conisbro', on the east. They will prove a considerable benefit to the miners who work in these localities. Each car will hold twenty-eight passengers. They have been so designed that they can run over the permanent track through Mexbro' which connects the two new sections.

Some remarkable figures showing the development of tramway traffic in Liverpool have been published recently. From Jan. 1 to Aug. 21 the receipts were £422,221 as against £443,061 last year. The passengers totaled 95,766,-114, as against 94,053,741 in 1914. In reference to the anomaly of an increase of 1,712,373 passengers being coupled with a decrease of £840 in receipts, it was pointed out that 4,483,775 free journeys had been given to soldiers on duty or on furlough, to wounded soldiers and to nurses. Those journeys, at an average fare, would yield £22,745. Liverpool was the only city giving these free journeys to any great extent. So far as was known, this enormous traffic had been conducted without a complaint.

In the annual report of C. J. Spencer, general manager of the Bradford Corporation Tramways, there is a reply to the criticisms which have been offered from time to time against the trackless trolley system. Mr. Spencer contends that it is not correct to state that either a profit is being made or a loss incurred on the trackless routes in Bradford, because the feeding value, which is an important function of the car, cannot be taken into consideration in the accounts. The routes along which the cars are run are undoubtedly routes upon which tramways could not be laid without incurring heavy capital expenditure, and this method of traction was primarily adopted because of its cheapness in capital construction, and not because it was better than a tramway. He, therefore, submits that an efficient means of transit has been afforded in districts in which regular tramway service would be too costly.

The Underground Electric Railways have for some time been at work transferring the power supply of the City & South London Railway and the Central London Railway to the immense station at Lots Road, which supplies all of the other underground railways of the company. The two railways mentioned above have only recently been acquired and both had power stations of their own. Soon, however, these power houses will be discontinued, and both of the railways operated from Lots Road by means of substations.

A report has been presented to the Bristol Council from the tramways option committee regarding the option to purchase vested in the corporation which expires on Oct. 31 next. The lords of the treasury have given it as their opinion that it is not desirable, under existing conditions, that the purchase money should be raised either by the issue of stock or otherwise, and the committee recommends the Council to take advantage of a special act of Parliament passed this year and make application to the Board of Trade for an order extending for one year the period during which the corporation may exercise its option.

A. C. S.

News of Electric Railways

STRIKE IN FORT WAYNE

Despite a Court Order the Men on the Fort Wayne City Lines Go on Strike

In the face of a temporary restraining order granted by Judge Arthur B. Anderson of the United States District Court of Indiana, enjoining labor leaders from persuading the employees of the city lines of the Fort Wayne & Northern Indiana Traction Company from violating their working agreement with the company, the men quit work shortly after midnight on Sunday, Sept. 26. Complaint was filed in the Federal Court at Indianapolis on Saturday evening, Sept. 25, by the United States Mortgage & Trust Company, New York, trustee under the mortgage of the Fort Wayne & Northern Indiana Traction Company, against Joseph C. Colgan, executive officer of the Amalgamated Association, who has been conducting the work of organizing the union at Fort Wayne, and the car service men who have signed the individual working agreement of the company, asserting that a strike was about to be called on the lines of the company in the city of Fort Wayne in violation of the contract between the company and its employees.

Judge Anderson entered an order on the showing of the United States Mortgage & Trust Company, temporarily restraining Colgan, his agents, and others who received notice of the issuance of the order, from persuading, intimidating or compelling the trainmen to leave the service of the company in a body, or in any way interfering with the operation of the cars of the company, until a hearing should be held in the United States Court on Oct. 5, at which time the court would decide whether the restraining order should be made permanent. Printed copies of the order were delivered to the employees of the company, and the order was read to Joseph C. Colgan and the members of the union at a meeting which was being held on Sunday night, Sept. 26, prior to the walkout. In spite of the order, the men failed to take out their cars Monday morning, and only about ten cars were operated in the city. About 180 car service men of the local city lines are involved in the strike, of whom about two-thirds have joined the union.

The point on which the strike was ordered, and practically the only demand made by the labor organizers, was the recognition by the company of the newly formed union. This was in violation of the "open shop" working agreement which was signed by all employees of the company on July 25, 1915, under the terms of which it was agreed that all differences arising between the company and its employees which could not be settled between them should be submitted to the Public Service Commission of Indiana, sitting as a board of arbitration. The union alleged that five men were discharged by the company for their activity in organizing the trainmen. The company had reinstated two of the men after a hearing of their cases, but refused reinstatement of three men on account of repeated violation of rules.

On the afternoon of Sept. 27, upon the showing of the United States Mortgage & Trust Company, through its attorneys, Ferdinand Winter and W. H. Latta, Indianapolis. Judge Anderson issued a citation for civil contempt against three union men identified with the strike movement. These men were ordered to appear in the United States District Court at Indianapolis on the morning of Oct. 5 to show cause why they should not pay such sums and compensation to the parties entitled to receive it as the court may find, and to answer to any other order of the court that may be made for violation of the court's restraining order.

An ordinance was passed by the City Council of Fort Wayne on Sept. 29 imposing the qualification that car crews shall have fourteen days' experience in operating cars over the streets of the city before being allowed to take out cars. The president of the Council asked the members to pass the ordinance for the avowed purpose of aiding the union to win the strike. The ordinance as passed includes a penalty of from $5 to $100 for each offense. The city attorney of Fort Wayne decided that the ordinance could not be made effective until Oct. 7, allowing time for publication.

Mayor Hosey requested the officials of the company to meet a committee of the union and arrange for arbitration. President J. M. Barrett of the company stated in a letter to the Mayor that harmonious relations with the men were interrupted by professional organizers who came to incite the strike and that the company had a contract with the employees which was violated when the men went out on strike under instructions from outside organizers. The employees had been required to return to work or lose their positions. Through their committee they declined to return to work. This was taken as final and the company secured other experienced and competent men to operate its cars who would continue as employees. These men were not strikebreakers, as reported. Mr. Barrett declined to agree to any board of arbitration other than the Public Service Commission. Mr. Barrett insisted on the company's legal and constitutional right to choose its employees for the operation and management of its business.

On the morning of Sept. 28, Sam W. Greenland, general manager of the company, stated that at least 65 per cent of the cars were being operated on the Fort Wayne city lines, some by the regular employees who had returned to work and others by new men who had been employed.

On Sept. 29 six cars were stopped and several of them stoned by strike sympathizers. A motorman was injured in this attack, but the arrest of three men, who were held under bond, seemed to quiet the disorder. Mr. Barrett promptly addressed a written appeal to Mayor Hosey for additional police protection and to put policemen on cars.

On Sept. 30 practically all regular cars were being operated in Fort Wayne in the day time, but operation was suspended in the evening to prevent violence. The feeling seems be prevail that the arrests following the recent disorder have had the desired chastening effect and that the company will be able to continue operating without further serious disorder from the lawless element.

FURTHERING THE PROGRESS OF THE TOLEDO FRANCHISE

A statement was filed with the City Clerk at Toledo, Ohio, on Sept. 23 by the committee of the Toledo Citizens' Franchise Association which filed the petitions for a referendum vote on the street railway franchise recently. In this case the statement is a review of the most important conditions of the franchise. It is as follows:

"To obtain municipal ownership of the street railway system any time during the twenty-five-year term of the ordinance, either by arbitration or condemnation proceedings.

"If the property is purchased, nothing shall be paid to the company on account of stocks, bonds or securities of the company, or for any franchise rights, and the remainder of the franchise term shall be surrendered by the company.

"The company must construct a cross-town line as directed, and equip the system with pay-as-you-enter or pay-as-you-leave cars.

"After the system has been rearranged the city shall, for a period of one year, direct the operation of the system. During this period the company shall give 3-cent fares by selling five tickets for 15 cents, which 3-cent rate of fare shall not be increased during the remainder of the term of the ordinance, provided the company receives a return of 6 per cent net on the appraised value of the street railway property.

"Children in arms, policemen and firemen in uniforms shall be carried free.

"Transfers for all passengers; extra transfers to or from cross-town lines.

"The city to regulate for safety and convenience of public and passengers.

"The company must pave, clean, sprinkle and keep the street car strip clear of snow.

"Provision is made for increased wages to employees of the company."

The Central Labor Union has gone on record as opposed

to the initiated franchise and has made arrangements to take part in the campaign against it.

Petitions for the submission of the franchise to a referendum vote at the regular November election have been filed with City Auditor McDonnall. They contain 22,135 signatures. This is equal to the entire vote cast at the recent primary election. The men who circulated the petitions reported to the Citizens' Franchise Association that most of those who signed expressed themselves in favor of the franchise.

The franchise has been indorsed by the City Civic Federation. W. W. Campbell, president of the Municipal Ownership League, who expressed himself in favor of the franchise at a recent meeting, appeared at the offices of the Franchise Association and offered to aid in the campaign for the franchise.

RHODE ISLAND COMPANY RESTS ITS CASE

In the arbitration hearings of the Rhode Island Company on Sept. 28 at Providence, James M. Swift, attorney for the company, rested the case of the road. It is not known when the matter will go to the arbitration board for decision, however, as a considerable number of rebuttal witnesses are to be called by the union. At this session evidence regarding an interview with W. D. Mahon, president of the Amalgamated Association, as advanced in connection with reports of the recent union convention at Rochester, N. Y., and bearing upon the fundamental importance and desirability of arbitration, was submitted. The board also allowed the admission of an address by Mr. Mahon published in the *Motorman and Conductor*, in which the point was made that the wages of employees and the ability of companies to pay a living wage should be determined by local conditions and not by conditions existing elsewhere.

Prof. Albert S. Richey of the Worcester (Mass.) Polytechnic Institute was again on the stand at last week's hearings. He stated that in the last eight years tenement rentals had increased about 2.4 per cent. Comparisons were made of the cost of living in 1907 and 1914, taking the former year as a basis because it was the first in which the federal government issued a bulletin on the cost of foodstuffs. Professor Richey said that during this period foodstuffs had increased 22.4 per cent in price, while in 1915 there has been a reduction of 2.6 per cent from the 1914 price level. Between 1907 and 1914 clothing prices fell off 0.4 per cent, fuel prices rose 9.8 per cent, and lighting prices fell off 24.8 per cent. The witness testified that as a whole the cost of living in 1915 was 10.4 per cent more than in 1907, but that in 1914 it was 12.1 per cent more than in 1907. With the exception of clothing, these figures applied to retail prices. The weighted average of the principal items used in reaching the estimated result was as follows: food, 51.13 per cent; rent, 26.2 per cent; clothing, 16.4 per cent; fuel, 4.68 per cent; lighting, 1.59 per cent. Yearly wages have increased on the average 19.3 per cent, or 8.9 per cent more than the increased cost of living to 1915 inclusive. It was brought out that motormen and conductors on the Boston Elevated Railway received 3 cents a day more than at Providence and worked one hour less a day than men in the latter company. For 1914 the Rhode Island Company paid 8.5 per cent of its operating revenue in taxes, whereas ten Massachusetts companies paid 6.2 per cent of their revenue. In 1915 the Rhode Island Company was obliged to pay 9.3 per cent in taxes.

