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LAND FOR CARHOUSES AND SHOPS

A failure to provide enough land adjoining carhouse and shop improvements so that future needs for expansion may be met in the same locality has been found to be a costly error in the history of a number of companies. It is an error of the kind, however, that teaches a lesson for the future. An investment in idle land naturally is one that a railway manager dislikes to make because it presents no immediate advantage. It is dead capital for a period, and he cannot foretell whether its time of usefulness is five or ten years in the future. He hesitates to take the risk that a long look forward involves. There are, however, two points bearing on this subject that should be kept in mind. The first is that as the railway is generally a permanent institution the natural development of traffic is bound to create a requirement for greater carhouse and shop facilities that must be met by the company in the future, regardless of the personnel of the management. The other is that a purchase of well-located acre property at a reasonable price in the outskirts of a growing community is an investment that has at least a fair chance of yielding a profit. While the fact that the company will need property in the future is the controlling reason for purchases of this character, the risk of the investment is lessened by the probability that the values of such land as would ordinarily be bought are more likely to increase than decrease, so that a profit is more likely than a loss, provided, of course, that the land is not acquired at a "boom" figure. Moreover, land that is within the price which a railway company can afford to pay before the surrounding country becomes settled too quickly is worth more than the company can afford to invest after acre property is subdivided into lots. In the choice of location, also, the company should have future requirements in mind because the growth of the city nearly always will change the "center of gravity" of the system.

POSTING RULES IN DARK PLACES

When the head of the car maintenance department transmits a new regulation to the several shops and carhouses he takes it for granted that it will be posted at a spot where it will be sure to be seen and read. Of course, the most logical place is the vicinity of the time clock, but in that case it is essential that the time clock itself should be in the right place. In one shop recently visited the workroom enjoys splendid natural lighting, but the hallway which leads to it is placed in the middle of a two-story office building. Even in the morning, when lighting conditions are best, the hallway is in twilight, while in the afternoon it would be absolutely dark without lamp illumination. The time clock in this hallway serves as the center of a group of important notices which are printed in every style from the faintest mimeograph copy on letter paper to the blackest scareheads on heavy cards. These notices include rules regarding fire prevention, safety packing of journal boxes, exchange of brakeshoes, holidays, etc. Furthermore, some of the notices are below and others are above the range of vision. Of course, space in proximity to a time clock seems a proper place in which to display instructions of this character, but if the clock is in a narrow hallway, not many employees are likely to linger lovingly over a statement which cannot be taken in at a glance, especially when scores of men are waiting to take their turn at the clock. Under these circumstances, it would be better to place the instructions in some well-lighted part of the shop or, if practicable, print the instructions on slips which could be inserted in each man's pay envelope from week to week. On large properties another feasible plan is that followed by the Philadelphia Rapid Transit Company. This is to print the rules in booklet form.

ELECTRIC PASSENGER SERVICE ON STEAM TRACKS

The list of installations of storage battery cars in this country shows that several are operated over steam railroad tracks. This fact suggests the thought whether electric railways are always as keen as they should be in endeavoring to lease short divisions and spurs of neighboring steam lines for the purpose of extending their service at lowest first cost. The d.c. electrifications of the New York, New Haven & Hartford Railroad are well-known examples of the advantage of converting old steam lines in preference to building new suburban and interurban extensions to the existing city systems. In these instances, however, this most efficient use of railway property was accelerated because of the control of both classes of railways by one company. Nevertheless, community of interest may be made just as potent as community of ownership. Why should an electric railway duplicate the greater part of the investment made by a steam railroad when the tracks of the latter are exploited far below the

saturation point? Such conditions may arise in either city or interurban territory. Thus one Eastern city has spread over so great an area that it now practically engulfs a number of old steam railroad divisions. In former days these lines were of some importance as passenger routes, but now they are used only for an hour or two each day to move freight to and from local coal yards, breweries, factories, etc. If some of these lines could be leased as a part of the local street railway system, they would afford ideal short cuts for many people. Again, a certain electric railway recently expended several hundred thousand dollars to convert an interurban railway of highway type into a line with larger and faster cars by transferring part of the route to a private right-of-way. Community of interest, however, would have led to the electrification of the neighboring steam tracks for the same schedule under conditions that would have caused no interference with the through steam passenger and freight service. A decade ago most steam railroads would have scorned any offers to co-operate in this manner, but most of them have since learned to respect the superiority of electric railways in attracting passenger travel. As population increases, the highway type of interurban railway tends more and more to assume the character of a street railway, so that eventually many electric railways will be prepared to enter into agreements for conducting their through service over the adjacent steam railroads.

THE STEAM BOILER AND ITS FURNACE AS INDEPENDENT UNITS

The recent agitation in favor of replacing the out-of-date and perfectly meaningless term "boiler-horse-power" with the myriawatt brings attention to another engineering expression which has long since outlived its usefulness. This is the "ratio of grate to heating surface" of a steam boiler. It would be difficult to invent any term more misleading in the light of present-day knowledge and practice, yet the fact that it has been inherited from the historic days of the birth of steam engineering seems to permit it to hang on in spite of its moribund condition. Its origin and its early usefulness are, of course, obvious. When steam coal containing less than 13,500 b.t.u. was not even considered, when boilers were operated at ridiculously low capacities, and when from 10 lb. to 12 lb. of fuel per square foot of grate per hour was an almost universal rate of fuel consumption, the ratio of grate to heating surface at least gave an indication of the beliefs of the designer as to the advantages of forcing a boiler, and it is along these lines that the expression is most often used. In some cases an attempt has even been made to establish a single ratio as uniformly satisfactory.

Of course, to every student of the phenomena of steam generation the old-time idea that the boiler, or heating surface, and the grate were in some way interdependent is a manifest fallacy, for the heating surface, having only the inherent ability to absorb heat, cannot of necessity influence directly the furnace or grate, which by burning coal is a heat producer. The two have, indeed, diametrically opposite duties, the one taking in heat and the other giving it out.

With modern boilers, which may be installed anywhere from the Atlantic seaboard, where the highest grades of fuel are available, to the Rocky Mountain States, where lignite may be used, a fixed ratio of grate to heating surface would involve any manufacturer in a great deal of trouble; and, in like manner, a ratio satisfactory in one plant with a steady all-day load would be entirely useless in the design in another plant which was required to handle a severe two-hour peak. In the Western States a ratio of 1:30 might do very well, while in the East, especially if the load was a steady one, it would provide a magnificent chance for thin fires, full of holes, which would cut heavily into the coal pile unless the boilers were worked exceedingly hard. On the other hand, even with this ratio a lack of appreciation of draft values and resistance losses in the latter case might involve a failure on the part of the boilers to "steam."

In the end, the only satisfactory method for meeting the complex problem of steam production at the present time is to pursue the logical course of designing furnace and boiler as two entirely separate units. Neither is tied up to the other except by factors of minor importance, and neither involves a problem which cannot be completely solved before the other is approached. In fact, this procedure is now very generally followed in stoker installations, where the stokers are not only purchased separately from the boilers but in addition are likely to have an entirely different rating.

In the arrangement of a hand-fired boiler plant the same method is generally used by the most successful designers, the size of the boilers, or extent of heating surface, being determined by the expected demand for steam and in accordance with the conditions laid down by the character of the load and the cost of fuel but quite irrespective of the area of the grate. This might vary all the way from an allowance of 3 lb. of steam per square foot of heating surface, as in the case of a steady load and costly fuel, to 8 lb. of steam when the conditions were reversed.

The design of furnace would then be determined from the amount of coal of the given quality which had to be burned to produce the required amount of steam, from 60 per cent to 70 per cent of the heat units in the coal being assumed as the amount which would be absorbed by the boiler. The actual area of grate would then become a matter of judgment on the part of the designing engineer. The fuel might be of such a nature as to be most suitable for a strong draft and a high rate of combustion, in which case a high stack and small grate would be installed. But if more moderate rates were considered preferable sufficient grate might be installed to burn the required weight of coal per hour at a rate in the vicinity of 20 lb. or even 15 lb. per square foot.

When it was finally installed the area of a grate so designed would have a ratio to the heating surface somewhere between 1:80 and 1:20, but the actual figure would be quite as meaningless as that obtained by comparing the heating surface with the kilowatt capacity of the plant, and it is certainly high time that its use was completely discontinued by those steam engineers who adhere to it solely for reasons of conservatism.

AHEAD OF THE STEAM ROADS

The statement that electric railways are in position to, and should, profit by the experience of steam roads in the development and use of signaling systems has been made so often that it is commonly accepted as a matter of fact. There is one particular, however, in which steam railways can learn something from electric roads, and that is how best to maintain signaling facilities. It is almost a universal custom among electric railways which have signals to require their maintenance to be handled by the department which looks after the overhead and power facilities. This puts the signal maintenance in the hands of men who are already handling electrical work and are familiar enough with it to be able to assimilate the added labor of caring for the applications of electricity which the signals represent. It is true that hardly any signals except such as are electrically operated are used on electric railways, but the fact remains, nevertheless, that these roads have shown a much better appreciation of the fitness of things in keeping all of their electrical facilities under the eye of an electrical department than steam roads have in trying to combine the maintenance of signals with maintenance of track. Steam roads have had for many years a department in charge of their telegraph and telephone facilities, which corresponds in a way to the overhead department on electric roads. But instead of trying to work out a combination of the telephone, telegraph and signal maintenance, which undoubtedly could have been made successful, they seem to be endeavoring to combine two kinds of labor which are distinctly incompatible.

There is hardly a signal installation made nowadays into which electricity does not enter, either for route locking, power distant signals or for the entire plant. The telegraph repairman is not purely an electrician. A great part of his duty is straight mechanical work, and it will be much easier to enlarge his field so as to include signal maintenance, or to enlarge the signal maintainer's field so as to include telegraph work, than it would be to do the same thing with track labor.

The first application of the idea of combining the signal and track maintenance forces was made on a large Western steam system and is said to have proved a success, but it will take many trials in many places to prove that such an arrangement is either more economical or more satisfactory than the present system, which requires the maintenance of signals to be handled by men who do nothing else. One steam road has tried to work out a combination of the maintenance of its electrical facilities similar to the customary electric road plan, and although this has not yet been put into practical use, it sounds much more reasonable than the proposed combination of the duties of sectionmen and signal maintainers.

Electric railways seem to have arrived first—and without straining—at the best solution of the difficult problem of how to maintain signals most economically. And in this respect, at least, steam roads have something to learn from electric railways—even though the latter may be indebted to the former for much of the pioneer work that has been done in connection with the engineering problems of signaling.

PROGRESS IN EXPRESS CAR DESIGN

The article printed elsewhere in this issue on the new express cars of the Bay State Street Railway illustrates gratifying progress in a branch of rolling stock design which has hitherto received much less attention than it deserves. In the early days of electric express service it was not thought important to utilize anything better than the ordinary box-car type of design, and to-day many thousands of such cars are doing reasonably good work along well-established lines but without that operating efficiency which the best practice is now demanding. As a rule these cars are strongly built and give little trouble in service, but they are heavy in relation to their capacity and dimensions and do not always afford the maximum carrying space inside on account of various obstructions to the storage of freight and express matter.

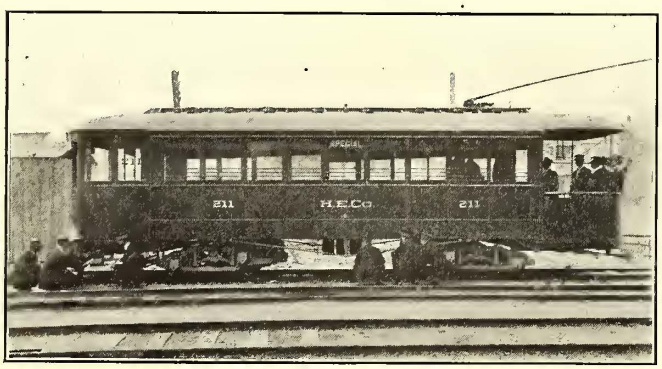
To save weight without any decrease of strength has been the motto of the Bay State company's equipment department for several years, and the results secured in passenger-car design are well known to our readers. In the new express cars a saving of over 4000 lb. has been secured in comparison with the company's 1911 type of rolling stock for express service, which has the same general dimensions, and a carrying capacity of 40,000 lb. has been obtained with a car body weighing only 13,595 lb. This has been accomplished by the use of an all-steel frame and by close attention to the combination of functions so far as practicable in individual features of the equipment. Thus, the wiring is carried just below the roof in iron conduit which is utilized as a part of the roof structure support; the diagonal wooden strips to which the outside sheathing is attached are installed in such a way as to carry a portion of the loading; the bumper is combined with the drawhead, and a structural revolution in design has been established by the disposition of steel members for transmitting all loads directly upon the bolsters as foci, regardless of the location of freight in the car interior.

One of the most useful features installed in these cars is the simple but effective scheme of running the bell cord through conduit to give a bigger loading space as the shipments approach the roof in height. Another, which will at once commend itself to the express traffic man, is the installation of special electric heaters beneath the floor with short ducts leading upward to openings inside the car near the doors, so that perishable freight will not suffer from the cold when the latter are left ajar purposely or inadvertently. The installation of multiple-unit control, permitting train operation, with consequent saving of motormen's wages, over certain portions of the system, and the tabulation of detailed weights given are also of much interest. It is apparent that some of these improvements are of a character that might suggest themselves to a progressive car engineer who had no special knowledge of the peculiarities of express freight transportation; but another class of improvements is due entirely to the willingness to learn practical conditions from the men who are concerned with the daily handling of freight on electric cars. The best thing about all this is that these improved cars cost no more to build than the former heavier type.

Instruction of Trainmen on the Houston Electric

This Article Describes the Schoolroom Equipment and Complete Course of Instruction to Prospective Trainmen as Conducted at Houston and Also the Method of Teaching the Instructors

The Houston Electric Company, Houston, Tex., has recently enlarged its course of instruction for new trainmen, equipped a schoolroom and employed an expert instructor to conduct the work. The rapid growth of this property required an increased number of trainmen and made a more comprehensive system of instruction necessary. The present course may be completed in about three weeks, after



Houston Instruction School—Finding Trouble on Instruction Car

which the successful applicants are placed in probationary service for a period of six months. During this time the new trainmen are required to report to the instructor at the end of the first month and also at the close of the six months' probationary period. On each of these occasions the instructor lectures them concerning their particular faults, as shown by individual records, and discusses the problems which may confront them from time to time in the service. Following the final lecture, the men are placed on their own responsibility.

The new schoolroom is situated in a new carhouse located just outside the business district of Houston. It is large and well lighted both naturally and artificially and is equipped with mechanical, electric and air-brake appliances now in use on the Houston Electric Company's cars. An additional course of instruction is given by the road instructor in an instruction car, usually one of the latest pay-as-you-enter types in use on the company's lines.

Essentially, the schoolroom equipment includes a set of controllers, air-brake equipment, overhead line switches, car-lighting switches, bell circuits, headlight circuits, heater circuits and a fare register. To illustrate the flow of electricity through the car circuits, a series of incandescent lamps representing the resistance points of the controller are arranged on a board so as to show what is meant by a motor in series, series parallel and parallel. Views of the schoolroom equipment are shown in the illustrations.

Controller equipment includes the three types installed on the company's cars, namely, GE K-36-J, K-28-B and K-10, and each is equipped with an automotoneer. The principal characteristics of the controller equipment are described to the students, and they are thoroughly instructed as to the repair of damages both permanent and temporary in case of accident while in service.

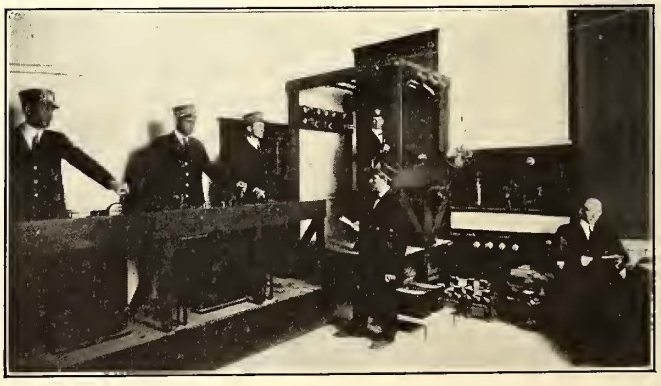
The Houston Electric Company uses five types of motors, namely, the GE-54, 67, 81, 219 and 80. The method of making repairs so far as the trainmen are concerned and the principle of motor design may be demonstrated by a single motor equipment. Accordingly, the schoolroom installation includes only one type of motor for demonstrating purposes. Each student is required to familiarize himself with the operation of this motor before he is taken on to the instruction car. He also is required to become familiar with the operation of the air-brake mechanism, various types of resistance and other electrical apparatus used on the cars, all of which are included in the schoolroom installation.

EMPLOYING AND INSTRUCTING TRAINMEN

The new method of employing and instructing trainmen now in vogue on the lines of the Houston Electric Company requires that all applicants for positions report at the office of the superintendent of transportation Monday morning of each week. After passing the physical examination conducted by a physician, they are again sent to the office of the superintendent of transportation, where they are furnished with a badge, punch and book of rules and receive an order for a uniform and cap. Experience has shown that about one-third of those who apply for a position fail to qualify because of defects which are discovered by the superintendent, who interviews all applicants.

Subsequent to the purchase of a uniform and cap the conductors report to the instruction department, or trainmen's school, at 9 o'clock each Tuesday morning. After a record of each man has been entered in the book entitled "Record of Trainmen During Probation Period" they receive a preliminary lecture for conductors. At the close of this lecture a breaking-in blank is given to each man. They are then sent to the road instructor, who places them with platform instructors on the various lines. As soon as they have received their cap and badge they are required to go to a local photographer and have their picture taken, returning a receipt to the main office.

Newly appointed motormen report at the trainmen's school at 2 o'clock Tuesday afternoon, and after a record of each man has been made they attend the preliminary lecture for motormen. At the close of this lecture they are provided with a breaking-in blank and sent to the road instructor for assignment to platform instructors on the different lines. A reproduction of the breaking-in blank is shown in one of the illustrations. On this form each motorman or conductor platform instructor is required to specify



Houston Instruction School—Class of Motormen

the number of day and night trips the student makes with him, as well as the kind of brake used on the car. The object of these requirements is to make sure that each student is entirely acquainted with all types of brake equipment and that he has made a sufficient number of night trips over each line to become thoroughly familiar with the route after dark. In addition to obtaining the approval of the platform instructors, all student motormen and conduc-

tors must be "O. K.'d" by the road instructor on each line.

After service at breaking in under the platform and road instructors, the conductors are required to report to the trainmen's school Wednesday morning for an intermediate lecture by the chief instructor, after which they are questioned regarding the book of rules and general operation. These questions cover all details and are asked partly to test the man's knowledge at that time and partly to show him what questions he will be required to answer correctly in his final examination, if he wishes to qualify as a conductor. Whenever a student fails to answer a question it is answered for him and thoroughly explained. At the close of this preliminary test the student conductors are returned to the road instructor to complete the remainder of their student work on the different lines.

Motormen who have been breaking in one week are required to report at the trainmen's school on Wednesday afternoon for an intermediate lecture by the chief instructor. At the close of this lecture they, too, are asked questions concerning the book of rules and general operation, as were the conductors, except that the questions are relative to the work about which they have received preliminary road instructions. In a similar way the motormen are again returned to the road instructor, who places them with platform instructors to complete their student work on the remainder of the lines with which they are unfamiliar.

Thoroughly to familiarize students with the different lines operated by the Houston Electric Company requires approximately three weeks. At the close of this period both conductors and motormen are examined by the road instructor to test their familiarity with the various lines and operating conditions on each. If their test proves satisfactory, they are sent to the trainmen's school for a final lecture and qualifying examination. If the student fails to pass this examination and the road instructor believes there is a possibility of making a good trainman of him, he receives further road instruction. On the following Thursday morning all student conductors and on the following Thursday afternoon all student motormen who have quali-

HOUSTON ELECTRIC COMPANY

INSTRUCTION BLANK

Date_____ 191__

Mr._____ Road Instructor:

Please allow the bearer Mr._____ Badge No._____ to start breaking in as a_____ and when competent to operate a car alone on the various lines O. K. him and have him report at the Trainmen's School for further instructions.

_____ Instructor.

When the "Student" above named has become competent to operate a car alone over a certain line, the Platform Instructor will fill in the proper spaces below, showing exact number of day and night trips the "Student" has made with him, and if Motorman state kind of brake used.

LINE	No. DAYS	No. TRIPS DAY	No. TRIPS NIGHT	KIND OF BRAKE	PLATFORM INSTRUCTOR SIGNATURE	BADGE No.	DATE—O. K.	S. C. OF ROAD INSTRUCTOR
Franklin								
Harrisburg								
Leeland								
Reagan Shuttle								
Rice Institute and Bellaire Shuttle								

Date Road Examination and O. K._____ _____ Road Instructor.

Date Final Examination and O. K._____ _____ Instructor.

Houston Instruction School—Instruction Blank

fied after the three weeks' road instruction attend the final lecture and qualifying examination. While the rating of conductors is determined by their proficiency in answering the questions on general rules and special rules for conductors, they are also required to familiarize themselves with the rules governing motormen. Likewise all motormen are required to have some knowledge of the rules governing conductors. If the rating on this examination is satisfactory, they are considered competent to operate a car and report to the office of the superintendent of transportation for duty.

Twice each week—namely, on Monday morning and Friday morning—during the period of road instruction all student conductors and motormen are required to report at a specified time and are taken out on the instruction car in charge of the road instructor. On different days cars of

Houston Instruction School—Class of Conductors

different types are used for this purpose, so that during the course of the student work they will become familiar with the various types of cars in regular service. On these trips different features of operation, both usual and unusual, are discussed in detail. After the car has been operated over the lines a sufficient length of time to give each student an opportunity to run it a while, it is set out on a side track. While there the car is crippled in various ways, and the student motormen are required to find and remedy the trouble. These semi-weekly trips of instruction on the car have been of great assistance in training the men. Often those who have been in service five or six months will make the trip for additional information.

At the completion of the three weeks' course of instruction all trainmen are considered probationary, and in matters which might be considered as indicating need of further instruction they are under the supervision of the instruction department. So far as practicable, whatever discipline may be necessary during this period is in the nature of reinstruction. The chief instructor sets aside one hour each day for further instruction of probationary trainmen who may be sent to him by the superintendent of transportation. To keep the instructor advised as to each trainman's record, copies of all reports affecting it are sent to him and are added to the probation record which is on file in the office.

On each Monday morning probationary conductors, and on each Monday afternoon probationary motormen, who have been at work one month are required to report at the trainmen's school for a lecture by the chief instructor. These lectures for the two classes of men are different, but both review the work of the past month. Each trainman's record is taken up with him privately, his mistakes are discussed and suggestions for the improvement of his work are made to him.

On Friday morning probationary conductors, and on Friday afternoon probationary motormen, who have completed their six months' probationary period have a final lecture by the chief instructor in which their work for these six months is reviewed. The trainmen now having completed a probationary period are relieved of all supervision so far as the instruction department is concerned.

TRAINING INSTRUCTORS

To assist the conductor and motormen platform instructors in the work of instructing student trainmen and at the same time clearly outline the course of instruction two eighteen-page pamphlets, one for each class, have been printed and supplied to them. The pamphlets call attention to the importance of properly instructing newly appointed men, the method of instructing them and what to expect from the students. The instructions are issued in a conversational form, which makes them easy to read and comprehend. When a student is started on the road under the platform instructor he receives a booklet giving intermediate time points for all lines. This enables him to check schedules with the regular crew and become familiar with the schedules for each run.

As an extra incentive to platform instructors not only to put forth their best efforts and use the greatest care in breaking in men but also carefully to follow up these men during the probationary period, the company, in addition to paying them an extra 15 cents a day while instructing students, gives them a bonus of $5 for each man broken in who remains in the service at the end of six months, provided, however, that he has made a satisfactory record during that period.