A. E. Potter, president of the company, also testified that in the last year the company had run all-night cars at a cost of $49,000, on account of the franchise agreement. The cars did not pay. Among the data sheets filed at the hearing was a list of union employees who have testified at the proceedings, giving the wages and days off duty of each man for the year ending July 2, 1915. The wages varied from $396.05 to $1,320.30, and included forty-eight regular men and one spare man. Of these thirty-two earned more than $700 a year, seventeen earned more than $800, eight earned more than $900, and three more than $1,000. Only six earned less than $600. The days off, excluding Sundays and holidays, for those normally working a six-day week, varied in the table from none to seventy-eight. Mr. Potter said that the company really furnished taxicab service for a nickel as a result of the headway limitations enforced by the franchise. The night service cost the company almost 21 cents per car-mile. The company was obliged to forego the building of a new carhouse near the Pawtucket city line this year at a cost of $300,000.

ANOTHER SUBWAY COLLAPSE IN NEW YORK

The second accident within a few days occurred on subway construction work in New York at Thirty-eighth Street and Broadway on Saturday evening, Sept. 25, just before the theater crowds were beginning to drift in toward Times Square. The planking over the excavation for the new Broadway subway on the west side of that thoroughfare at Thirty-eighth Street collapsed without warning, leaving a hole about 100 ft. long, 30 ft. deep and extending from the street car tracks halfway across the width of the pavement. A taxicab standing in the street was carried down with the planking. One woman was killed and three men were badly hurt. A street car which was approaching the point of the accident had a narrow escape from being precipitated into the subway cut. The accident is unofficially ascribed to a rock slide under the sidewalk at the edge of the cut.

As a result of the accidents Mayor Mitchel has appointed a committee of twelve engineers to conduct an inquiry in co-operation with him and other city officials, with Commissioner of Accounts Walstein in general charge.

The Public Service Commission has retained a number of outside engineers to examine the cut and cover work in New York, report on its safety, and recommend means to prevent further disaster.

Much of the traffic that had been blocked by recent accidents in the construction work of the new subways was restored on Sept. 28. Longitudinal traffic was opened between Thirty-first and Thirty-fourth Streets. Broadway at Twenty-seventh and Twenty-eighth Streets was opened at night, and the crossing of Broadway and Twenty-ninth Street was opened before the rush hour on Sept. 29. This permitted the resumption of crosstown traffic on Twenty-eighth and Twenty-ninth Streets, including operation of the crosstown car lines. Seventh Avenue was opened to north and south traffic from Sixteenth to Twenty-third Street in the afternoon, and from Twenty-seventh to Thirty-first Street at night on Sept. 29. The Mayor's committee and the engineers of the Public Service Commission are considering what ought to be done on Broadway, between Thirty-fifth and Fortieth Streets. Meanwhile Police Commission Woods has issued a statement assuring the public that there never has been any question as to the security of the foundations of buildings in the shopping district of elsewhere.

B. R. T. AND INTERBOROUGH PLAY A TIE

The all-star team of employees of the Brooklyn (N. Y.) Rapid Transit Company and the team from the shops of the Interborough Rapid Transit Company, the champions of the Interborough Rapid Transit League, met in a ball game at Ebbett's field on the afternoon of Sept. 29. They played to a deadlock of six all, the game being called in the tenth inning on account of darkness. H. Tobin started the game for the Interborough team, but he gave way to Wood in the seventh inning after a pinch hitter had batted for him in the sixth. Deutsch, a port-sider, started the game for the Brooklyn Rapid Transit team. Five hits off him in the third inning for a total of four runs drove him to the clubhouse. Schroeder succeeded him and allowed only five hits up to the tenth inning. The Interborough team made thirteen hits as against ten hits for the Brooklyn Rapid Transit team. The fielding feature of the game was a one-handed catch off first base by Smith of Brooklyn, while the batting feature of the game was a home run along the third base line by an Interborough man in the third inning.

The game was staged like a regular league contest. The score board used by the Brooklyn National League team was employed to show the balls, strikes, outs and score by innings. About 7500 people witnessed the game, among them many ladies. The B. R. T. contingent was carried to the field in special cars. Music was furnished by both the Brooklyn Rapid Transit Band and the band of the Interborough Rapid Transit Company. The rivalry between the teams is extremely keen. At the game were many of the officers and department heads of the companies.

Cleveland Municipal Ownership Proposal Rejected.—The City Council of Cleveland has voted down the ordinance providing for the issue of bonds for the purchase of the Cleveland Railway. Councilman W. J. Reynolds is urging Council to have a complete transportation survey of the city made.

New Elevated Extension Opened in Brooklyn.—The Liberty Avenue extension of the Fulton Street elevated line of the Brooklyn (N. Y.) Rapid Transit Company was opened on the afternoon of Sept. 25. Lefferts Avenue will be the terminus of the line until further extensions are opened on the way to Jamaica.

Ohio Roads Denied Reduction in Tax Valuation.—The Ohio Tax Commission has declined to make any reduction in the valuations of the Cincinnati Traction Company, the Ohio Traction Company and the Columbus interurban station property. The request of the Ohio Electric Railway for a reduction of about $3,000,000 in its valuation has not been passed upon.

Briefs Filed in Missouri Right-of-Way Case.—Judge E. E. Porterfield of the Jackson County Circuit Court has received the final brief, the answer to the response of plaintiff to the brief of defendants in the application for the rehearing of the suit of the Interstate Railway against the Kansas City, Clay County & St. Joseph Railway. He probably will take a month to consider the case before rendering a decision. This is the case in which damages of $1,500,000 were awarded for alleged usurpation of right-of-way.

Massachusetts Companies to File Contracts.—The Massachusetts Public Service Commission has requested all street railways within its jurisdiction to file with the secretary of the board copies of all contracts relative to the purchase of power and of all agreements relative to the use of tracks or rolling stock, management, construction or maintenance work, between any company and any other street railway. Contracts for supplies are also to be filed, except where the volume of purchases does not exceed $5,000.

Wage Concessions Awarded by London Conciliation Board.—The claims of the London (England) County Council tramwaymen have been dealt with by the Conciliation Board, which grants various concessions worth £58,300 per annum. The demands for an extra 1s. a day, a fortnight's holiday, and the reduction of the hours of labor to eight a day are refused. As the finance committee of the Council states, the result of this award is to place a heavy additional charge on the tramways undertaking. The award has been accepted by the men by ballot.

Newport Franchise Ultimatum.—The Commissioners of Newport, Ky., have passed an ordinance fixing the rental charge for the use of the streets at $1,000 a year per mile of track until such time as the Cincinnati, Covington & Newport Railway secures a definite franchise to take the place of one alleged to have expired. This amount is to be paid in monthly installments with interest at the rate of 6 per cent on all deferred payments. The Business Men's Club endeavored to settle the difference between the city and the company, but so far no results have been reached. The company offered to accept a franchise with a rental of $3,000 a year for the use of the streets, but fixed that as the maximum.

No Suitable Signals for New York Elevated.—The Interborough Rapid Transit Company has notified the Public Service Commission for the First District of New York that its engineers have been unable to discover "on the market or in process of development" a system of signals for use on the elevated railroads which would give the maximum of safety without reducing the capacity of the roads. Last April the commission adopted a resolution directing the company to place such a system in trial operation not later than Oct. 1, 1915. The company now asks for an extension of at least six months in which to begin the experiment. Without acting upon the request for extension, the commission directed that a hearing be held on the matter on Oct. 1, 1915.

New Haven Conspiracy Trials This Month.—William Rockefeller and his associates in the directorate of the New York, New Haven & Hartford Railroad will face trial in the United States Courts at New York on Oct. 13 on the indictment found by the Federal Grand Jury last November, accusing them of a criminal conspiracy under the Sherman law. The date was set on Sept. 27 by United States Circuit Judge Hunt at the close of a session of the court at which efforts were made to secure separate trials for Lewis Cass Ledyard, Charles M. Pratt, Henry K. McHarg, Frederick F. Brewster and Alexander Cochrane. They asked to be put in the same class as George F. Baker, T. N. Vail, T. de Witt Cuyler, Edward Milligan and F. T. Maxwell.

Atlanta Paving Dispute Before Court.—Litigation between the city and the Georgia Railway & Power Company, Atlanta, Ga., is still going on in the courts over a city ordinance which requires the company to lay a concrete base for its tracks wherever the city is putting down a permanent pavement. Soon after the ordinance was passed the city attempted to enforce it by blocking up Grant Street when the company refused to concrete the track base on that street. The company then enjoined the city from blocking the street. A hearing on a permanent injunction preventing the city from interfering with the company's track construction will come up soon in the Superior Court. The company claims that crushed stone is a better base for tracks than concrete.

Combined Auto and Railway Service in Seattle.—The City Council of Seattle, Wash., has disregarded Mayor Gill's veto and has passed a bill authorizing the Board of Public Works to enter into a contract with F. M. Peterson to establish an auto bus service from the north terminus of Division "A" of the Municipal Railway to points in Ballard. Under the contract, passengers who ride on Division "A" may obtain transfers to the motor bus at Thirteenth Avenue and Nickerson Street, the north terminus, and ride into Ballard. Passengers also may board the jitney at Ballard and transfer to the municipal railways. The city will allow the operator of the auto bus 3 cents on every transfer for adults and 1¼ cents for school children. The franchise granted to Mr. Peterson is not an exclusive one. It is understood that several large motor buses will be put into operation at once.

Gulf Storm Suspends Street Car Service in New Orleans.—The property of the New Orleans Railway & Light Company, New Orleans, La., suffered from the destructive hurricane which swept up the Gulf Coast on Sept. 28 and 29. At the New York office of the United Gas & Electric Engineering Corporation, which acts as operating engineer for the New Orleans property, B. F. Wood, chief engineer, stated on Oct. 1 that the engineering company had been unable to get into any wire communication with the officials in New Orleans, but had received the following wireless message via Mobile, Ala., sent from New Orleans on Sept. 30, by S. J. Dill, a vice-president of the engineering corporation: "Severe hurricane New Orleans Wednesday. Considerable property damage. Electric and street railway service badly crippled account poles and trees down. Cleiborne, Canal and Prytania barns damaged. Clearing up lines fast as possible. Cannot give estimate of property damage. Also considerable damage to consumers' idle power house."

Agreement on Extensions in Tacoma Likely.—It is reported that an agreement will probably be reached between the city of Tacoma, Wash., and the Tacoma Railway & Power Company by which the company will extend the Pacific Avenue line to Forty-sixth Street, making connections between the Tacoma Avenue and Point Defiance lines, this in return for the use of the Tacoma Avenue fill for the South Tacoma line and a physical connection between the municipal power plant at La Grande and the Tacoma Railway & Power Company's plant at Electron. It is understood the point upon which the transaction hinges is the rate to be charged in the exchange of current in case either plant should be disabled. The construction of the South Tacoma line over the Tacoma Avenue fill would eliminate a dangerous curve and grade on one of the most heavily patronized lines in the city and shorten the time between South Tacoma and the business section of the city. It would also permit the routeing of cars direct between South Tacoma, American Lake and Point Defiance. The Pacific Avenue extension has been desired for some time, as it will provide transportation for a large residence district south of the present terminus of the Pacific Avenue line at South Thirty-fourth Street.