For the purpose of discussing matters of special interest in the courses of instruction, once each month a meeting of platform instructors is held. Methods of platform instruction as well as general operation are suggested and discussed by trainmen and others attending the meeting. The men take a very active interest in the various topics presented, and much good results. While these meetings are primarily for platform instructors, all trainmen are urged to attend and inspectors are always present and take an active part in the discussions.

In order to further the spirit of co-operation and zealous interest in the welfare of the company resulting from the monthly meetings, attractive booklets are issued from time to time, discussing such subjects as "What Houston Street Car Service Means," "Hints to Trainmen," "Courtesy as an Asset," etc.

To systematize the work of instruction and better to assure the management that the students' courses of instruction are proceeding along definite lines and that each class is receiving a uniform system of instruction, the lectures given by the chief instructor have been written out. The lectures vary in length from 2000 to 6000 words and discuss topics of especial interest to each class, depending, of course, on the length of the students' career.

To keep the general superintendent informed as to the work being done by the instruction department, a daily report is sent to him, showing the names of the students, the lines on which they have been broken in and the names of the platform instructors for each day, the names of the men who have attended lectures and examinations each day and of those sent back to the school for additional instruction, and containing a record of instruction car operation showing men out on the car, type of car used and the time out and in. The names of students "O. K.'d" for regular service as well as the names of the platform instructors are also shown on this report form.

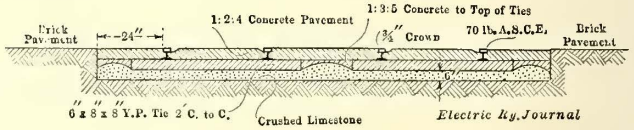
The courses of instruction were prepared and the manner in which the work is conducted was determined by H. F. Rykert, chief instructor, under the supervision of R. T. Sullivan, general superintendent, and David Daly, general manager of the Houston Electric Company.

The concession for a new electric tramway and lighting system in Pernambuco, Brazil, was granted to Dodsworth & Company, Rio de Janeiro, who have arranged with J. G. White & Company, New York and London, to do the construction work. The foundation for the power house is now being built and surveys being made for the carhouse and the track, a portion of which has already been laid.

CONCRETE PAVING AT TEXARKANA, ARK.

After investigating the results obtained by different street railway companies throughout the country, the Texarkana (Ark.) Gas & Electric Company decided to use a concrete paving surface around its double-track line on Broad Street, the principal thoroughfare in Texarkana. Two years' service since the installation of this type of paving gives some idea of what wear may be expected from it eventually. The paving shows no evidence of failure at the present time, and the depth of wear is negligible. To obtain these satisfactory results, W. L. Wood, Jr., general manager, had a rigid set of specifications drafted for the work. During the progress of the construction, both as to track foundation and paving, it was closely inspected, and every precaution taken to produce a permanent job.

Essentially the track cross-section contains 6 in. of 2½-in. crushed limestone laid in a trench 19 in. deep. This was thoroughly rolled with a heavy road roller, and then the track was laid. The latter included creosoted yellow-pine ties of standard size laid 2-ft. centers and 70-lb A. S. C. E. rail spiked in place, the whole resurfaced to the finished elevation. At this point in the progress of the work the new track was connected through and regular traffic schedules resumed. To correct the weak spots which were disclosed by the traffic, it was customary each night, after a section of new track had been laid and opened to traffic, to couple a general utility motor car to a 100,000-lb. gondola car which had been loaded with stone ballast. This equipment was then run back and forth over the new track until all possible weak points had been detected. The following day the spots in the foundation were pick-tamped to surface and again submitted to the ballast car test load before the concrete was placed.



Cross-Section of Track in Concrete Pavement at Texarkana

After the skeleton track had been brought to a permanent surface and tested, an additional quantity of crushed stone was cast between the ends of the ties in double track to the height of the top of the tie, to reduce the quantity of concrete in the finished pavement. Then the paving foundation was laid. This consisted of 1:3:5 concrete brought up to the tops of the ties. The paving surface was laid with concrete in the proportions of 1:2:4, where the aggregate consisted of 1-in. crushed stone. No wearing surface mixture was provided, but the paving material was placed comparatively dry or of a consistency which would bring moisture to the surface if tamped. After the paving surface had been accurately formed with a templet which gave a ¾-in. crown between the rails and a 1¼-in. flangeway, the surface was floated to complete the job.

Expansion and contraction were provided for by ½-in. joints spaced at 6-ft. intervals. Ordinary weather boarding, which is of a wedge section, was used as the insert at the expansion joints, and after the initial set it was replaced with an asphaltum filler. To prevent breaking down the edges of the concrete paving, particularly at street intersections where there is cross traffic, flat bar iron of ½-in. x 4-in. section was laid edgewise to form a curb. Under all track special work and at each joint the crushed stone ballast foundation was poured solid with cement grout just before placing the paving foundation. A period of ten days was allowed for the concrete to set before traffic was resumed. The question of trench drainage was carefully investigated, but this work was considered unnecessary in this particular section of track because excellent natural drainage was provided by the sandy subsoil. A cross-section of the track is shown in the accompanying drawing.

New Light-Weight Express Cars of the Bay State Street Railway

Description of New Rolling Stock with Detailed Weights and Special Features Planned to Provide Maximum Carrying Capacity in Fast Express Service on Lines South of Boston—Car-Body Design Gives 20 Tons Capacity for Body Weight of 13,595 Lb.—Use of Wiring Conduit in Roof-Framing Structure—Special Heater Arrangement—Compression Bumper and Drawhead

The Bay State Street Railway, of Boston, Mass., has recently placed in service three express cars of special design which will shortly be supplemented by five others of the same construction for use on the through lines of the company between its Boston freight and express terminals and points in southern Massachusetts and Rhode Island. The new cars represent a striking advance in rolling stock built for this class of service and are said to be the lightest-weight express cars of their capacity thus far developed. They were designed in detail by E. W. Holst, superintendent of equipment of the Bay State company, and were constructed under the immediate supervision of the department at the shops of the St. Louis Car Company.

The new car is of the double-truck, flush-platform type, with side and end doors, steel underframing and semi-steel body. The general dimensions are as follows:

Total length over bumpers	39 ft. 0 in.
Length between screen bulkhead partitions	30 ft. 0 in.
Width over side plate at bottom	8 ft. 0 in.
Total width over all	8 ft. 2 in.
Height from rail to top of floor	46 in.
Height from rail to top of trolley board	11 ft. 9 in.
Distance between truck centers	22 ft. 0 in.
Wheelbase of trucks	6 ft. 4 in.
Wheel diameters	34 in.

The equipment includes Baldwin "A" trucks, four GE-201 motors, 5½-in. axles, G.E. emergency air and Peacock hand brakes, multiple-unit control of the Sprague-General Electric type, Kilbourn sand boxes, Root snow scrapers, eight Consolidated car heaters, Wilson trolley catchers, Midvale steel wheels, solid forged gears with 14:70 ratio, United States headlights and folding fenders, the latter designed by the equipment department.

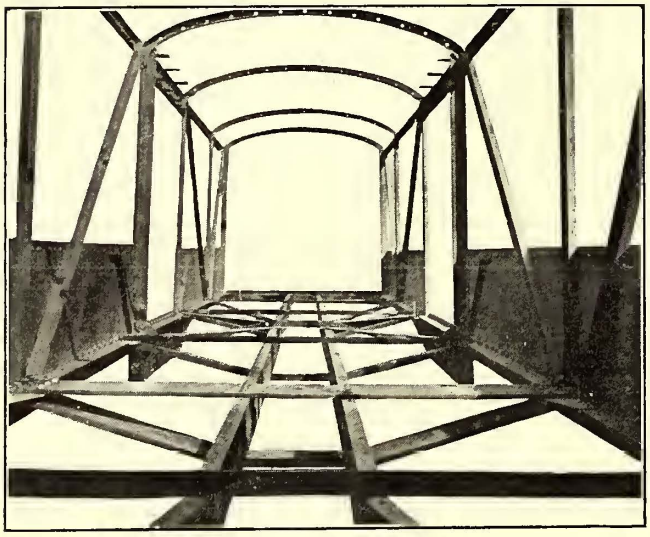
The dimensions of these cars are standard in the Bay State company's practice and are the same as those of the express car described in the ELECTRIC RAILWAY JOURNAL of May 20, 1911, page 872. The carrying capacity is 20 tons, and the total weight of the car equipped, but without load, is 45,800 lb. This represents a saving of more than 4000 lb. in weight in comparison with the earlier express cars mentioned.

Bay State Express Car—General Side View

The underframing and main superstructure framing are of steel throughout, a special feature being the design of the members to transmit the weight of a load concentrated at any part of the car back to the bolster. The longitudinal members of the underframe consist of two 8-in. channel-iron center sills running continuously from bumper to bumper and two 5-in. x 3½-in. x 5/16-in. angle-iron side sills reinforced in the center by a ¼-in. x 18-in. truss plate on each side. The center sills weigh 11¼ lb. per foot, and the side sills 8.7 lb. The center sills are spread apart a distance of 2 ft. 11 in. beyond the body end sills. The latter are built of 3½-in. x 2½-in. x ¼-in., 4.9-lb. angle irons, the center sills being tied at the lower edge by 3-in. x ½-in. knees. The bolsters are of M.C.B. design, 10 in. wide, the lower member being 1 in. and the upper member ¾ in. thick. The bolsters are tied to the side sills by ¼-in. gussets. The bumpers are of 7-in. channel iron tied to the corner posts and to extensions of the side plates. The needle beams are of bolster design, the top member being a 3-in. channel and the bottom member a 4-in. channel iron, tied to the side-sill angles with 3/16-in. gussets to which 4-in. x ¼-in. diagonal braces are fastened. A 3/16-in. side plate 30 in. wide is riveted between the side doors and the corner posts. A center beam of reversed bolster construction is provided in the form of a 4-in. channel iron which is tied to the truss plate below the sill angle with ¼-in. gussets.

The corner posts are of 4-in. x 4-in. x ¼-in angles braced from the bolster with 4-in. channel irons and fastened to the latter at the top with 3/16-in. gusset plates. The center door posts are in two cases built of 4-in. x 4-in. x ¼-in. angles and in two cases of 4-in. channels braced from the bolster with 4-in. channels and fastened to the body plate with gussets. The gusset at this point connects the two doorposts over the door. By reason of the use of cross-beams of inverted bolster construction a load applied in the center of the car, for example, brings the tension strains on the doorposts, which compress bar angle braces back to the