Financial and Corporate

SECURITIES OWNED BY METROPOLITAN LIFE

Annual Report Shows Comparative Holdings of Electric Railway, Steam Railroad, Municipal and Other Securities

The latest annual report of the Metropolitan Life Insurance Company, New York, N. Y., for the year ended Dec. 31, 1914, contains an unusual summary showing the detailed security holdings of that corporation. On the above-mentioned date, the company owned $204,790,794 of bonds and $5,423,826 of stocks. This total for bond holdings was made up of the following items: municipal bonds, $21,444,694; steam railroad bonds, $123,220,922; electric railway bonds, $25,218,845, and bonds of other public utilities, $34,906,333. The stock holdings comprised $3,086,052 of bank stock, $1,034,500 of electric railway stock, $986,945 of steam railway stock, $194,480 of other public utility stock and $121,848 of industrial stock.

The bond and stock holdings were both widely diversified as to location, thus affording an excellent example of how a large investing corporation follows out one of the cardinal principles of investment in minimizing the bad effects of local business disturbances. Moreover the distribution of the securities among the several fields was almost as might be anticipated, the only surprising feature being the way electric railway bonds and other public utility bonds outranked municipal bonds in popularity. At first glance one may wonder why the total of steam railroad bonds is so high, but when he considers that the insurance company began business in 1867 and that electric railways and similar utilities are relatively infant industries as compared to the steam railroad business, the comparatively high investment in steam railroad funded obligations is not difficult to understand. It is interesting to note that electric railway stocks are considered to rank next to bank stocks in the possession of non-speculative attributes.

DIVIDEND REDUCTION IN HARRISBURG

Cut Largely Caused by Decrease in Earning Brought About by Jitney Competition

The Harrisburg (Pa.) Railways has announced that the semi-annual dividend on the preferred stock of the company will be 1 per cent, payable on Oct. 1, as compared with the last semi-annual dividend of 2½ per cent. The Harrisburg Railways preferred stock was issued to be a 5 per cent cumulative stock until this year, when it became a 6 per cent cumulative stock. The payment for the half year just closed makes a total of 3½ per cent for the last twelve months.

Frank B. Musser, president and general manager of the company, is quoted as follows:

"The jitneys are largely responsible for the decrease in our earnings. The falling off in passenger traffic cannot be ascertained until the work for the year is gone over, but we can tell from the ordinary receipts that there is a big drop in the city lines, convincing us that it is caused by the jitney service. The jitneys do not go out of the city, confining their operations to the more prescribed city limits."

F. M. Davis, superintendent of transportation of the company, is reported to have said:

"Whenever we arranged for something big at Paxtang, the rain interfered and prevented a large attendance, and there was a corresponding loss. But the largest cutting in on the receipts was by the jitneys. Then, again, the increase in the number of automobiles, not in the jitney service, has had something to do this summer with reducing receipts. Formerly it was the custom of a man to take his entire family for a trolley ride in the summer evenings, but now he owns an auto and takes the family out for a ride in that.

"This, however, is not the first ordeal the street railway has gone through in the way of reduction of receipts. When the bicycle craze started some years ago and reached the high mark, the street railway receipts were materially reduced, but the bicycle has had its day."

ANNUAL REPORT

American Water Works & Electric Company, Inc.

The first annual statement of income, profit and loss of the American Water Works & Electric Company, Inc., New York, N. Y., for the year ended June 30, 1915, follows:

Company's proportion of net earnings of subsidiary companies (exclusive of West Penn Traction Company)	$646,012
Income from bonds and preferred stocks owned, interest on bank balances, etc.	348,462
Total gross income	$994,475
Expenses and taxes—less proportion contributed by subsidiary companies for expenses of administration and included in the operating expenses of such companies	48,353
Net earnings	$946,122
Deductions	467,484
Net income	$478,638
Net income, April 27, 1914, to June 30, 1914	89,969
Total credits	$568,607
Deduct special funds to be set aside under terms of supplemental mortgage	519,455
Credit balance remaining June 30, 1915	$49,152

With the exception of minor amounts actually received as dividends on preferred stock of some of the West Penn Traction properties around Pittsburgh, Pa., the foregoing figures do not include any earnings from those companies, as such earnings are not immediately available for the American Water Works & Electric Company, the cash equivalent having been used for construction purposes. Had the American Water Works & Electric Company's proportion of these earnings been included, the net earnings would have been increased about $232,000 and would have been approximately $1,178,122.

While the earnings for the year ended April 30, 1915, (comparisons at June 30 not being available) do not show so large an increase as previous years, they do show an increase even under the very unfavorable general business conditions which prevailed during the last year. Owing to the business depression in the Pittsburgh district, the earnings of the West Penn Traction properties were not so large as had been anticipated. In addition to this, the net income was adversely affected by the interest charges on the new money provided for a large amount of construction work, the benefits of which were reflected in the earnings to only a limited extent. The recent statements, however, show decided improvement, and with the return of normal conditions it is expected that large and increasing earnings will accrue to the American Water Works & Electric Company from its holdings of the securities of the West Penn Traction properties.

The annual report contains the following statistics relative to the West Penn Traction properties: Miles of road owned, 317.04 miles; miles of power lines (25,000 volt transmission lines)—poles miles, 396.56 miles, and wire miles, 552.71 miles; number of cities and communities served, 170; number of consumers, 23,345, and kilowatt-hour output, 154,973,930 kw.-hr.

THIRD AVENUE BOND DELAY

A statement by the Third Avenue Railway, New York, N. Y., relative to the delay in authorization of the remaining $2,650,000 of the original $6,650,000 bond issue applied for on Dec. 23, 1913, is at variance with a recent announcement made by the Public Service Commission for the First District of New York. The commission stated that while it had authorized on Feb. 20, 1914, $4,000,000 of 4 per cent bonds to cover expenditures occasioned by the acquisition of the New York City Interborough Railway and the Belt Line Railway Corporation, the remaining $2,650,000 applied for is still under investigation, as the amount asked for is to replace expenditures on plants. The commission asserted that the delay was occasioned by reason of the Third Avenue Railway's failure to comply with an order issued several years ago, requiring all corporations to file monthly statements of expenditures against capital accounts.

The Third Avenue Railway now states that its petition for approval of $6,650,000 of bonds was filed on Dec. 23, 1913, and covered expenditures for capital account from Jan. 1, 1912, to Oct. 31, 1913. The petition was amended from

time to time to cover expenditures for capital account up to Feb. 28, 1915. On Oct. 31, 1913, the commission issued a circular letter suggesting that all companies make periodical reports of expenditures against which they might later ask the approval of the commission for the issue of bonds. This has never been put in the form of an order, and no definite form of report has been suggested by the commission.

The railway, however, acknowledged the receipt of this circular letter and stated that it was the intention of the company to make such reports. Before it was possible to prepare the reports in question the application was made and the books and records were thrown open to the accountants and engineers of the commission for investigation. It then seemed that any reports of this nature would be superfluous and the matter was dropped pending the action of the commission on the application. In the present case the commission is considering expenditures made during a period of twenty-two months prior to the date of its suggestion as to the reports and during a period of sixteen months subsequent thereto. It is said, therefore, that the delay, if any, in acting on the application connot be charged to the lack of these reports. In the latest annual report of the company, President Whitridge stated that he was informed that a final decision in this case might be expected in the near future.

BIRMINGHAM REORGANIZATION PLAN ADOPTED

Committee of Bondholders Approves Plan Based on Procuring of Guaranty for Bonds—Alternative Plan Is Submitted

The committee of bondholders of the Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala., of which S. H. Cunningham is chairman, has adopted the plan of reorganization submitted by the committee headed by Charles H. Zehnder, and has given notice that it will allow dissenting depositors until Oct. 25 in which to withdraw. In the event that it is possible to procure a guaranty of the principal and interest of an issue of bonds such as is desired, the proposed new company to be created after the foreclosure sale will be organized with $4,000,000 of bonds, $1,060,000 of preferred stock and $1,590,000 of common stock. Of the $4,000,000 of first mortgage 5 per cent thirty-year gold bonds covering all the property $1,500,000 is to be issued at once. The bonds are to be dated and to bear interest from Jan. 1, 1916, but are to be redeemable at the option of the company on any interest date at 101 and interest. The $1,060,000 of preferred stock is to be a non-cumulative issue and is to have equal voting power with the common stock. The preferred and common issues are at present limited to the foregoing figures.

Holders of deposited first mortgage 5 per cent bonds of the present company will receive 50 per cent of the principal amount of their bonds in bonds of the new company, amounting to about $1,262,650. The remaining $237,350 of bonds presently to be issued will be sold for cash. The balance of the authorized issue of bonds will be reserved for betterments and additions, new equipment, etc., at 85 per cent of the cost of the same. The new stock issue will be delivered to the guarantor of the bonds as a consideration for such guaranty, any part not so used to go into the treasury of the company. The cash arising from the sale of the $237,350 of bonds will be applied to the payment of any part of the purchase price of the properties required to be paid in cash, to the expenses, disbursements and compensation of the committee and all other expenses incident to the reorganization. Any balance will be placed in the treasury of the new company.

An alternate plan or reorganization provides for a new company with the same share capital as previously mentioned, but in this case the first mortgage thirty-year, 5 per cent bonds are to be for the authorized principal sum of $1,000,000, dated Jan. 1, 1916, the present issue of which is not to exceed $250,000. In this case the $250,000 of bonds are to be sold for cash at such prices as the committee may approve to meet the expenses of the reorganization, the balance being reserved for betterments, etc. In such a case the entire authorized stock is to be deposited with voting trustees for five years. The voting trust certificates would be distributed among the holders of the deposited present first mortgage 5's, 50 per cent of the face amount of the bonds to be exchanged for preferred voting trust certificates and 60 per cent for common voting trust certificates, thus calling for $1,009,120 and $1,515,180 thereof respectively. Any balance would be turned over to the treasury of the new company. Depositors under the Sept. 15, 1914, agreement must waive the right to exchange $700 of new bonds for $1,000 of old bonds.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—The Aurora, Elgin & Chicago Railroad has decided to omit the usual quarterly dividend of 1½ per cent on the $3,100,000 of 6 per cent cumulative preferred stock. Regular payments have been made on the stock since July, 1906. E. C. Faber, vice-president and general manager of the company, is quoted as follows: "Directors and officers unanimously and formally decided that on account of the depressive effect of the European war on the company's business the company's best interests would be conserved by taking no action on the preferred dividends at this time." The depression in the Chicago industrial district, increased use of automobiles by former regular patrons and rainy Saturdays, Sundays and holidays all contributed to the reduced earnings.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—The report of traffic for the first eight months of the year over the Vancouver city lines owned by the British Columbia Electric Railway shows a decrease of nearly 10,000,000 passengers as compared with the record for the corresponding period of last year. The company's percentage payments to the city for the period show a decrease of nearly $25,000 as compared with last year. The number of passengers carried on the city and suburban lines during August was 2,357,102, as compared with 3,368,572 for August of last year. The city's percentage check on the August traffic was $3,251, as compared with $6,956 a year ago.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—The report of operation of the Columbus, Delaware & Marion Railway to the Common Pleas Court for the year ended June 30 shows the net operating income was $160,922, the operating revenue being $295,335. Eli M. West, receiver, states that his salary and attorneys' fees were included this year, whereas they were formerly made separate items. Improvements amounting to $40,000 were made. Mr. West says that the showing would have been much better had it not been for unseasonable weather, business depression and an increase in the number of automobiles used.

Denver & Northwestern Railway, Denver, Col.—The directors of the Denver & Northwestern Railway, which is the holding company for the Denver Tramway, have passed the usual quarterly dividend of one-half of 1 per cent. This payment, it is said, was discontinued in the best interests of the company and the interests as well of its stock and bond holders.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The regular dividends on the first 7 per cent cumulative preferred and the second cumulative 5 per cent preferred stock of the Elmira Water, Light & Railroad Company have been declared, but no dividend has been declared on the common stock.

Memphis (Tenn.) Street Railway.—The Memphis Street Railway has sold on a when-issued basis an issue of $1,500,000 of two-year 6 per cent collateral gold notes to a syndicate composed of Bertron, Griscom & Company, Reilly, Brock & Company, Philadelphia, and Counselman & Company, Chicago. The company has also sold to the first two houses named an issue of $600,000 of one-year 5 per cent guaranteed notes. Both issues are to be dated Nov. 1, 1915.

New York (N. Y.) Railways.—The arbitration committee appointed to fix the amount of interest to be paid on the New York Railways 5 per cent adjustment income bonds for the six months ended June 30, 1915, declared on Sept. 30 that 1.37 per cent would be an equitable payment. This interest compares with 1.288 per cent for the corresponding period last year, an increase of 0.82 per cent. The payment for the last six months of 1914 was 1.769 per cent.

Northern Electric Railway, Chico, Cal.—The reorganization agreement of the Northern Electric Railway, in addition to being agreed to by all the creditors' representatives, has been signed by all parties in interest, including the several constituent railways, the Sloss interests and certain San

Francisco banking institutions. The holders have been asked to deposit securities and claims with the Union Trust Company or the First Federal Trust Company, San Francisco, depositaries.

Philadelphia & Western Railway, Upper Darby, Pa.—As announced in the ELECTRIC RAILWAY JOURNAL of Sept. 18, 75 per cent of the stockholders of the Phoenixville, Valley Forge & Strafford Electric Railway recently agreed to the sale of the company to the Philadelphia & Western Railway. Official advices from the latter company now state that fast through electric car service between Philadelphia, Valley Forge, Phoenixville, Spring City and Pottstown is probable within a year, the Philadelphia & Western Railway to form the terminal trunk line but to take no part in financing the plan. There has been no sale of the property to the Philadelphia & Western Railway. The plan contemplates a 7-mile extension of the Phoenixville, Valley Forge & Stafford Electric Railway to a connection with the Philadelphia & Western Railway at Bridgeport. This work and new cars such as the Philadelphia & Western Railway would be willing to attach to its trains will cost, as estimated, about $300,000. The Phoenixville, Valley Forge & Strafford Electric Railway now runs 4½ miles from Valley Forge to Phoenixville. From there the Pottstown & Phoenixville Railway now operates 25 miles in two sections, one from Pottstown to Sanatoga, the other from Spring City to Phoenixville. The gap from Sanatoga to Spring City is now being filled in by a new line under construction and largely graded. With these lines joined up new fast electric service will be provided through a territory inhabited by about 40,000 persons, affording Philadelphia easier access from towns 30 miles up the Schuylkill River and giving a frequent service out to Valley Forge Park.

Tennessee Railway, Light & Power Company, Nashville, Tenn.—The $2,500,000 note of the Tennessee Railway, Light & Power Company, due on June 22, 1915, was paid at maturity. To finance this payment there was sold by E. W. Clark & Company, Philadelphia, Pa., $2,500,000 of one-year 6 per cent secured note participating receipts dated on June 22, 1915, and due on June 22, 1916, interest payable quarterly on Sept. 22. The participating receipts are issued by the Guaranty Trust Company, New York, N. Y., and certify that the holder is entitled to a certain interest in a one-year 6 per cent promissory note for $2,500,000 executed by the Tennessee Railway, Light & Power Company and secured by pledge of $2,500,000 of Nashville Railway & Light Company common stock, paying 4 per cent, and $2,500,000 of Tennessee Power Company first mortgage 5 per cent gold bonds. These securities represent an investment on the part of the Tennessee Railway, Light & Power Company of more than $5,000,000, and the income received from them is 50 per cent greater than the interest on the notes.

Trinidad Electric Company, Ltd., Port of Spain, Trinidad.—The directors of the Trinidad Electric Company, Ltd., have passed the usual quarterly dividend of 1¼ per cent. Heretofore this rate has been maintained for many years.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—The property of the Buffalo & Susquehanna Railway between Wellsville and Buffalo, on which W. R. Page, president Western New York & Pennsylvania Traction Company, had an option, was recently sold at foreclosure to M. G. Bogue, representing the bondholders' committee. It is officially stated, however, that this sale will not interfere with the option that was given on the property.

DIVIDENDS DECLARED

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Columbus, Newark & Zanesville Railway, Columbus, Ohio, quarterly, 1½ per cent, preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred.

Honolulu (Hawaii) Rapid Transit & Land Company, quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Ottawa (Ont.) Traction Company, quarterly, 1 per cent.

Porto Rico Railways, San Juan, Porto Rico, quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1½ per cent.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 75 cents, preferred.

Tidewater Power Company, Wilmington, N. C., 3½ per cent, common.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

Winnipeg (Man.) Electric Railway, quarterly, 2½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., July,		'15	$139,823	$83,689	$56,134	$54,312	‡$2,371
1 "	"	'14	153,560	93,773	59,787	53,817	‡6,468
7 "	"	'15	986,717	572,360	414,357	375,872	‡41,488
7 "	"	'14	1,067,975	624,054	443,921	366,005	‡81,060

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., July,		'15	$174,093	*$107,636	$66,457	$26,466	$39,991
1 "	"	'14	226,664	*112,435	114,229	30,995	83,234
12 "	"	'15	2,132,941	*1,236,433	896,508	341,990	554,518
12 "	"	'14	2,454,805	*1,366,180	1,088,625	363,356	725,269

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

1m., July,		'15	$26,177	*$13,297	$12,880	$4,584	$8,296
1 "	"	'14	28,309	*16,881	11,428	4,651	6,777
12 "	"	'15	263,167	*164,694	98,473	55,629	42,844
12 "	"	'14	284,921	*180,531	104,389	55,615	48,774

JACKSONVILLE (FLA.) TRACTION COMPANY

1m., July,		'15	$50,098	*$34,890	$15,208	$13,559	$1,648
1 "	"	'14	57,441	*37,341	20,100	11,437	8,663
12 "	"	'15	637,939	*445,117	192,822	155,715	37,107
12 "	"	'14	731,116	*464,829	266,287	141,553	124,734

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1m., July,		'15	$74,851	$38,598	$36,253	$20,339	$17,154
1 "	"	'14	79,998	41,807	38,191	20,267	19,604

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m., July,		'15	$151,850	*$92,663	$59,187	$25,094	$34,093
1 "	"	'14	188,715	*104,801	83,914	23,179	60,735
12 "	"	'15	1,782,860	*1,045,332	737,528	293,293	444,235
12 "	"	'14	2,169,475	*1,215,255	954,220	276,586	677,634

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m., July,		'15	$23,196	*$14,400	$8,796	$6,286	$2,510
1 "	"	'14	24,250	*16,658	7,592	6,600	992
12 "	"	'15	291,458	*184,201	107,257	80,601	26,656
12 "	"	'14	308,279	*197,246	111,033	80,562	30,471

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., July,		'15	$21,941	*$12,627	$9,314	$6,026	$3,288
1 "	"	'14	24,405	*15,449	8,956	6,054	2,902
12 "	"	'15	246,080	*150,518	95,562	73,748	21,814
12 "	"	'14	285,521	*178,166	107,355	72,743	34,612

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., July,		'15	$664,564	*$402,137	$262,427	$153,395	$109,032
1 "	"	'14	726,373	*423,156	303,217	156,440	146,777
12 "	"	'15	7,846,588	*4,804,799	3,041,789	1,888,957	1,152,832
12 "	"	'14	8,691,638	*5,065,591	3,626,047	1,844,296	1,781,751

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., Aug.,		'15	$260,792	*$158,298	$102,494	$58,560	‡$44,078
1 "	"	'14	255,488	*155,057	100,431	57,063	‡43,456
8 "	"	'15	1,968,619	*1,218,592	750,027	459,648	‡291,451
8 "	"	'14	2,003,459	*1,231,906	771,553	450,112	‡322,677

SAVANNAH (GA.) ELECTRIC COMPANY

1m., July,		'15	$67,285	*$44,306	$22,979	$21,608	$1,371
1 "	"	'14	73,627	*48,294	25,333	21,265	4,068
12 "	"	'15	806,732	*522,568	284,164	257,688	26,476
12 "	"	'14	850,681	*566,457	284,224	253,958	30,266

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m., July,		'15	$448,858	$215,831	$233,027	$143,375	‡$98,312
1 "	"	'14	443,816	212,237	231,579	136,398	‡101,595

*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

JITNEY JOTTINGS

New York's Jitney Law Sustained by Supreme Court—Richmond Company Suspends Jitney Service

With the filing in the Albany County Clerk's office on Sept. 27 of an order by Supreme Court Justice Hasbrouck the Public Service Commission of the Second District of New York finds the so-called jitney bus law sustained in all its principal phases. As the result of the decision, rendered on Sept. 27, the courts in this and other cases have held that the following classes of vehicles must secure the consent of local authorities and come to the commission under the new law for a certificate of public convenience and necessity, namely: (a) A bus line. (b) A stage route. (c) A motor-vehicle line or route. (d) A vehicle in connection with a bus line, a stage route, a motor-vehicle line or route. (e) A vehicle carrying passengers at a rate of fare of 15 cents or less for each passenger within the limits of a city. (f) A vehicle carrying passengers in competition with another common carrier which is required by law to obtain the consent of the local authorities of said city to operate over the streets thereof.

This classification was made by Supreme Court Justice Brown in a case in the Niagara County Supreme Court wherein Burt G. Hurtgam was restrained from operating a bus line from Lockport to Olcott Beach, though he charged a fare of 50 cents and only part of his line was within the city of Lockport. The result of this decision was to make practically all operators of bus lines in the cities of the State liable to procedure under the penalty clause of the public service commissions law unless they secure the permission of the city authorities and the certificate of the Public Service Commission.

In Justice Hasbrouck's decision, filed on Sept. 27, he holds that in the case of Elmer G. Booth, Rochester, the license of the city of Rochester, granted Booth before this law took effect, does not relieve Booth from the necessity of getting the consents of the city authorities under the new law and of coming to the Public Service Commission. The court says: "The license, being the child of the statute and not of the nature of a contract nor of a class known as vested rights, is susceptible of revocation or annulment at any time by the creating power" (the Legislature).

This decision will compel all of the many Rochester jitney owners to conform to the new law, whether or not they possess an old public-vehicle license from the city.