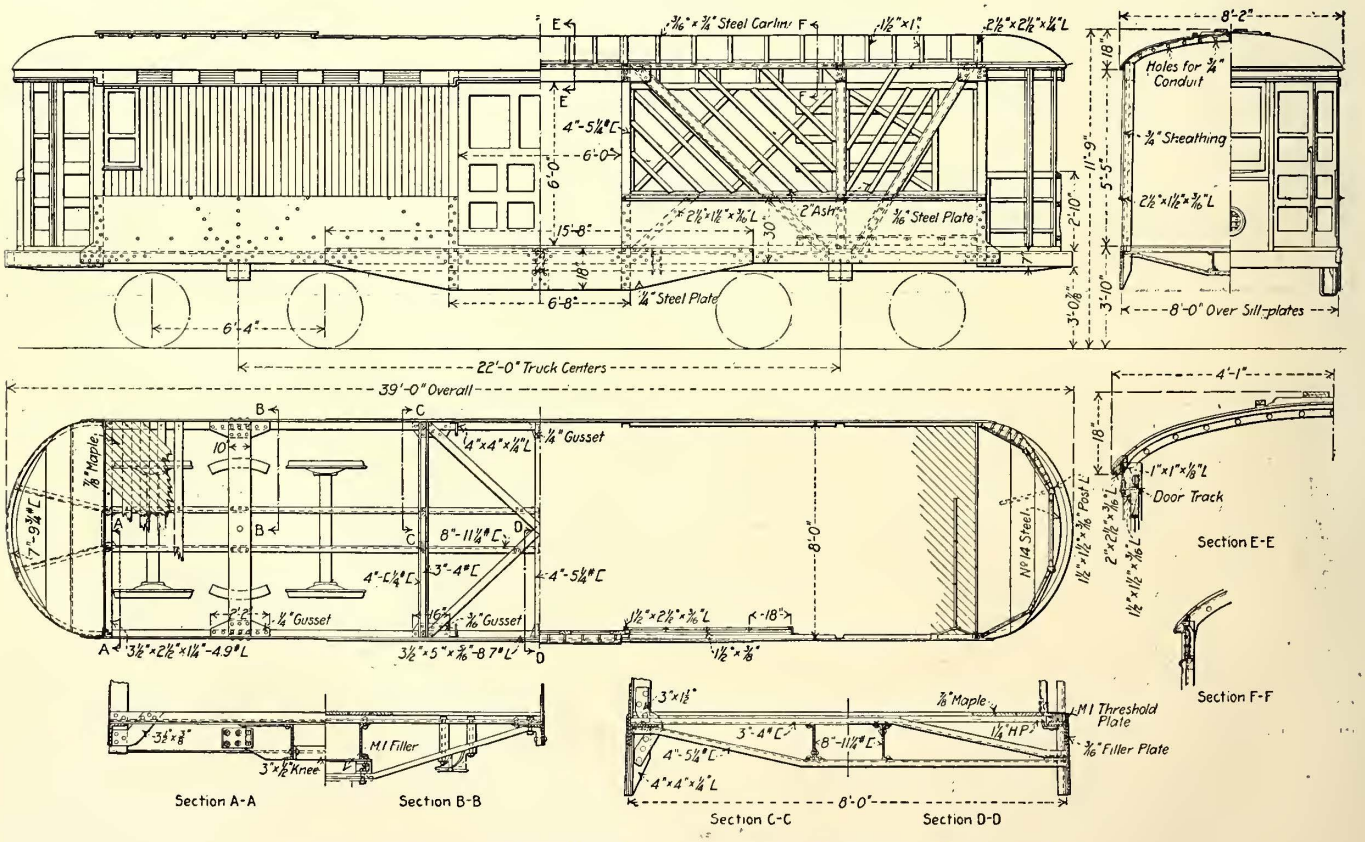
bolsters and transmit the strain directly to the latter. The diagonal braces are 4 in. x ¼ in. in section and the bolster posts are 4-in., 5¼-lb. channels. The corner post rafters are made of 2½-in. x 2½-in. x ¼-in. angle irons, laid inside the posts and fastened to them and to the gussets, forming a turtleback roof. The rafters connecting the bolsters and the center doorposts are of 2-in. x 2½-in. x 3/16-in. angle irons and form a truss roof. The body plate is of 2½-in. x 2-in. x 3/16-in. angle iron run in one length from corner post to corner post and extending 6 in. beyond the post to provide a fastening for the bonnet bow of the vestibule. Steel carlines, composed of 2-in. x 2½-in. x 3/16-in. angles, are provided at intervals along the upper belt rail, and these are drilled for ¾-in. pipe conduit, which serves the threefold purpose of carrying wires and bell cord and strengthening the roof structure. Wooden carlines are used in intermediate positions between the steel carlines. The conduit is suspended between the angle-iron rafters and is tied to the corner post rafters with nuts and bellmouths. Wooden rafters laid on top of the conduit are carried from 3/16 in. to ¼ in. above the steel rafters. All steel carlines are attached to the body plate, and the roof is installed with ½-in. poplar sheathing covered with prepared cotton duck roofing.



Bay State Express Car—Body Framing

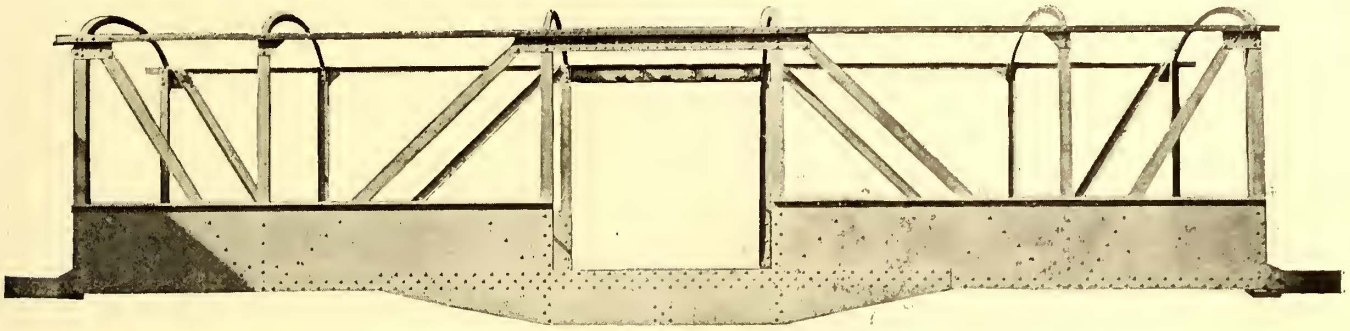
Bay State Express Car—View of Interior

The side from the body sill plate to the roof is sheathed with ¾-in. tongued and grooved hard pine. Wooden sheathing was found to be lighter than steel plate on account of the additional furring necessary with the latter. On the inside the sheathing is constructed only with protection strips of ash which also serve for tying up boxes and barrels. Ten ventilators are installed on each side directly under the body plate, these being of the type described in



Bay State Express Car—Framing Plans and Elevations, Sections, Etc.

the previous article and having adjustable louvers. The side doors are 6 ft. square and are of 1¾-in. ash, with ash panels and three stationary windows in the upper portion. The body end partitions are each of 1½-in. x ⅜-in. angle-iron bar filled in between with screen sections made of No. 11 steel wire, 1-in. mesh, in a ⅞-in. grooved steel frame. The side doors are each provided with screen shields of the same mesh and wire size as for the end partitions, the former having angle-iron corners and being attached at the top to the body-plate reinforced angle. At the corners of door openings angle irons are provided and bolted at the bottom to clips extending up from the angle sill so as to form part of the doorpost construction. The floor is composed of 1¼-in. x 4-in. hard-pine pieces laid 4 in. apart and bolted to the angle-iron side sills and to the channel-iron center sills, with a wearing surface of ⅞-in. maple laid diagonally and screwed to the under flooring. The side doors are provided with four 1-in. pipes with holes cast in the threshold plate 23 in. apart on centers and 6 in. inside the car, with brackets and stop plates at the top to protect the doors when special loads are carried.

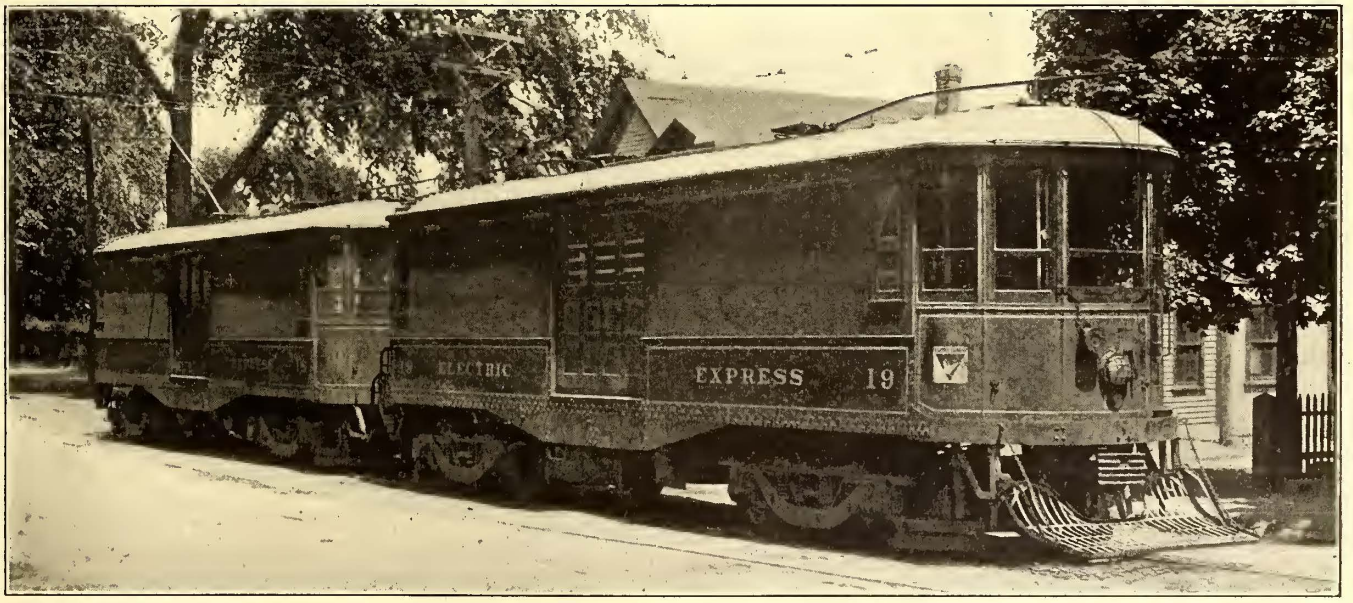


Bay State Express Car—Side View of Body Framing—Weight 6400 lb.

CONDUIT, ELECTRICAL EQUIPMENT, TRUCKS, ETC.

Eleven enameled conduits are installed in the roof to carry the main motor switch wires, control switch wires, lighting, air compressor, arc headlight and heater circuits. A double bell cord is used, with a condulet outlet in the middle of the central conduit which provides a suitable opening without danger of chafing. Each interior lamp is protected against injury by two ¾-in. x 1/16-in. metal straps 12 in. long placed around the bulb just above the lamp base. The conduits are installed 7 in. apart on centers, and their use enables the car to be more closely packed without damage to the bell cord or wiring.

The heaters are placed in the vestibules at each end and underneath the end door openings on the side of the car, inclosed in a double-lined box in the latter case, as shown in the drawing on the next page. The heater box is of sheet steel and the space between the walls is lined with asbestos. At the top of the box a short flue leads upward to an intake screen in the side of the car, so that when the doors are left slightly open in cold weather the danger of injury to perishable goods placed near the doors will be eliminated. All switches are placed inside the vestibules and nothing is left inside the car which will in any way occupy freight-carrying space. The heating grills near the doors are 4 in. high x 30 in. long. The motors are inside-hung with leads hung by leather straps from springs attached to the underframe, and the trucks were designed by the Baldwin Locomotive Works for 30,000 lb. king-pin load. It is probable, however, that a lighter truck built along the lines of the railway company's "Bay State 12" truck, which was described in the ELECTRIC RAILWAY JOURNAL of Oct. 5, 1912, will ultimately be applied to this service, since the superintendent of equipment is of the opinion that the trucks can be lightened materially with the same factor of safety if the latter design is adapted to the express cars.

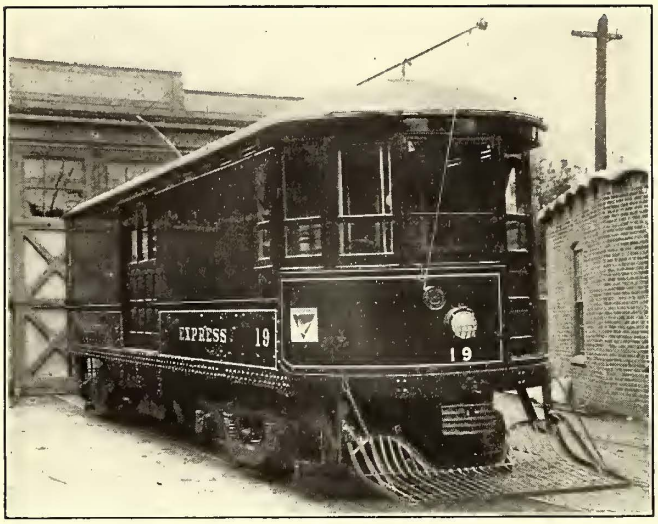


Bay State Express Car—Coupled for Multiple-Unit Train Operation

The fender is the company's own design and when hinged up extends over a spring-cushioned bumper, so that it is free to swing when the car is coupled with others. The bumper is illustrated in the accompanying drawing and combines also in its construction anti-climber and draw-

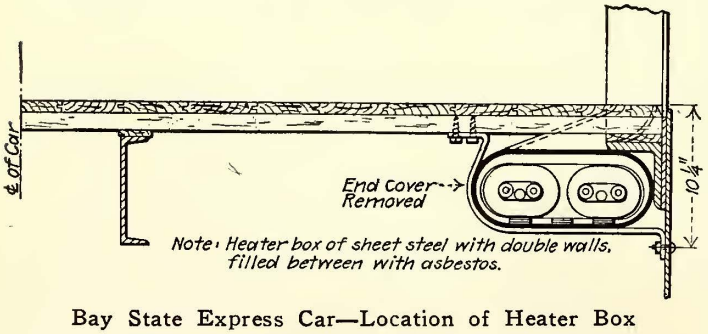
head features which are the basis of patent applications now pending. This arrangement minimizes the weight and works out very satisfactorily in practice.