The Public Service Commission for the Second District of New York has permitted the Troy Auto Car Company to renew its application for a certificate of convenience and necessity under the jitney law for its bus line in Troy and Lansingburgh. The petitioning company has amended its certificate of incorporation and says it wishes to proceed with the application, which was opposed by the street railway employees of Troy.

Frederick B. Hemingway, Allen Brothers and Irving K. Weed have discontinued the operation of the jitney bus line they were alleged to be running in competition with the Poughkeepsie City & Wappingers Falls Electric Railway. The Public Service Commission has permitted the company to withdraw the application it had made to the commission for permission to sue the jitney operators under the recently enacted jitney bus law.

Complaint by the jitney owners of Philadelphia who were forced to discontinue their business because of Council's ordinance of July 2 was again heard by the Common Pleas Court, this time by Judges Audenried, Carr and Finletter, Court No. 4. Argument was heard for and against the demurrer of City Solicitor Ryan to the bill in equity filed by the Union Motor Bus Company against the city authorities to restrain them from enforcing the ordinance. Assistant City Solicitor Wolf supported the demurrer by contending that the complainant's bill did not advance sufficient reasons for having the ordinance declared unconstitutional, nor did the bill point out the extent of the injury alleged to be worked the jitney owners by the ordinance. The fact that a number of automobiles were purchased by some of the complainants on the installment plan, and that the enforcement of the ordinance prohibited them from earning sufficient money to keep up the payments as they became due, did not show, according to Mr. Wolf, the necessity for equitable intervention by the court. Mr. Wolf said the ordinance did not discriminate against the jitneys and in favor of the taxicabs as alleged in the bill. He also said that the right to operate a jitney was a concession granted by Councils with the authority of the Legislature, and therefore Councils had the right to restrict their operations. Decision was reserved.

Under the guise of the People's Motor Club, the jitneymen of Philadelphia, Pa., think they see a way under the so-called membership plan of operating without paying a license or putting up the required $2,500 bond. All that is necessary now to become a member of the club and enjoy its privileges is to pay 25 cents "dues." This payment carries with it a strip of five tickets, which are each good for a jitney ride. The headquarters of the club are in the Parkway Building. It is a small office. There President Paul Randolph and a young woman were busy recently selling tickets to new "members" and in registering drivers who wish to "hire" their cars to the club.

The Motor Transit Company, a subsidiary of the Virginia Railway & Power Company, Richmond, Va., has announced that it will discontinue operation of its jitney cars. In its formal announcement the Motor Transit Company states that it has lost in actual operation more than $700 a month, without providing for interest and depreciation, which amount to more than $15,000 additional. It is impossible, the company states, to operate cars on a 5-cent fare without heavy and increasing loss, and the company is therefore forced to abandon its motor service.

The City Council of East Liverpool, Ohio, has passed the jitney ordinance on final reading and the measure is now before the Mayor for signature. The new measure contains but few changes from the original draft. Instead of making the city license $10 as before, the new measure taxes the jitney owners $25 annually to operate. This tax will be paid into a fund for the improvement of streets, according to the second measure, which differs from the first in that it stated that such money should be paid to the general fund. Another section which makes the latter ordinance differ from the first is the section requiring all owners to provide a $5,000 bond, which may be furnished by another party. At the request of Councilman Horton this clause was made to read that only a reliable bonding house would be accepted as legal in order to operate the buses.

Standing by his former decision in the jitney ordinance suit, in Portland, Ore., Circuit Judge Bagley states that he still firmly believes that the City Council has no authority to stop the referendum by attaching an emergency clause to an ordinance. Pending an appeal to the Supreme Court, the city of Portland was enjoined from enforcing the ordinance regulating jitneys. A decision is expected in the Supreme Court within a month.

Two injunction suits filed in the Sixty-eighth District Court against the city of Dallas, Tex., seeking to prevent the operation of the jitney ordinance have been dismissed for want of prosecution.

A new ordinance, passed by the Common Council of Jamestown, N. Y., authorizes the operation of jitney bus lines under modified restrictions from those at first proposed which were held to be prohibitive. The new ordinance reduces the license fee to $10 and $20 for the two size cars, and the indemnity bond from $10,000 to $1,000 for the small car, and $2,000 for the large car.

The Pacific Coast Casualty Company, which has been doing practically all the jitney bus bonding business in the State of Washington under the 1915 bonding law, has notified H. O. Fishback, state insurance commissioner, and I. M. Howell, Secretary of State, that it has temporarily discontinued doing jitney bus bonding business. This action is taken, it is understood, in order to permit the consolidaton of a number of companies. In the meantime the jitney bus operators are finding it difficult to secure bonds required by the state law.

The Auto Bus Protective Association of Ohio was organized at Youngstown on Sept. 24. This is intended as a State organization, composed of representatives of various local associations. The next meeting, it is said, will be held in Columbus.

PUBLIC SCHOOL SAFETY WORK IN BROOKLYN

Summary of Report for Year—Crusade to Continue—New Plans Made for Coming Year

George W. Wingate, president of the Brooklyn Institute for Safety, has submitted a report of the activities of the institution during the public school year of 1914-1915, together with the work in the vacation schools and playgrounds during the summer term of 1915. The fiscal year of the Brooklyn Institution for Safety, beginning on Oct. 1, brings the inauguration of each year's work of the insitution into accord with the approximate date of the opening of the schools in the fall and enables the work of the regular school year and of the summer term in the vacation schools to be considered together. The Brooklyn Institution for Safety holds the permission of the Board of Education of the city of New York to conduct public safety instruction in the public schools. This activity has been delegated by the institution to the bureau of public safety of the Brooklyn Rapid Transit Company, which has maintained a lecturing staff and carried out such instruction with the approval and under supervision of the directors of the Brooklyn Institution for Safety.

During the regular session of the public schools ending in June last, the bureau of public safety delivered lectures in 173 public schools in Brooklyn, reaching approximately 200,000 children in the lower grades and 15,000 in the high schools. In addition to this, safety lectures were given in fifty-four parochial schools to approximately 40,000 pupils. These safety lectures were generally accompanied by an exhibition of stereopticon slides related to the subject of the lecturers' addresses and where schoolhouse equipment permitted, by the presentation of safety motion pictures, particularly the film, "The Price of Thoughtlessness," and the film, "The Locked Door," both of which were produced through the co-operation of the institution. It is estimated that about 95,000 children were reached with the motion pictures during the year. In forty-five schools safety patrols were organized with a total membership of 800 boys, and forty-two "Careful Clubs," with a membership of 770 were organized among the girls in the schools.

The safety patrols have been instructed through the co-operation of teachers in certain specified patrol duties in and about the schoolhouses in the hours of assembly and dismissal, whereby protection is given to the younger children while coming to and going from school; they have been used as a means of obtaining reports of accidents or dangerous conditions observed by the children and as a general stimulant of thought for safety in the schools where they have existed. Similarly the "Careful Clubs," without attempting specific patrol duties in and about the schools, have been made agencies of safety thought and safety endeavor among the girls.

There were distributed in the schools 190 safety bulletin boards and attractive safety bulletins from time to time were issued for posting on these boards as well as a supply of blanks for the reporting of accidents and dangerous conditions observed by the children.

Upwards of 400,000 safety buttons were distributed along with about 235,000 copies of a safety leaflet in story form. In seventy schools prize essay competitions were held on subjects related to safety, the prize being in each case a picture, book or other useful or decorative object suggested by the principal. These prizes were presented to the schools in the name of the child adjudged to be the winner of the essay contest.

As in the previous year a large safety calendar was provided for every school classroom in Brooklyn, public and parochial, where such calendars could be displayed, approximately 8500 of such calendars being provided, and thus effectively placed before the school population of the borough. About 1000 small calendars were distributed to various organizations and individuals engaged in safety work throughout the country with whom the institution has been exchanging safety ideas and material.

In addition to the work in the public schools the bureau of public safety developed to a considerable extent lectures among social and civic organizations. Upwards of 100 such lectures were delivered to approximately 40,000 adults. At these lectures safety motion pictures were exhibited where possible and for this purpose educational films, such as, "The Workman's Lesson," and "The Crime of Carelessness," were presented through co-operation with the National Association of Manufacturers and other organizations engaged in summer work.

The summer term in the schools and playgrounds began on July 6 and came to a close on Aug. 20. The instruction at these playgrounds was of an informal and personal nature, and the circumstances under which the lecturers met the children were particularly well adapted to bringing the safety lessons home to the children in a personal and effective way.

At many of the playgrounds parents as well as children were addressed. Safety lectures were given between July 6 and Aug. 20 in sixty-two of the sixty-six vacation schools and playgrounds, about 50,000 children and 1100 adults being reached. Safety buttons were distributed to these chilren as well as to the children in attendance at the public schools.

The president of the Brooklyn Institution for Safety has served during the year as a member of the Mayor's central committee on street traffic and safety. In this capacity he has presented the experience of the institution gained in its public safety work in Brooklyn to this committee, which advises the Mayor and the Police Commissioner in respect to safety problems throughout the city. Specifically he has transmitted to the Mayor's central committee on street traffic and safety suggestions as to a plan of co-operation between various municipal authorities and local interests in working for child safety in public streets and places. The president of the institution has also prepared for the information of the president of the Board of Education, based upon the work done in the Brooklyn Public Schools, a plan for the proposed extension of the safety patrol system in the schools.

The Brooklyn Rapid Transit Company has provided funds to continue the work in the public schools during the coming year. The crusade for the next year, as approved by the Department of Education of the city and the directors of the Brooklyn Institution for Safety, will embrace a new feature in the shape of district safety work, as well as containing the safety instruction which has been given in the public schools.

The studies which have been made by the bureau of public safety of the Brooklyn Rapid Transit Company in conjunction with the Brooklyn Institution for Safety have indicated that the hazard of street accidents in Brooklyn is most severe in certain well-defined districts where tenement houses and similar causes of congestion abound. Many of these districts are comparatively small and consist of a few blocks on a given street or group of streets, within which accidents, particularly to children, are very common. Last spring, for the purpose of trying out the possibilities of safety work in such congested districts, a section of Myrtle Avenue between Tompkins and Sumner Avenues was taken up by the bureau of public safety. Co-operation was established between police and public school authorities, churches and local organizations. Literature was distributed and meetings held and the population, old and young, was greatly impressed with the work carried out in its own behalf.

The success of this experiment has led the Institution for Safety through the bureau of public safety to feature similar work for the coming year. The so-called danger sections are now being checked up, and during October each one of these districts will be taken up in its turn and systematic safety work with the co-operation of both public and private agencies will be conducted therein. While the district safety work is built up around the most common types of street accidents it is not restricted to such hazards —the dangers of fire and firearms, of falls, drowning, etc., are all emphasized.

In the public schools the safety patrols and careful club feature have been organized during the last two years and will be continued to further development by the bureau of public safety.

Negotiations are now under way for the production of a new safety motion picture to supplement the film, "The Price of Thoughtlessness" which has been in constant use in safety work of Brooklyn for nearly two years.

BAY STATE FARE HEARING PLANS

Protracted Investigation Anticipated on Application to Increase Fares on 954-Mile Suburban System

The Massachusetts Public Service Commission has announced that hearings on the proposed general increase in fares upon the Bay State Street Railway will begin on Nov. 8. The new schedules were to become effective on Nov. 1, but under the statute the commission is allowed six months in which to consider the matter. The proposed rates will therefore be suspended for the full period unless otherwise ordered. In view of the large area affected by the case, the size of the company, and the number of municipalities concerned, it is expected that an exhaustive and protracted investigation will be necessary.

At the request of the commission the company has had copies of the new fare schedules printed. These are being sent by the board to the local authorities in the cities and towns affected. To assist counsel the board is also supplying those desiring them copies of its opinions in recently decided fare cases, and has expressed itself ready to welcome any suggestions as to methods of investigation, or to principles and rules which ought to be applied in dealing with the Bay State case.

On the fourteen divisions of the company in Massachusetts there are about 875 fare limits, single-fare units predominating over through fares. By the new schedule local fares in some municipalities would be increased from a 5-cent to an 8-cent unit, notably in Reading, Wakefield, Stoneham, Woburn and Melrose, and in part in Winchester, Brockton, Quincy, Milton, Hingham and elsewhere. On the Reading and the Woburn divisions, for example, nearly 100 fares are listed with a rate per mile ranging in general from 2.47 cents to 3.41 cents. On the Lawrence and Haverhill divisions there are several zones where the per-mile rate will exceed 2 cents, and also on the Gloucester division. On the Salem division the rate usually runs below 2 cents per mile, and on the Lynn division twenty-four zones are below 1 cent and thirty-one above 1 cent per mile. On the Chelsea division the rate runs from slightly below 1 cent to a maximum of 4.84 cents per mile.

Near-Side Stop in Elgin.—The City Commission of Elgin, Ill., has ordered that all street cars must hereafter stop on the near side.

Exchange Arranged Between Canadian Lines.—Arrangements have been completed between the London & Port Stanley Railway, London, Ont., and the Wabash Railway, for an interchange of freight and passenger traffic.

Loans of $25,000 in St. Louis in August.—The Savings & Loan Association, organized among the employees of the United Railways, St. Louis, Mo., loaned to its members in August $25,000. The membership of the association now numbers 2151. The loans made during the last eight months total $146,000.

Motorman Exonerated.—Sidney Boyt, motorman of the car of the International Railway which met with disaster at Queenstown Heights, Ont., on July 7, has been found not guilty of the charge of manslaughter lodged against him by the dominion police authorities before Magistrate Campbell in St. Catharines, Ont.

Cincinnati Suburban Fare Case Before Ohio Supreme Court—The case of the Interurban Railway & Terminal Company, Cincinnati, Ohio, against the city of Cincinnati, involving a reduction of fare to 5 cents between Pleasant Ridge and the end of the line, was heard in the Ohio Supreme Court on Sept. 23. Attorney Frank Dinsmore appeared for the company and Walter M. Schoenle, city solicitor, for the city. The company lost in the lower courts and at present an injunction prevents it from collecting more than 5 cents between the points mentioned.

Publicity for Louisville Suburban Lines.—Plans for publicity by which Louisville people can be induced in greater numbers to use the country cars of the Louisville & Interurban Railway in search of views and recreation are being considered by R. H. Wyatt, general freight and passenger agent of the company. At his suggestion the officials of the company have taken under advisement a plan of displaying in the city cars views of picturesque landscapes with statements to the effect that such and such a view is to be seen on the LaGrange, the Shelbyville, the Prospect or other line at this or that point.

Semaphore Traffic System for Louisville.—Louisville's police authorities are about to make some experiments with the semaphore system of traffic regulation at the busy street intersections, by way of increasing the efficiency of the traffic officers. It is expected that the first installation will be made at Third Street and Broadway. This is a busy corner with much automobile and street railway traffic. Large apartment houses here have produced many complaints that the whistle of the traffic officer is disturbing to the occupants. The safety-zone system, which has been in effect for a year or more, has proved so uniformly successful that the police authorities are interested in whatever comes along in the way of an improvement.

Three-Car Trains Operated in St. Louis.—Expansion of business in Granite City, Madison and Venice, Ill., immediately across the river from St. Louis, Mo., necessitated an increase in the street railway service furnished by the St. Louis Electric Terminal Railway, and to meet this demand three-car trains have been put in operation. These trains consist of a motor car, equipped with GE-201 or Westinghouse 306 motors, and two trail cars. The motor cars and trailers are all single end with full vestibules on both ends. The motor cars were described in the Electric Railway Journal of May 28, 1910, page 951. These cars furnish a combined seating capacity of 126. They are 50 ft. long over the bumpers and 9 ft. 3 in. wide over the side sheathing. The three-car trains are operated for the accommodation of passengers living in St. Louis and employed in a number of large industries on the Illinois side of the river. Safety appliances on these cars include a green signal light to indicate to the motorman that the vestibule doors are closed. The cars are wired in series, making it necessary for all doors on the motor and trailers to be closed before the signal light shows in the motorman's cab. All cars are equipped with folding doors and steps. The trailer capacity has been increased by removing the bulkheads between the vestibules and the body of the car. The satisfactory results obtained from the operation of these three-car trains has induced E. D. Bell, general superintendent of the company, to decide to increase the number of trains of this type as business justified.

Eighty-five Autos Driven Through Lowered Gates on Long Island Since Jan. 1.—Exactly $4,327.01 has been spent in the last three months by the Long Island Railroad for 176 newspaper advertisements in New York City, Brooklyn and on Long Island, to make people more careful in driving automobiles over grade crossings. Twenty-five crossing gates on Long Island have been painted with black and white stripes. Heavy gates made of telegraph poles have been placed at one of the crossings leading to Long Beach and another at Central Islip. Similar gates will be placed at other crossings. Thirteen large signs, most of them electrically lighted at night, have been displayed over the main roads on Long Island warning automobile drivers of the danger they run in going over railroad grade crossings without stopping to look for trains. Since the first of the year eighty-five automobiles have been driven through lowered crossing gates. In fifty of these cases the gates were broken by the machines. These gates were lowered to warn automobile drivers of approaching trains. J. A. McCrea, general manager of the Long Island Railroad, said on Sept. 24: "We have devoted much time and thought during the past summer to the question of how most effectively to prevent automobile accidents at grade crossings, and we have adopted every suggestion that was at all feasible. It is quite clear, however, from the number of accidents due to reckless driving which we have had reported to us in the past summer, that the railroad alone will not be able to do very much. As long as there are crossings—and certainly all the grade crossings on Long Island cannot be eliminated at a moment's notice—accidents will occur unless the State and township authorities take up the subject vigorously. We are going to continue our campaign, and I hope next summer we will be able to think of something sufficiently startling to arrest the attention of those reckless drivers with whom it seems utterly useless to reason."

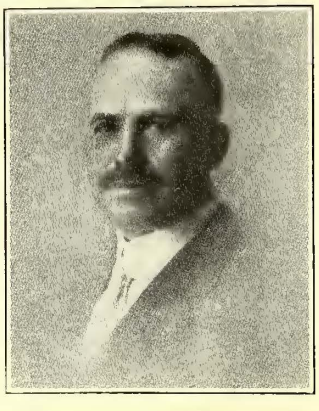
Personal Mention

Mr. Edward H. Dewey of Nampa has been elected president of the Boise Valley Traction Company, Boise, Idaho, the corporation that took over the Idaho Traction Company's lines following the receiver's sale. This company, which forms a part of the power merger, will be operated as a separate unit.

Mr. T. Lee Miller, for the last four and a half years associated with the Toledo Railway & Light Company, Toledo, Ohio, in the capacity of assistant to the president and manager in charge of operations, has been placed in charge of the Sangamo Electric Company's New York office. Mr. Miller was graduated from the University of Cornell, class of 1909, and established connections with Warwick, Mitchell, Peat & Company, accountants, where he originated and established the present efficiency system for the Buick Motor Company.

Mr. J. H. Prior has been appointed chief engineer of the State Public Utilities Commission of Illinois. Mr. Prior was educated at the Armour Institute of Technology and the University of Chicago. He was engineer of design of the Chicago, Milwaukee & St. Paul Railway from 1905 to 1914, engaged in the design of all classes of railroad structures, structural betterments, and track elevation work for that company. In 1906 and 1907 he made valuations of that company's structures in Minnesota and South Dakota, required by the railroad regulatory and taxing bodies of those States. Previous to his appointment as chief engineer, Mr. Prior was assistant chief engineer of the commission he now serves. He is a member of the American Society of Civil Engineers and has been from time to time an officer of the Western Society of Engineers.

Mr. John A. Beeler has resigned as vice-president and general manager of the Denver (Col.) Tramway, in which capacities he will be succeeded by Mr. F. W. Hild, as noted in the next column. Mr. Beeler was born at Towanda, Ill., on June 28, 1867, and received his early education in the public schools of Cincinnati. He entered the street railway field in 1886 as an assistant in construction work with the engineering department of the Vine Street Cable Railway, Cincinnati. Continuing in cable construction work, he went to Denver, Col., in 1888 as assistant engineer with the Denver Tramway. In 1890 he was made constructing engineer for the Denver Tramway, which was then actively engaged in building electric lines. In 1898 he was elected chief engineer of the Denver City Tramway, which represented a merger of all the railways, cable and electric, in Denver. In 1902 he was elected vice-president and general manager of the system. Mr. Beeler was among the first to adopt a double-truck trail car for handling rush-hour loads or peak traffic. He also introduced a number of other novel features that have created much interest in the railway field. One was the employment of student conductors, selected from the local universities and high schools, to man the trailers operating during the periods of heaviest travel.



J. A. BEELER

Mr. Edmund S. Davis, chief engineer of the Boston (Mass.) Transit Commission, who is one of the engineers called upon by the New York Public Service Commission to investigate the construction conditions on the new subway system now being built in New York City, was born in Northfield, Vt., sixty-seven years ago. From 1876 to 1879 he was employed on the Boston water works system, and from 1880 to 1890 was located in Colorado, where he served in the United States surveyor-general's office at Leadville and Denver. In 1890 he located in Boston and was associated with Mr. Howard A. Carson in the formation of the Boston Transit Commission's engineering staff. All the subway construction in Boston has been under Mr. Davis as principal assistant to Mr. Carson, and on the latter's retirement in 1909 Mr. Davis became chief engineer of the board. The building of the Boylston Street subway under the leaning tower of the Old South Church in Copley Square was carried through under his direction. This is, perhaps, the most difficult task the commission has had in the twenty years of its activity.