The vestibules are unusually convenient in arrangement. The arc headlight switch is located within 15 in. of the air-brake handle and diagonally above the latter, a conductor's valve being set overhead to enable the emergency brake application to be made from either end. This is an important feature in the successful operation of a fast ex-



Bay State Express Car—End View

press car service, since the conductor and motorman are separated when heavy loads of bulky merchandise are carried, and thus they cannot communicate as freely as on a passenger car. On the headboard of each vestibule are mounted a motor switch, air-compressor circuit-breaker, master controller breaker, headlight switch, heater knife switches and a lighting breaker. Each vestibule carries a Badger chemical fire extinguisher, and a seat is provided for the motorman. The vestibule doors are made to lock either outside or inside by padlock attachments, the padlock being fastened through a hole and angle piece at the door, the handle and latch being combined to save weight. Grab handles are provided on the vestibule doors only, and these are installed so as to be flush or inset in relation to the sides of the car. The cars are painted green with a dark finish, being otherwise like the passenger rolling stock. By operating them in multiple-unit trains from Boston to important centers south, where a motorman can be secured



Bay State Express Car—Location of Heater Box

for further service on the single car basis, a saving of one man is possible on the platforms.

The summarized weight of the car is as follows:

	Lb.
Car body light	13,595
Motors	8,520
Trucks	16,240
Car-body details	2,164
Air brake equipment	1,199
Electrical equipment	2,528
Equipment brackets, pipes and conduit	1,505
Total	45,751
Actual weight of car on scales	45,800

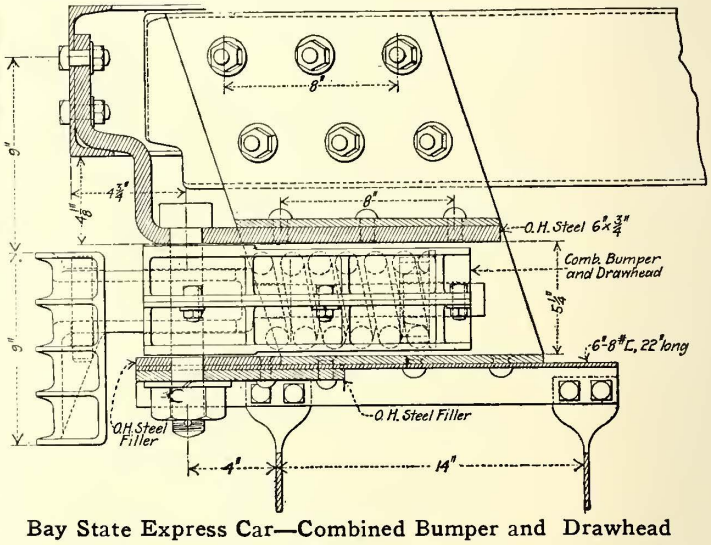
Detailed weights are given in the accompanying tables:

Car-Body Details

	Lb.
Fenders	332
Sanding appliances	117
Body center plates	92
King pin and keys	54
Drawhead, bar and shackles	470
Snow scrapers	480
Foot gongs	24
Incandescent headlights	32
Signal bells and cord	8
Hand-brake staff and handles	138
Gearedd hand brake	138
Hand-brake cables and clamps	56
Floating levers and brake rods	109
Air-brage levers	114
Total	2164

Equipment Brackets, Pipes and Conduit

	Lb.
Air-compressor brackets	28
Governor brackets	18
Compressor cradle	72
Emergency valve brackets	10
Brake cylinder supports	145
Reservoir hangers	52
Contactor box hangers	80
Resistance hangers	116
Heater brackets	59
Mud guards	30
Miscellaneous bolts and cleats	90
Air-brake piping	230
Wiring conduit	575
Total	1505



Bay State Express Car—Combined Bumper and Drawhead Casting

Air-Brake Equipment

	Lb.
Air compressor	633
Jamb cylinder	176
Motorman's valves	40
Reservoirs	141
Air governor	82
Quick-service valves	20
Emergency valves	43
Safety valves	2
Whistles	7
Mufflers	10
Air gages	2
Air purifiers	19
Push rod and pins	18
Emergency valve strainer	6
Total	1199

Electrical Equipment

	Lb.
C-97-A controller	158
SB-52 contactor box	842
Three resistance boxes	170
Trolley stand, poles, etc	267
Trolley hooks	7
Trolley catchers	27
MR circuit breakers	59½
MS-46 switches	20
MS-2 switches	4½
MS-14 switches	8
Roof fuse block	12
MS-16 fuse box	5
MS-13-B fuse box	17
ML lightning arrester	36
Train-line couplers	28
Bus-line couplers	29
BJ-343 connection boxes	70
Arc headlight resistances	13
Arc headlights	40
Wires	460
Heaters	240
Heater switches	15
Total	2528

Maintenance Costs of Old and New Railway Motors

A Comparison of the Costs of Operating Old and Modern Types of Motors in City and Interurban Service, Based Upon Figures Taken from Six Roads in Operation

BY J. C. THIRLWALL, RAILWAY AND TRACTION ENGINEERING DEPARTMENT GENERAL ELECTRIC COMPANY, SCHENECTADY

In a general way every electric railway management realizes that, in the life of car equipments, a point is reached sooner or later where it is a measure of economy to replace the various parts with others of a more modern design. There are a number of factors which determine this point, including power consumption, schedule speeds, efficiency of operation as regards delays, the safety or comfort of passengers and the cost of maintenance. The values of some of these factors are indeterminate in terms of dollars and cents; those of others can be directly calculated. But railway accounting, in the case of the great majority of roads, has not reached a point where it shows automatically the relative costs of maintaining new equipments as compared with obsolescent types running on the same lines. It, therefore, very frequently happens that the executives of electric properties, simply because the facts are not clearly brought to their attention, allow certain parts to remain in service much longer than they would if they realized the savings made possible by the replacement of such equipment by that of more modern design.

Railway motors afford a striking instance of this fact, for there are thousands of motors in service in every part of this country the maintenance costs of which are so high, compared with those of a later design, that it would be a measure of financial economy if they were to be scrapped and new motors installed in their place. If these motors cannot be called obsolete, they are at least obsolescent; that is to say, they are of so inferior a design or so overloaded when used that it is impossible to obtain any great amount of mileage from them annually without an excessive number of failures and consequent heavy repair bills. During the past two years investigations have been made in a very thorough and careful manner by one of the large manufacturing companies into the cost of maintenance of each of the different designs of motors in service on six roads operating city and interurban service in different parts of this country. These roads operate in and between cities of from 25,000 to 700,000 inhabitants, and the conditions of traffic, schedules and loads and the methods of maintenance are sufficiently varied to make the figures obtained extremely representative in character. There are, of course, local differences in service and in the methods of caring for the equipment between the different roads, and these differences caused the average cost of motor maintenance on the different roads to vary slightly. But in general it was the proportional number of old motors in service as compared with the number of modern types owned that made the costs for any road high or low as the case might be. For instance, on one road 70 per cent of the mileage was made with GE-800 and GE-54 motors which had been in service for ten to twelve years. The average cost per 1000 motor miles for this road was $1.70. Another road, with an average cost of but $0.60 per 1000 motor miles approximately one-third that of the former, was enabled to reach this figure because only 20 per cent of its mileage was made by excessively old types of motors and 40 per cent was made by motors which were designed within the past six years. In consequence, its costs of operation were strikingly low.

A summary of the figures obtained from the records of these roads for the year 1911 is published in Table I, the motors being divided into four groups, the division being made on a basis of years of service and similarity of design.

TABLE I—AVERAGE COST OF MOTOR MAINTENANCE ON SIX ROADS—MOTORS CLASSIFIED ON BASIS OF LENGTH OF SERVICE

	Class I 15 Years or More	Class II 10 to 15 Years	Class III 6 to 10 Years	Class IV 3 to 6 Years
Number of motors in service	745	3,866	2,980	1,356
Motor miles run during 1911	2,323,830	110,672,907	105,801,679	50,261,070
Miles run per motor	3,120	28,627	35,504	37,065
Motor miles run per defect	1,800	8,597	21,410	62,513
Cost of inspection per 1000 motor miles	$2.20	$0.30	$0.11	$0.03
Cost of repairs per 1000 motor miles	3.22	1.36	0.76	0.25
Total maintenance cost per 1000 motor miles	5.42	1.66	0.87	0.28

A study of these figures, which represent a total service of over 269,000,00 motor miles, shows several things. Primarily, the excessive costs of the motors in Classes I and II, as compared with those in Classes III and IV, are very prominent. Secondly, the mileage made per defect by the two first classes is very low, which means as a result frequent delays in service, numerous "pull-ins," cars held from service for repairs when needed and the resultant demoralization to the schedules, and these, in turn, mean a very large, though indeterminate, financial loss, as well as the loss of prestige and the antagonism of public sentiment. Such conditions, while not capable of being expressed directly in dollars lost, are unquestionably a heavy expense. This idea is borne out by the fact that the individual motors in the two first groups make annually but a small fraction of the mileage run by the motors in the two latter groups.

A very large proportion of these motors, of course, are mounted in service cars, sweepers, snow plows, etc., where the amount of work they are required to do is necessarily little. Others are beneath single-truck cars of ancient style which may be held as reserves and used only on days when an unusual press of traffic demands more than the ordinary number of cars. On this type of equipment, where the mileage made per year is necessarily limited by the car itself rather than by the motors, it is questionable whether the replacement of the old motors by those of a more modern design would return a reasonable percentage on the investment. But a very large proportion of these oldest motors are mounted under cars, passenger, work and supply, which operate regularly and run up a large mileage annually but at a very high cost for motor repairs. Another large proportion of motors is beneath cars which are capable of and suitable for regular service but are kept lying idle the greater part of the time owing to the unreliability of their motors. Thus they are revenue consumers instead of revenue producers.

POSSIBILITIES OF SAVING IN MOTORS OF CLASS I

Were the motors in Class I replaced by ones having costs no higher and with efficiency as great as those in Class IV and were an equal amount of mileage obtained from each annually, the saving in maintenance costs for the former type would be sufficient to wipe out the cost of replacement within two or three years. This would be equivalent to an investment yielding 30 per cent to 50 per cent annually. And with strictly modern motors, which those in

Class IV are not, the gain in both efficiency and economy would be even more marked.

POSSIBILITY OF SAVING IN MOTORS OF CLASS II

In the case of the motors in Class II, the advantage in replacement is not so obvious. The reduction in expense in the case of most of the individual motor types which it includes, were they replaced, would be sufficient to pay a substantial interest on the capital invested in the substitution, but to many railway managers the question would occur: "Can this reduction in expense be maintained over a period of years long enough to justify the initial expenditure?" The answer to that question is emphatically "Yes."

In the first place, an analysis of the cost of motor repairs, which constitute 85 per cent of the total costs for all motors, is shown in Table II, which represents actual averages on the different roads.