Mr. F. W. Hild, general manager of the Portland Railway, Light & Power Company, Portland, Ore., has resigned from that company to become vice-president and general manager of the Denver (Col.) Tramway. Mr. Hild has been general manager of the Portland Railway, Light & Power Company since March 15, 1911. This company operates 286 miles of electric railway and does a general lighting and power business in Portland and vicinity. Mr. Hild was in charge of the railway, light and power operating departments of the company. He was formerly assistant general manager and chief engineer of the Havana (Cuba) Electric Railway. He was graduated as an electrical and a civil engineer from Union College at Schenectady, N. Y., in the class of 1898 and was for a time connected with the General Electric Company. While in the employ of this company Mr. Hild assisted in the important rehabilitation work carried out by the Twin City Rapid Transit Company, the Kansas City Railway & Light Company and the Chicago Edison Company. Mr. Hild was one of the originators of the idea of organizing an association to represent the electric railways on the Pacific Coast and was elected president of the Pacific Coast Electric Railway Association at its organization in San Francisco, Cal., on April 1, 1913. A farewell luncheon extended to Mr. Hild on Sept. 30 by the Portland Chamber of Commerce was attended by several members of the "Red Special" party of delegates to the San Francisco convention who were the guests that day of the officers of the Portland Railway, Light & Power Company. President C. Loomis Allen of the American Electric Railway Association, Mr. W. F. Ham, vice-president of the Washington Railway & Electric Company, Washington, D. C., and Mr. Charles C. Pierce, vice-president of the American Electric Railway Manufacturers' Association, addressed the members of the chamber on the electric railway problems of the day. Mr. F. T. Griffith, president of the Portland Railway, Light & Power Company, then paid a tribute to the ability of Mr. Hill, who replied in a fitting speech. Mr. Hild succeeds Mr. John A. Beeler with the Denver Tramway. The Denver company operates 230 miles of line.

F. W. HILD

OBITUARY

Rufus R. Canfield died on Sept. 23 at Sequim, Wash. He was sixty-one years of age. Mr. Canfield assisted in building the electric railway at Windsor, Canada, and became superintendent of the line. Later he was connected with the Detroit & Northwestern Railway, of which he was an officer until the merger of the company with the Detroit (Mich.) United Railway. He then became superintendent of the Syracuse, Lakeside & Baldwinsville Railway, which was succeeded after sale under foreclosure by the Syracuse, Lake Shore & Northern Railroad and is now included in the system of the Empire United Railways, Inc. Mr. Canfield removed to Sequim in 1908.

T. J. Hanlon, Jr., manager of the Pensacola (Fla.) Electric Company, has written the following letter to the City Commissioners regarding tickets for school children: "We have received from our Boston office authorization to sell a 3¾-cent school ticket as was recently requested by you. These tickets will be sold in books of forty each, and will be good on school days only, between the hours of 8 a. m. and 5 p. m."

Construction News

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

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

RECENT INCORPORATIONS

*City Electric Company, Albuquerque, N. M.—Incorporated in New Mexico to operate a railway system, also to operate trackless vehicles and do general electric power business. Offices, Albuquerque. Capitalization, $250,000. Incorporators: George Roslington, Lloyd E. Sturges and E. L. Groze.

FRANCHISES

Ceres, Cal.—The Tidewater & Southern Railroad has received a franchise from the Council to construct a line through Ceres. The company is building a line from Stockton to Modesto and Turlock. The company has asked the Council of Stockton for a franchise to construct a single track along Sutter Street from Hazelton Avenue to Main Street.

Los Angeles, Cal.—Bids will be received until Oct. 6 by the Council of Los Angeles for a twenty-one-year franchise on San Pedro Street and South Park Avenue from Thirtieth Street to Slauson Avenue. Bids will also be received for a twenty-one-year franchise on San Pedro Street and South Park Avenue from Thirtieth Street to Florence Avenue.

Cambridge, Mass.—The West End Street Railway has asked the Council for a franchise to relocate its track on Garden Street at Mason Street and at Concord Avenue, and on Huron Avenue from Concord Avenue to Aberdeen Avenue.

Farmington, Mich.—Frederick McCain, Detroit, has asked the Council for a franchise to construct an electric railway between Farmington and Royal Oak.

Collegeview, Neb.—The Lincoln Traction Company has received a twenty-five-year franchise from the Council to construct a loop around block 25 in Collegeview.

Yorkville, N. Y.—The New York State Railways has received a franchise to place its tracks in the center of Whitesboro Street, Yorkville, and on the easterly and westerly approaches of the new halfway bridge.

Elyria, Ohio.—The Cleveland, Southwestern & Columbus Railway is negotiating with the city of Elyria for a renewal of its franchise for twenty-five years. The company has agreed to pay a portion of the expense of eliminating the railway crossing on Bridge Street. Peter Witt, street railway commissioner of Cleveland, has suggested to the city that the company put 1 cent out of each 5-cent fare into a trust fund to belong to the city and be used for extensions and betterment of service.

Providence, R. I.—The Rhode Island Company has received a franchise from the Council to relocate its tracks on Narragansett Boulevard from the side to the center of the street.

El Paso, Tex.—The El Paso Electric Railway has received a franchise to construct a line on Piedras Street from Alameda Street to Boulevard Street.

Galveston, Tex.—The Galveston Electric Company has received a franchise from the Council to construct single track beginning at a connection with its present track on Fifty-sixth Street and Avenue V½, extending on Avenue V½ to Fifty-third Street, connecting with the company's track at Fifth-third Street and Avenue V½. The franchise was granted on condition that the company abandon its track on Fifty-third Street from Avenue V½ to the beach, on Fifty-sixth Street from Avenue V½ to the beach and on Avenue W½ from Fifty-third Street to Fifty-sixth Street.

TRACK AND ROADWAY

Los Angeles (Cal.) Railway.—Orders have been issued to this company by the Board of Public Utilities to install a 1500-ft. stretch of double track on the Temple Street line, beginning at Robinson Street, to provide proper siding accommodations for that line.

Pacific Electric Railway, Los Angeles, Cal.—This company will electrify the municipal belt line at the harbor, 6½ miles. This was the only bid received for the work.

Municipal Railways of San Francisco, San Francisco, Cal.—A bill ordering the construction of an extension of the Geary Street municipal railway across Golden Gate Park from Tenth Avenue and Fulton Street to Fourteenth Avenue and Lincoln Way, and thence to Judah Street, was passed by the Board of Supervisors on Sept. 20 with only one dissenting vote. At the same time the supervisors adopted a resolution requesting that the Park Commission grant permission for the construction of the proposed extension of the municipal railway across Golden Gate Park.

Boise (Idaho) Railroad.—This company has awarded a contract to S. E. Burnham for the construction of an extension from the present terminal of the Thirteenth Street line to connect with the Soldiers' Home line.

*Hillsboro, Synthiana, Bainbridge & Chillicothe Traction Company, Hillsboro, Ill.—This company made application to the Public Utilities Commission of Ohio on Sept. 23 for permission to issue $500,000 capital stock to sell at 80 and $1,700,000 first mortgage, 5 per cent, ten-year bonds to sell at 85, the funds thus secured to be used in building an electric line between Hillsboro and Chillicothe, 42 miles. It is claimed that 80 per cent of the right-of-way has been secured.

Kankakee & Urbana Traction Company, Urbana, Ill.—This company has awarded a contract to the Central States Bridge Company, Indianapolis, Ind., for the construction of the only bridge necessary between Ludlow and Paxton. It is to be 100 ft. long and only one span. The two pieces of steel weigh 115,000 lb. A slight change has been made in the line from the orginal plans so as to pass a large timber tract half-way between Ludlow and Paxton to be converted into a park by a stock company of Paxton people. They have agreed to spend $10,000 in making it ready for boating, swimming and other amusements. By the change the line extends about a half mile further east than originally intended.

Union Traction Company, Coffeyville, Kan.—This company is leveling its track on Eighth Street west of Walnut Street. An entirely new base, the same as on East Eighth Street, is to be put in.

Anthony & Northern Railway, Hutchinson, Kan.—Plans are being considered to build extensions of this company's line north from Pratt. Cars are running to Trousdale, and Larned business men have guaranteed to O. P. Byers, promoter of the line, that the city and townships in Pawnee County traversed by the new line will vote $115,000 in bonds. Kinsley business men have duplicated the offer.

Kansas City-Western Railway, Kansas City, Kan.—New track is being laid by this company on Thirteenth Street, Leavenworth. The rails will be 60 ft. long, weighing 80 lb. per yard. There will be 6 in. of rock under the ties.

Salina (Kan.) Street Railway.—This company has abandoned the construction of its Park Street line to the new union station at Salina as the Mayor will not recede from his position which requires a bond to be given by the company to protect the city from any damage that might arise on the street. The company is willing to give bond to protect the city from the company's negligence. The business men of Salina have taken up the matter in an effort to have the city waive the unreasonable demand regarding the bond.

Worcester (Mass.) Consolidated Street Railway.—Work has been begun by this company repairing its tracks on Main Street from May Street south. Work has also been begun on the construction of double tracks on Pleasant Street from the end of the present double track to Moreland Street. The laying of new rails on the Canterbury Street line from Webster Square to Freemont Street will be started soon.

Metropolitan Street Railway, Kansas City, Mo.—Work has been begun by this company on the construction of its tracks on Broadway south from Fourteenth Street to Southwest Boulevard. The extension of the Prospect Avenue line from Forty-eighth Street to Seventy-second Street will be begun within a few weeks.

Springfield (Mo.) Traction Company.—Plans are being made by this company to construct an extension of its Monroe Street line to Phelps Grove Park. It is planned to use the rails on Boonville Street, which are to be removed to make way for heavier and more modern equipment of that line.

Three Forks, Mont.—The contract for the construction of the line between Three Forks and Radersburg has been awarded to Clifton, Applegate & Company, Spokane, Wash. Julius Rosholt, Fairmount, N. D., is interested. [Aug. 21, '15.]

New York, N. Y.—On Oct. 15 the Public Service Commission for the First District of New York will open bids for portion "C" of the ballast contract for the new rapid transit lines. This portion covers about 80,000 cu. yd. of trap rock, or hard limestone. The commission has already awarded contracts for nearly 300,000 cu. yd. of ballast.

Interborough Rapid Transit Company, New York, N. Y.—In a few weeks the Public Service Commission of New York will advertise for bids for the digging of another East River rapid transit tunnel. It will be the tube from the foot of Fourteenth Street, Manhattan, to North Seventh Street, Brooklyn, which will carry the tracks of the Fourteenth Street-Eastern District line of the dual system. The work has been held up because a permit granted by the War Department made the city responsible for all loss or damage due to construction. The commission objected, and the War Department has modified the permit so that the city's obligation is restricted to "all legal liability."

Cleveland (Ohio) Railway.—Operation has been begun by this company on its extension on Euclid Avenue, Cleveland.

Bartlesville (Okla.) Interurban Railway.—This company reports that it is reconstructing ½-mile of track in Dewey, using 72-lb. 6-in. T-rail to replace 60-lb. rail. The company is also constructing a 2-mile loop in Bartlesville.

Southwestern Light, Power & Railway Company, Oklahoma, Okla.—A report from this company states that it will construct a line from Oklahoma to Dennison via New Castle, Duncan, Lawton, Lindsay, Davis, Ishmingo and Durant, 176 miles. The line will reach a park at Arbuckle. The power station will be located at Davis and the repair shops at Arbuckle. The company will also furnish power for lighting. The contract for the construction of the line has been let to the Arbuckle Construction & Improvement Company. Officers: W. T. Croslen, president; J. H. Stewart, secretary; W. P. Woolsep, general manager, and A. L. Mitchell, electrical engineer. [Sept. 18, '15.]