Table II—Cost of Repairs per 1,000 Motor Miles

	Class I	Class II	Class III	Class IV	Difference Between II and IV
Fields	$0.43	$0.26	$0.15	$0.02	$0.24
Commutator	0.77	0.30	0.10	0.01	0.29
Armature	0.90	0.18	0.09	0.025	0.155
Brushes	0.06	0.05	0.03	0.025	0.025
Brush holders	0.19	0.15	0.10	0.005	0.145
Gear and pinions	0.14	0.13	0.10	0.055	0.075
Bearings	0.65	0.24	0.12	0.09	0.15
Miscellaneous	0.08	0.05	0.07	0.02	0.03
	$3.22	$1.36	$0.76	$0.25	$1.11
Inspection cost	2.26	0.30	0.11	0.03	0.27

When the figures for Class II and Class IV are compared, the items which show the largest reduction in cost are: field, 24 cents; armature (including commutator), 44.5 cents; brush holders, 14.5 cents; bearings, 15 cents, and inspection, 27 cents. On these five items, $1.25, or more than 90 per cent of the total saving, is effected. The chief factor entering into this reduction is not the age of the motors but their design. Modern motors cannot and will not show the heavy rate of depreciation characteristic of the older types. The reasons for this are obvious.

CHANGES IN ARMATURE DESIGN

First, in respect to armatures. The vastly improved electrical characteristics, due to changes in design and construction which have been worked out within the past few years, produce a motor which by the elimination of sparking and flashing at the brushes under all conditions of load has at one stroke wiped out the big majority of armature, brush and commutator defects. The most frequent single class of defects on this old type of motors is flash-overs. Flash-overs are the result in almost every case of a slight arcing at the brushes and these flash-overs are across a gas-filled air space to a ground either on the shell, the housing or the commutator cone. The flashes, in turn, result in short-circuited commutators, burnt hammer springs, grounded brush holders, and, in fact, they are the cause of a large proportion of coil insulation break-downs. Their elimination, therefore, means a big reduction in all electrical troubles and, as a consequence, in repair bills.

PROTECTION AGAINST OIL

A second factor making toward this same result is the much better protection against the entry of oil into the interior of the frame which is afforded on the latest designs. Oil-soaked insulation, which is a characteristic of almost every old-style motor, reduces its life and efficiency very rapidly. Oil on the commutator, on the mica band and on the brush-holder insulator means a rapid accumulation of dirt, carbon dust and iron particles from the brakeshoes on these parts, with resultant short-circuits and grounds. Numerous and enlarged oil deflectors on the shafts of the latest armatures absolutely prevent oil from the bearings creeping in and being thrown about the interior of the shell. This not only reduces the repair bills but also the cost of inspection, for the thorough cleaning of all parts when they are dry is a much simpler matter than when they are plastered with oil-soaked dirt.

COMMUTATOR CONSTRUCTION

A third factor is the under-cutting of commutators and the use of wider mica between segments. This has reduced brush wear and commutator wear and has altogether eliminated the enormous number of flat commutators that was so characteristic of the older designs. While many motors which were originally put out with smooth commutators have since had them under-cut, the fact that 32-mil mica was employed in their construction reduces the advantage gained as compared with present designs, which use 45-mil mica to reduce the chances of short-circuits between segments.

LUBRICATION

A fourth and very important factor is the improved lubricating arrangements and bearing design of the latest types. Hot armature bearings have always been a frequent source of trouble, and when one occurs with the old design of bearing, with its thick babbitt lining, the armature inevitably strikes the pole pieces. This almost invariably results in grounded coils and often in the "mushrooming" of the armature, a condition which compels a complete rewinding and heavy repairs of the core and shaft. Babbitt linings which break away from the shell and work out, owing to bad track work or rough cross-overs, are also common and frequently result in the same defects. They also compel very frequent rebabbitting of bearings, adding greatly to the cost of maintenance. With the modern bronze bearing, lined with a thin layer of tough, tin-base babbitt, in combination with an improved system of lubrication, not only are the chances of hot bearings reduced to a minimum, but should one occur, the motor can run for a long distance before the armature will strike the pole pieces. Under such circumstances the replacement of a new bearing and fresh waste is the only expense incident to the return of the motor to service. Again, the deep-flanged, felt-lined covers of the oil wells afford excellent protection against the entry of water into the oil chambers, a condition which frequently occurred on the older types, floating away the oil and causing hot bearings.

FIELD TROUBLES

Field troubles are for the most part "grounds," caused by water or oil coming into contact with the insulation, or by mechanical injury, or by short-circuits caused by overheating. The modern field, which uses an insulation of a far higher efficiency and durability than that originally employed, is also reinforced by the impregnating compound which is forced through the entire structure of the coil. Hence it is far less liable to break-downs caused by either water or overheating. Moreover, the entry of either water or oil to the interior of the shell is much better guarded against than formerly, and in the case of the box type of motor such a condition is very unusual. To guard against mechanical injury, special precautions have been taken by clamping the field coils in metal pans resting on a machined seat and held rigidly in place by sheet-steel spring flanges. Such a construction reduces the chances of defects of this kind to a minimum.

BRUSH-HOLDER DESIGN

Brush-holder design has been improved by the elimination of the old-style wooden yokes and asbestos compound insulators, which have been replaced by a porcelain and mica construction that is readily cleaned, and if these parts receive ordinary care, grounded brush holders should be unknown. The protection of the brush holders from oil spray, mentioned previously, also assists in eliminating this source of danger.

INSPECTION

The last item, that of inspection, shows a big decrease in cost for the same reasons that make fewer repairs necessary. The one essential feature governing the length of time which motors can remain in service without shop attention is the oiling arrangement. With the older types of motors, lubricated by grease cups or oil caps, daily or

tri-weekly inspection is necessary if the motors make any considerable mileage. Otherwise dry cups, hot bearings and armatures rubbing on pole pieces may result. With the modern type of frame heads and axle caps, containing oil reservoirs and lubricated by capillary attraction, it is quite possible to extend the oiling periods to from twenty to thirty days. Therefore, not only are a far less number of annual inspections necessary, but the time devoted to each inspection is far less than with older types. The only work necessary as a rule is oiling, an inspection of brushes and trial or brush tension and gaging of armature clearance, and this is a matter of but a few minutes' work for one man. On the other hand, where flash-overs, grounded brush holders and oil spattering over the shell interior are common, a thorough cleaning up of all parts that can be reached through the commutator opening is a vital necessity at each inspection, frequent replacements of brush-holder insulators must be made, bolts must be tightened or renewed, commutators filed down or sand-papered, etc.

NECESSARY WORK AND ITS COST

In short, the improvements in design and in materials in the most recent types of motors are such that their repair costs should never approach those of the older types, and the rate of depreciation should be far slower. The only items that will require regular renewal on a time or mileage basis will be the brushes, bearings, gears and pinions. A conservative estimate of the cost of these items, including labor charges, after motors have been in service a sufficient time to make regular renewals necessary, is approximately 16 cents per 1000 motor miles. It is considered, therefore, that a total maintenance cost figure of 25 cents per 1000 miles (which includes both inspection and repairs) is reasonable and legitimate to assume for an average under ordinary service conditions throughout this country. Basing the annual amount of service which should be made by each motor upon the same conditions, we shall assume 40,000 miles as the figure, which agrees closely with the mileage actually made by thousands of cars similarly equipped. The total cost for inspection and repairs under these conditions would then be $10 a year per motor.

The savings that would result from replacement, therefore, would average, on maintenance costs alone, from $200 per motor per year in the case of the oldest motors to about $50 or $60 per year for those of the second class. Either figure would pay a liberal interest on the bond issue required to capitalize the cost of replacement with new motors.

OTHER SAVINGS

But there is still another direct economy that should result. As a general rule, the weights of motors of the present day of any given horse-power rating are considerably less than similar ones of earlier design. The reduction in weight that could be secured by replacement, therefore, would mean reduced power costs and reduced maintenance on trucks and tracks. The amount of such saving is estimated in ordinary service at from 3 to 8 cents per pound per year; perhaps 4 cents is a safe figure to use in ordinary city service. A reduction in weight of 500 lb. per car, which could in many instances be made, would therefore mean an additional $20 per year saved above the maintenance reduction.

With such incentives—namely, marked economies in operation, and greatly increased efficiency of service—it is the belief of the writer that operating companies would find it highly profitable to investigate the comparative cost of motors of different types on their lines. Where these appear excessive and the car equipments under which they are mounted are such that they can be or are used in fairly regular service, the cost of replacement should be obtained and the question as to whether the replacement is justified decided.

ILLINOIS ELECTRIC RAILWAYS ASSOCIATION OUTING

The Illinois Electric Railways Association held its regular meeting Sept. 19, 1913, at Starved Rock, Ill., with forty members in attendance. Owing to the fact that a number of members were extremely busy and could not attend the June meeting of this association, it was postponed and consolidated with this one held at Starved Rock. Most of the members assembled at Joliet, Ill., in the morning of the date of the meeting, where F. E. Fisher, general superintendent of the Chicago, Ottawa & Peoria Railway, had a special car awaiting them. On the way from Joliet to Starved Rock the special car stopped at Marseilles, Ill., where the members inspected the low-head hydroelectric plant of the Northern Illinois Light & Power Company.

President Marshall E. Sampsell presided at the meeting, which was held at the Starved Rock Hotel in the afternoon, and the business of the association was confined to reports of standing committees. John Leisenring, chairman of the signal committee, reported that he and several other members of the association had been invited to attend a meeting of the engineers of the Illinois Railroad & Warehouse Commission to revise the rules for overhead line crossings. It was stated that the commission's engineers had reached an understanding with the steam roads so far as light and power line crossings were concerned, and that the object of this meeting was to consider the question of lines other than light and power circuits crossing electric railway right-of-way. It was the sense of the association that the representatives of the signal committee should request a postponement of definite action until such time as all the members were able to formulate a set of tentative plans based on their local conditions. The signal committee then could employ this set of plans as a basis of its action on the proposed specifications for overhead line crossings.

The membership committee presented an amendment to the constitution of the association as regards its membership. This amendment did not materially affect the requirements already embodied in the existing constitution but defined the qualifications more clearly. The report of this committee was received and the secretary was instructed to submit a copy of the amendment to each of the members before the next meeting so that final action may be taken at that time.

The report of the traffic committee developed the fact that a number of the members had experienced difficulties in the operation of the interchange mileage coupon ticket. The objections and criticisms offered at this time were referred to the traffic committee, which was instructed to investigate the situation thoroughly and report recommendations at the next regular meeting of the association. Final instructions also were issued to the traffic committee in regard to a map showing electric interurban lines in the association's territory. The committee was requested to report proposals and sketches for two sizes, one to include Illinois only and the other to include a portion of Indiana and Iowa with Illinois. At the close of this meeting the members, piloted by Mr. Fisher, explored Starved Rock and the numerous canyons in the surrounding territory. The return trip from Starved Rock to Joliet was made by special car.

Representatives of twenty-five of the principal steam roads in this country met in Chicago, Sept. 22, 1913, to complete the organization of the American Railway Safety Association and outline definite work for its members. A. W. Smallen, of the Chicago, Milwaukee & St. Paul Railway, was elected temporary chairman and L. S. Shedd, general safety supervisor of the Chicago, Rock Island & Pacific Railroad Company, was elected temporary secretary. The first meeting of the association was held in Chicago, June 9, 1913, when a constitution and by-laws were adopted.

All-Steel Cars for the Union Traction Company of Indiana

A Complete Description of the All-Steel Interurban Cars Recently Ordered by the Union Traction Company of Indiana—Explains Reasons for Adoption of All-Steel Design

The Union Traction Company of Indiana has recently purchased ten all-steel interurban cars which will be used in limited train service between Indianapolis, Fort Wayne, Logansport, Peru and Muncie, Ind. Steel construction was employed not only because of the apparent safety in operation due to its strength and durability but also because of the low cost of maintenance and the fact that the walls of the car could be constructed with a minimum thickness, thus giving a maximum interior width with minimum over-all dimensions.