Philadelphia & Western Railway, Upper Darby, Pa.—Direct electric car service between Philadelphia, Valley Forge, Phoenixville, Spring City and Pottstown will be established within a year if the plans formulated by a group of Philadelphia financiers are fulfilled. The Philadelphia & Western Railway will form the terminal trunk line and perform an important part of the new service, it being planned to run the new cars over their tracks. The plan embraces the extension of the Phoenixville, Valley Forge & Strafford Railway to a connection with the Philadelphia & Western Railway at Bridgeport. It will be necessary to build 7 miles of line. The cost is estimated at about $300,000. The Phoenixville, Valley Forge & Strafford Electric Railway now runs 4½ miles from Valley Forge to Phoenixville. From there the Pottstown & Phoenixville Railway now operates 25 miles in two sections, one from Pottstown to Sanatoga, the other from Spring City to Phoenixville. The gap from Sanatoga to Spring City is now being filled in by a new line under construction and largely graded.

Galveston-Houston Electric Railway, Galveston, Tex.—According to David Daly, general manager of this company, poles and other materials have been distributed along the temporary trestle over the causeway with a view to beginning immediate work to provide facilities so the company can send cars over the causeway under its own power. On account of difficulties to be encountered, by the fact that the single track across the temporary trestle is constantly being used for the many trains into and out of Galveston daily, it will be at least three weeks before this work can be finished and interurban cars can be operated across the trestle by electricity.

Richmond, Rappahannock & Northern Railway, Richmond, Va.—At a meeting of the stockholders of this company held on Sept. 16, the sale of $100,000 in preferred stock and $50,000 in common stock was authorized, the preferred stock to pay 7 per cent. Subscriptions have been received for $25,000 of preferred stock. [Sept. 28, '15.]

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—Work will be begun at once by this company on the construction of an extension of its line on Asylum Avenue, Racine.

SHOPS AND BUILDINGS

Shore Line Electric Railway, Saybrook, Conn.—Work has been begun by C. M. Williams on this company's new carhouse in Thamesville. The building will be 60 ft. x 250 ft. and will be constructed of brick. The erection of the proposed carhouse on Montauk Avenue, New London, has been postponed until next spring.

Arkansas Valley Interurban Railway, Wichita, Kan.—The contract for the construction of this company's $10,000 terminal at Hutchinson has been awarded to the Foy Construction Company, Hutchinson.

Holyoke (Mass.) Street Railway.—Plans have been completed by G. E. Pellissier, Springfield, for a new carhouse and substation to be erected at Amherst for the Amherst and Sunderland branch of the Holyoke Street Railway. The carhouse will be 130 ft. x 100 ft., of brick, mill construction, with blue stone or artificial stone trim, and all modern improvements. Part of this building will be two stories high, in which will be the offices. The substation will be 31 ft. x 102 ft., one story high.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Station finish construction on the New Utrecht Avenue elevated railroad in Brooklyn will soon be undertaken. The Public Service Commission for the First District of New York will advertise for bids, to be opened Oct. 26, for the finish of eleven stations on that road between Tenth Avenue and Coney Island. The stations are Fort Hamilton Parkway, Fiftieth Street, Fifty-fifth Street, Sixty-second Street (express), Seventy-first Street, Seventy-ninth Street, Eighteenth Avenue, Twentieth Avenue, Bay Parkway (express), Twenty-fifth Avenue and Bay Fiftieth Street. The New Utrecht Avenue line will be operated by the New York Municipal Railway Corporation as a branch of the Fourth Avenue subway, connecting therewith through the Thirty-eighth Street cut.

POWER HOUSES AND SUBSTATIONS

Richmond Light & Railroad Company, New York, N. Y.—This company has ordered from the Westinghouse Electric & Manufacturing Company one 7500-kva. turbo-generator, together with motor exciter equipment, and one 10,000 sq. ft. surface condenser. The purchase of this additional powerhouse equipment, which is to be installed in the Livingston power plant, has been made necessary by the energy demand imposed by the thirty-two new all-steel cars, equipped with Westinghouse motors, recently placed in operation on this line.

Carbon Transit Company, Mauch Chunk, Pa.—A report from this company states that it is receiving bids on new power equipment consisting of boiler with culm burning furnace and a 300-kw. 600-volt, d.c. turbo or engine-driven generator installed complete with condenser, piping, etc.

Ashland Light, Power & Street Railway, Ashland, Wis.—This company was the recent purchaser at a private sale of what was the original plant of the old Kentucky Electric Company, organized in Louisville, Ky., about eight years ago. This plant, together with other units of the Kentucky Electric Company, passed into the possession of the Louisville Gas & Electric Company when that organization took over the utilities of the city. It was not available for use in connection with the system which has been centered in the Waterside plant of the gas and electric company and has been on the market for some time. The plant will be shipped, almost in its entirety, to Wisconsin. The equipment, which was installed about eight years ago, included four 350-hp. B. & W. boilers, automatic stokers, etc., three 500-kw. Curtis turbo-generators, rewound and changed over from two to three phase, etc.

Manufactures and Supplies

ROLLING STOCK

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., is considering the purchase of two single-truck cars.

Jefferson City Light, Heat & Power Company, Jefferson City, Mo., will shortly place in operation six new cars, which are being built in the Topeka shops of the Illinois Traction System.

TRADE NOTES

Fibre Conduit Company, Orangeburg, N. Y., has located its New York office in larger quarters at 101 Park Avenue, corner of Fortieth Street.

G. S. Ackley & Company, New York, N. Y., representing the Ackley Companies, with offices at New York, London, Paris and Berlin, has been appointed by F. A. Wasson as exclusive sales representative for the Wasson air retrieving and non-retrieving trolley bases, in the foreign fields, excepting Canada.

Electric Service Supplies Company, Philadelphia, Pa., has received the following orders for "Protected" rail bonds: Interborough Rapid Transit Company, New York, N. Y., 5000 type P-4 bonds, 211,600 circ. mil capacity, 46 in. long; New York (N. Y.) Railways, 2500 type P-4-P bonds, No. 00 capacity, 14 in. long.

H. W. Johns-Manville Company, New York, N. Y., has moved its Chicago office to larger quarters in a building which it will occupy at Michigan Avenue and Eighteenth Street. The main floor is divided into sales showrooms for the many products handled by this company, among which are asbestos roofing, siding and lumber, packing, pipe and boiler covering, electric insulation, clothing, builders' specialties, and numerous appliances for the steam and electrical engineer.

Prest-O-Lite Company, Inc., Indianapolis, Ind., is building a new storage-battery plant involving additional floor space of 45,000 sq. ft., or one-third of its present floor space. The new plant will be ready for operation by Dec. 1, 1915. In the meanwhile operations are being conducted in the Murphy Building, Indianapolis. This company is also engaged in establishing storage-battery service stations at all of its branches. Twenty branches have been so equipped up to the present time.

Midvale Steel Company, Philadelphia, Pa., now in control of a syndicate headed by William E. Corey, formerly president of the United States Steel Corporation, was reorganized with the election of Joseph Entwisle as president; William P. Barba, formerly general manager, as vice-president, and Mr. Corey, Percy Rockefeller and Samuel M. Pryor as directors. Mr. Entwisle was elected president temporarily in order to facilitate the transfer of stock. He will be succeeded by Mr. Corey at the next meeting of the board, which will be held in New York.

Ohio Brass Company, Mansfield, Ohio, has received an order for 107,000 catenary hangers and other accessories from the Chicago, Milwaukee & St. Paul Railway for what is known as the third and fourth sections of its new electrification. This order constitutes half of the equipment of this kind necessary to be installed on the 200 miles of these new sections. This manufacturing company has also received an order from the Interborough Rapid Transit Company for 5000 standard-type rail bonds for the new elevated tracks now under construction in Queens County, Long Island.

Harry Vissering & Company, Inc., Chicago, Ill., whose automatic sand dryer was described in the ELECTRIC RAILWAY JOURNAL for Sept. 11, have made a number of installations on other electric railways besides the San Antonio (Tex.) Traction Company. Among these may be mentioned the Northampton (Mass.) Street Railway, Holyoke (Mass.) Street Railway, Coney Island & Brooklyn Railroad, now a part of the Brooklyn Rapid Transit System, Knoxville (Tenn.) Railway & Light Company, Des Moines (Iowa) City Railway, Seattle (Wash.) Municipal Railway, and Rhode Island Company, Providence, R. I. The Rhode Island company purchased a dryer in December, 1912, and reported recently that it had not spent 1 cent for repairs.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., in order to encourage the spirit of thrift among its employees, has just established a savings fund which offers facilities to the employees for the handling of their savings accounts. This fund is open to any employee of the company wherever he may be located, and he may become a depositor at any time and discontinue at any time. The amount of the deposit cannot be less than 10 cents and may be any multiple thereof and the deposits must be made from each regular pay. The deposit, however, is limited to one account, the amount of which in any one year cannot exceed $500. The idea of this is that the plan is intended as a method of encouraging the employee to save his earnings and when he has been successful up to this point, allow him to handle his own finances. Interest is paid on the deposit at the rate of 4½ per cent and is credited semi-annually. The Westinghouse company acts as a trustee and guarantees the deposits and interest. The rules provide that an amount of $100 or less may be withdrawn without notice, but an interval of two weeks must elapse before subsequent withdrawal can be made, and for withdrawals more than $100, notice of one week must be given. An auditing committee not to exceed seven persons is to be elected by the depositors from among their own number, which committee shall be given an opportunity to examine the condition of accounts at semi-annual interest periods, the findings of which shall be published.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a bulletin listing its various railway supplies.

Standard Machinery Company, Auburn, R. I., has issued a catalog describing its various types of foot and mechanically operated presses, including an aluminum slide armature notching press.

Stone & Webster Engineering Corporation, Boston, Mass., has issued a bulletin which contains illustrations of the new coal gas plant of the Fall River Gas Works Company, which was designed and constructed by this engineering corporation.

Holophane Works of General Electric Company, Cleveland, Ohio, has issued a lighting handbook. This publication covers the general subject of illuminating engineering from the practical standpoint and contains as well elementary technical data on lighting and data on the engineering performance of the products which this company manufactures.

S. K. F. Ball Bearing Company, New York, N. Y., has issued a reference folder for the various bulletins recently published by this company, each of which includes separatey the following subjects in their relation to ball bearings: general bulletin, railway lighting generators, hangers, textile machinery, automobile worm drive, electric motors, street railways, paper-making machinery, grain-milling machinery and machine tools.

Standard Railway Supply Company, Cincinnati, Ohio, has issued a folder describing its new improved "K-I" splicing sleeve. In this new sleeve the ends of the trolley wire, when in position in the sleeve, are bent downward, thus making it possible to lessen the thickness of the metal on the side opposite the wedges where least needed, and increase the thickness of metal over the wedges where most needed.

G. C. Reiter, Canton, Ohio, has issued advertising literature describing its various types of gongs for street cars or emergency wagons. The gong shells are manufactured from a special analysis of bell steel. It is stated that they give a loud, clear ring and will not crack, break or lose their tone under any conditions of service or atmosphere. The gong shells will fit any attachment. They are pressed, not cast. The types illustrated in the catalog include single-stroke foot gongs of the horizontal and vertical types, single-tap inside-striking foot gongs, single-stroke roof or hood gong, rotary vertical-type multiple-ringing gongs for foot, roof or hood, and multiple-ringing pneumatic gongs.