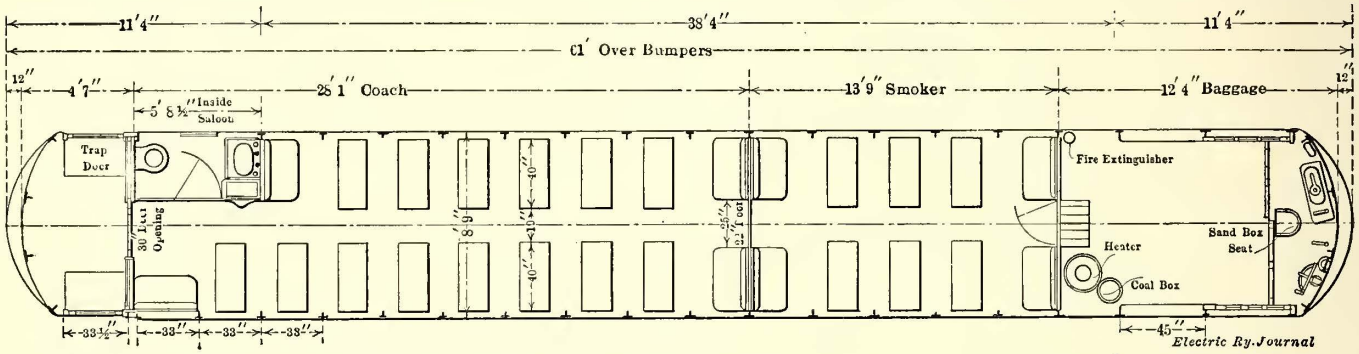
In the arrangement of the car body the management decided on a three-section car which included passenger, baggage and smoking compartments. The baggage space is located at the front end of the car adjoining the motorman's cab because this position affords an additional factor of safety to passengers in case of accident and because the motorman attends to loading and unloading baggage at the station stops. The smoking compartment adjoins the baggage section, and the main compartment is at the rear, available to the rear entrance.

To provide for the comfort of passengers as well as to give an unobstructed view of the right-of-way or other scenery in advance of the train, all partitions were installed with large glass areas. This arrangement permits the conductor to occupy the rear platform at all times, as he can observe the movements of the motorman and see the passengers in the car. It is considered specially desirable that the conductor should be on the rear platform when two or more cars are in a train so that careful watch may be kept over the entrance to both cars.

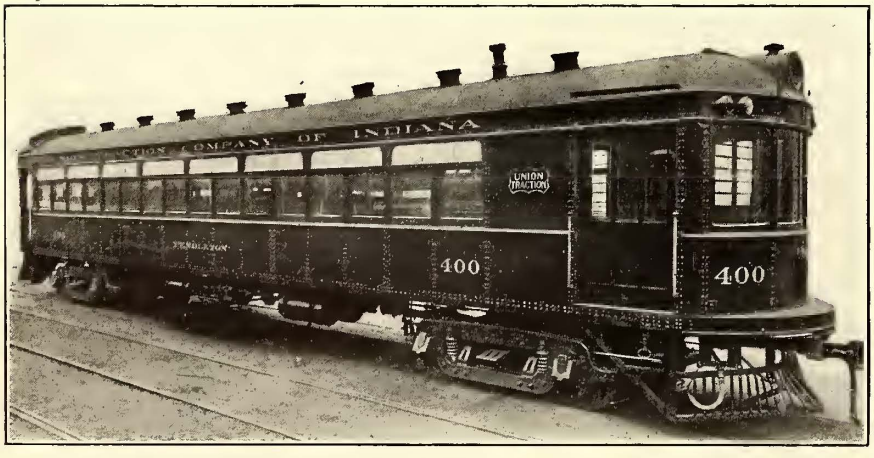
DETAILS OF CONSTRUCTION

One of the principal objections to all-steel cars has been the difficulty of providing proper insulation against wide variations in exterior and interior car temperatures. This has been overcome in the present design by the employment of a compressed cork filler for the sides and roof. The necessity for a floor in the passenger compartments which would not only be fireproof and resist abrasive action but would also be resilient, non-conducting and resistant to the action of moisture was met by the use of Channarch steel flooring filled with Flexolith composition. Over this a wearing surface of ¼-in. Agasote was laid, the surface in the aisle being depressed to admit the installation of a wearproof mat.

The general dimensions and weights are as follows:



Indiana All-Steel Car—Floor Plan, Showing Arrangement of Compartments



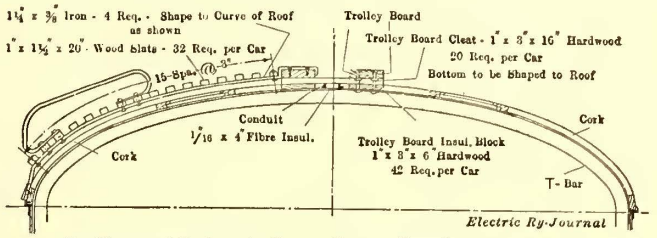
Indiana All-Steel Car—Exterior and Interior Views

Length over bumpers	61 ft.
Width over side plates	8 ft. ½ in.
Height from rail to bottom of sill	43 in.
Height from bottom of sill to top of roof	9 ft.
Truck centers	38 ft. 4 in.
Weight of car body with electrical and air-brake apparatus	45,200 lb.
Weight of two standard trucks complete with four motors	40,400 lb.
Weight of car body fully equipped and mounted on trucks	85,600 lb.

Standard structural steel shapes consisting largely of steel channels make up the underframe. The side framing is made of 2½-in. x 2¾-in. x 3/16-in. T-bars which form continuous posts and roof carlines extending from one

side sill to the other. The use of a continuous post and carline was made possible by the use of an arched roof. The sides of the car are sheathed with No. 14-gage steel, and the arched roof is formed of No. 16-gage steel riveted securely to the tops of the T-bar carlines. The sheathing is covered on the outside with a 1-in. layer of compressed cork, which is securely cemented to it, and this cork in turn is covered with canvas stretched tight and bound to the letter board with half oval iron. The surface then is properly coated with a roof paint which produces a roof that is not only waterproof but weatherproof as well. The cork serves as an insulating medium, as it is a non-conductor of heat and cold as well as of electric current.

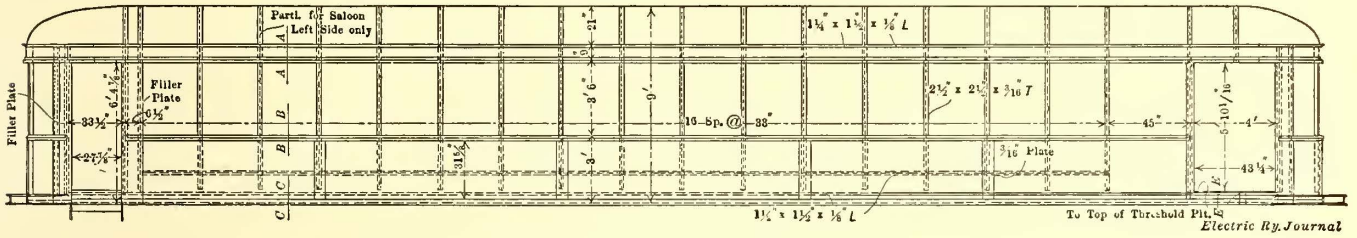
The use of Agasote for a head lining, for wainscoting below the windows and for the floor surface provides a fireproof insulating medium, and has enabled the designers to produce a car body lighter than would be obtainable if sheet steel were used throughout. The partitions between the different compartments, however, are built of steel with steel doors and moldings furnished by the Hale & Kilburn Company. The floor in the baggage compartment was built of 3/16-in. steel plate so that it could withstand rough usage, and it was insulated by a layer of compressed cork.



Indiana All-Steel Car—Cross-Section of Roof

both inside and out with pressed-prism plate glass. All interior brass trimmings in the car are of oxidized bronze, and the interior finish, including both the steel and the Agasote lining, is grained to match mahogany.

Seats are provided for thirty-six passengers in the main compartment and for twenty passengers in the smoking compartment. In the main passenger compartment the seats are of the Hale & Kilburn reversible type upholstered in plush, while in the smoking compartment the seats have stationary backs and are upholstered in real leather. A saloon has been provided at the rear left-hand corner of the main passenger compartment.

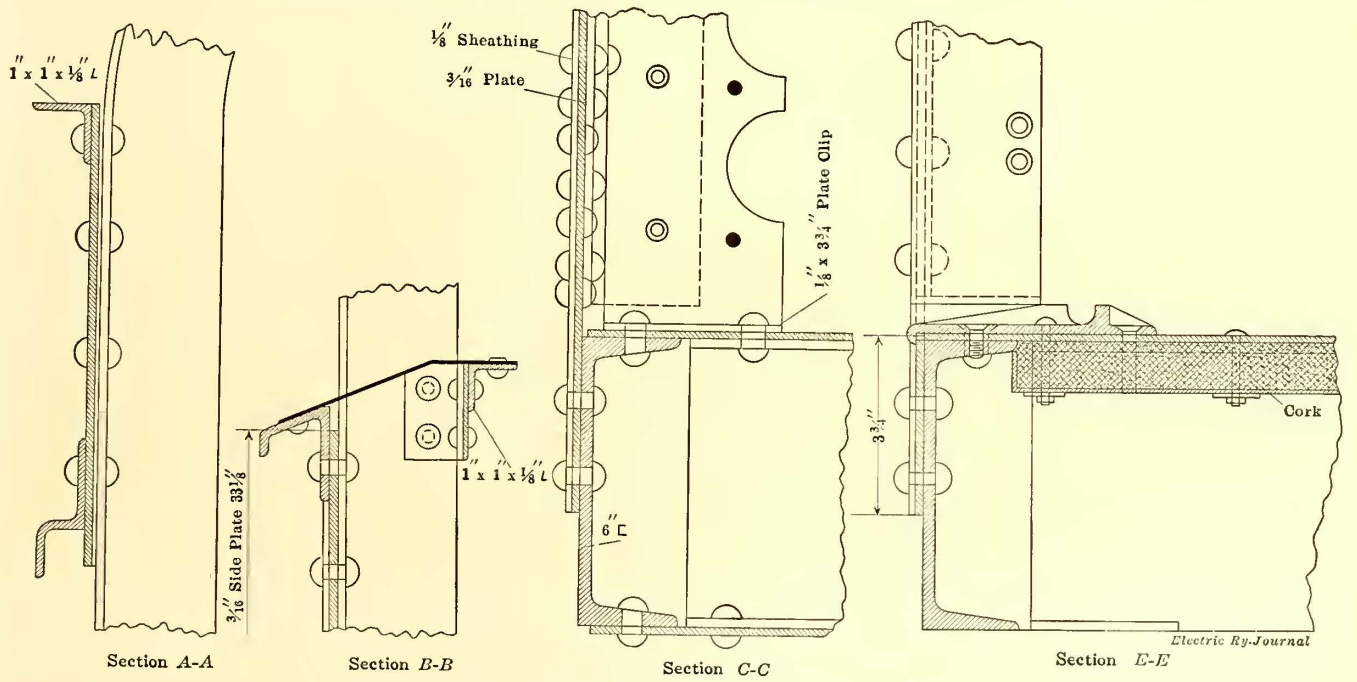


Indiana All-Steel Car—Plan of Side Framing

INTERIOR ARRANGEMENT AND EQUIPMENT

As is shown in the accompanying illustrations, each side of the car is equipped with eight twin windows. Each window is provided with double lower sash and both are arranged to raise, the outer one serving as a storm sash and being fitted with storm-sash fixtures. The inner sashes are fitted with Dayton raise-sash, locks and racks. The Gothic sash across the top of each twin window is glazed

A Peter Smith hot-water heater and a coal bin are installed in one corner of the baggage compartment, and a liberal installation of Utility ventilators provides ventilation throughout the car body. Other car equipment includes Alert fire extinguishers, Tomlinson M. C. B. radial couplers, Edwards steel trap doors in the rear vestibule, Universal safety treads, Ackley adjustable hand brakes with drop brake handles for use in case of an emergency, United States incandescent headlights, Knutson trolley retrievers and Keystone pneumatic gongs. The car bodies are



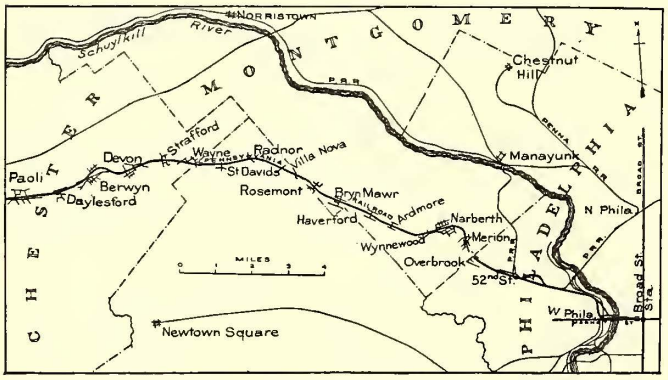
Indiana All-Steel Car—Details of Side Framing

arranged for single-end operation and are mounted on Standard C-80-P high-speed interurban trucks. Each truck was equipped with two Westinghouse No. 303 motors with HL control. All wiring, including that for the propulsion current as well as for the lighting and bell circuits, is installed in steel conduit housed in the car body. The air-brake equipment is Westinghouse NM type.

A headlight cabinet is provided in the center of the hood at the front end of the car. This opens into the motorman's cab and thus permits adjustment from the inside of the car. Each side of the front end at the letter board is equipped with openings provided with green and white roundels for electric markers. Similar openings are provided at each side of the rear end of the car at the letter board for red electric rear markers.

NEW ELECTRIFICATION PLANS OF THE PENNSYLVANIA RAILROAD

As a further step in the general electrification projects of the Pennsylvania Railroad it has been announced officially that the line between the Broad Street station and Chestnut Hill on the New York division is to be electrified within one year. The present plan comprehends the operation by electricity of suburban service only, and the through trains will be handled by steam locomotives.



Map of Philadelphia Suburbs, Showing Authorized Electrification to Paoli and Extension to Chestnut Hill

Multiple-unit cars will be used exclusively, one of the latest types of passenger coach, built by the Pennsylvania, having been designed so that it can readily be equipped with motors. A number of these coaches have been built within the past three years in anticipation of the suburban electrifications, so that no delay in changing the method of operation is expected on the score of necessity for building new car equipment. No purchases of electrical equipment have, however, been made as yet.

The matter of power supply is also undecided at the present time, and while negotiations are under way for the purchase of three-phase current from central stations in the vicinity of Philadelphia, it is still considered a question whether the railway company cannot generate its own power at a lower rate than that offered by any power company in view of considerations which will influence the problem in the near future.

The projected electrification to Chestnut Hill will involve an expenditure of $1,250,000, or for the 12 miles of route will cost $104,000 per mile. This is $96,000 per mile less than the estimated cost of the electrification to Paoli, 20 miles west of Philadelphia, which, as outlined in the Electric Railway Journal for March 15, 1913, page 515, is expected to cost $4,000,000 for 20 miles of route, or $200,000 per mile.

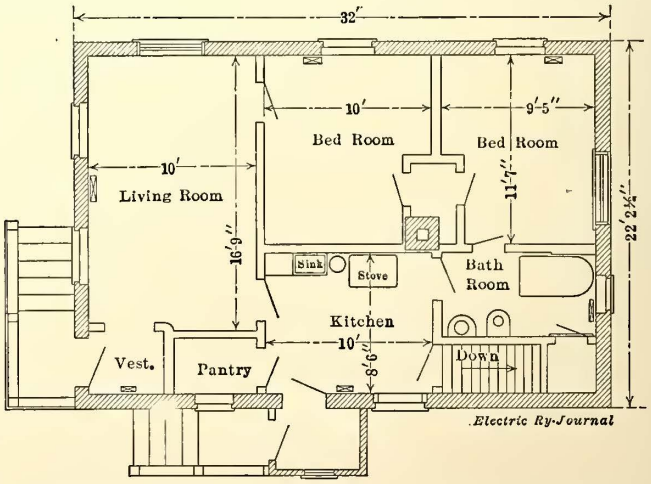
Both of these electrifications, one to the north and one to the west of Philadelphia, have been authorized as a means for relieving the existing congestion at the Broad Street station at the earliest possible moment. The two lines have the heaviest suburban travel of all lines out of Philadelphia, and as the proposed subway for Broad Street extending out to North Philadelphia could not be completed for some five years, the necessity at the present time for a frequent electric service to the suburbs is obvious.

A part of the railroad company's plans for general improvement of terminal facilities in Philadelphia includes the widening of the Broad Street station and the construction of eight tracks and high-level island platforms at North Philadelphia, and as the former work is largely dependent upon the outcome of negotiations with the city, an increase in the capacity of the existing Broad Street station was considered to be essential. There are at present eighty-five steam trains for the Paoli line operating in and out of the station every day and sixty-six to and from Chestnut Hill. By the operation of all of these by electricity in multiple-unit trains not only may immediate relief from congestion in the terminal station be obtained but the suburban service will be greatly benefited by the greater speed, frequency of operation and cleanliness of electric traction.

HOUSE FOR SUBSTATION OPERATOR

The accompanying plan shows the living floor of a two-story house recently erected at the rear of the Girard Avenue substation lot in Minneapolis by the Twin City Rapid Transit Company. The other floor is a basement, containing laundry, heater room and storeroom, and the house is rented to the substation operator at the nominal price of $10 per month. The building is of brick and is designed to accord with the style of the substation, which is a very handsome brick structure. It measures 22 ft. x 32 ft., outside, and is placed at the extreme rear of the substation lot to allow room for an attractive, pleasantly shaded yard between it and the substation. While primarily designed for two floors only, another story could be added without great cost. As the plan indicates, the details have been worked out with regard to the convenience of the occupants and economy of space, and as a result the substation operator has for a nominal rent what would be an expensive flat in an apartment house.

The Twin City Rapid Transit Company has had some experience with the plan of renting apartments to substation operators and finds that fewer operators are required when the chief operator lives on the premises, as he is able to give better supervision to the station and is available for emergency calls without delay. The practice is in line with that of German companies as outlined in an editorial in the issue of the Electric Railway Journal for Aug. 30, 1913.



Plan of Living Floor for Twin City Substation Operator

Watch Inspection on High-Speed Interurban Railways in the Central West

A Description of the Watch Inspection Methods Employed by the Aurora, Elgin & Chicago Railroad, the Illinois Traction System and the Chicago & Milwaukee Electric Railroad—Inspection Reports Used by These Companies Are Reproduced

Little need be said regarding the importance of accurate and reliable watches on high-speed interurban railways. The close headway as well as the short intervals allowed at meeting points on roads operating local and limited trains makes the reliability of its trainmen's watches of vital importance. This not only is true of the watches of all employees in the transportation department, but everyone interested in the time card, namely, foremen in charge of all classes of track men, linemen engaged on the bridges and structures and signal maintainers, must be provided with watches conforming to a certain standard. In fact, accurate watches in the hands of employees are a safety pledge in every road's operation.

The methods employed by several of the larger interurban railway companies in the Central West are both interesting and instructive. Essentially, each employs a general inspector to whom local inspectors, conveniently located, report the results of their inspections. The general inspector in turn condenses these reports into one general report for the head of the transportation department, and he is held responsible for the accuracy of all watches inspected. Watches must meeet certain standards as to movement and adjustment and must pass inspection at least every fifteen days, at which time they are set and regulated as required. In case repairs are necessary, the local inspectors, who in all cases are jewelers, must loan the trainman a watch which will conform to standard specifications.

On the Aurora, Elgin & Chicago Railroad the Ball inspection system has been adopted. This includes the appointment of the jewelry firm as general inspector, and it in turn appoints the local inspectors. The local inspectors are situated at the three terminals of the road, namely, Aurora, Elgin and Chicago. They make all inspections free of charge to either the company or the general inspector, but receive compensation for their work from watch sales and repairs. The general inspector, however, is under contract with the railroad company and receives a fixed salary based on the miles of road operated.

When a trainman or anyone connected with the service and interested in the time card is employed, he must obtain a certificate of general watch inspection. These certificates of inspection are issued by the division superintendent to all trainmen semi-annually. Following the receipt of the certificate they must present it to the most convenient local inspector, who checks the condition of the watch as he finds it. The form of this certificate is reproduced. Upon completing the general inspection, the local inspectors present the certificate to the general inspector, who makes such recommendations to the company as the condition of the watch may require.

If the watch is accepted as standard, the employee receives an inspection card, the form of which is shown in one of the illustrations. Following the receipt of this card the employee is required to report to the local inspectors at least every two weeks. A record of each watch's perform-

New Form 59

ILLINOIS TRACTION SYSETM

NAME_____

OCCUPATION_____ ADDRESS_____

MOVEMENT, DESCRIPTION AND NUMBER _____

CASE DESCRIPTION AND NUMBER_____

DATE OF EXAMINATION_____ CERTIFICATE ISSUED_____ NUMBER OF CERTIFICATE_____

+ FAST −SLOW ○ RUN DOWN □ STOPPED ⊕ SET ⊖ REGULATED

Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Rate	Sec. Fast or Slow.	Why Set or	Daily Rate Sec.	Inspector fill out and sign with Ink.

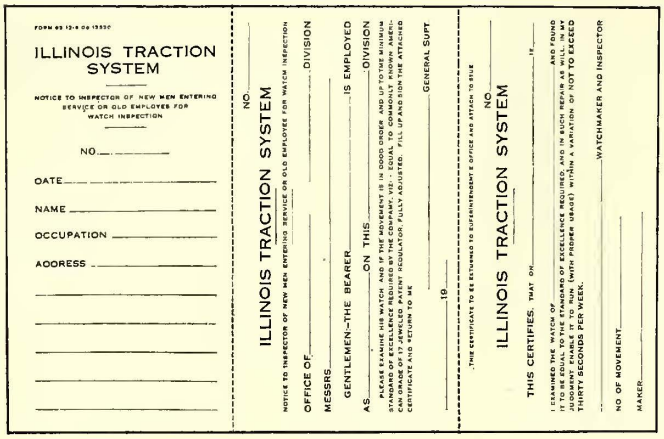
Watch Inspection—Form of Record Used by Illinois Traction System

ance is made on the inspection card, and the employee must carry this card at all times, as he may be required to show the record to the head of the transportation department if there is any question as to the accuracy of his watch. If the watch varies over thirty seconds during the interval between inspections it is set and regulated by the local inspector.

A report of all semi-monthly inspections is made on a form provided for that purpose. This record shows the variations for the two last inspections and is sent to the division superintendent's office at the end of each month. After the results of the inspection have been recorded on this general form the employee is required to sign the sheet opposite the check of his watch. This record advises the transportation department of the condition of all watches in the service and at the same time is a check on the information contained on trainmen's certificates of inspection. These are also carefully checked by the transportation department to ascertain if the employees' watches are being inspected promptly. In addition to the inspection just described, trainmen are required to compare their watches with a standard Western Union clock before taking out their runs. This standard clock is situated in the dispatcher's office, and comparisons may be made personally or by telephoning the dispatcher.

In case an employee's watch fails to pass the general inspection and does not conform to the standard specifica-

tions, he must procure one that does before he is accepted for regular service. The minimum standard of excellence for watches in service is of a grade equal to what is known, among American movements, as the seventeen-jeweled, lever-set Breguet hairspring, patent regulator, adjusted, and


ILLINOIS TRACTION SYSTEM

NOTICE TO INSPECTOR OF NEW MEN ENTERING SERVICE OR OLD EMPLOYES FOR WATCH INSPECTION

NO.

DATE

NAME

OCCUPATION

ADDRESS

ILLINOIS TRACTION SYSTEM

NO.

NOTICE TO INSPECTOR OF NEW MEN ENTERING SERVICE OR OLD EMPLOYES FOR WATCH INSPECTION

OFFICE OF ..... DIVISION

MESSRS. .....

GENTLEMEN—THE BEARER ..... IS EMPLOYED AS ..... ON THIS ..... DIVISION

PLEASE EXAMINE HIS WATCH, AND IF THE MOVEMENT IS IN GOOD ORDER, AND UP TO THE MINIMUM STANDARD OF EXCELLENCE REQUIRED BY THIS COMPANY, AND IN YOUR JUDGMENT ENABLE IT TO RUN (WITH PROPER CARE) WITHIN A VARIATION OF NOT TO EXCEED THIRTY SECONDS PER WEEK.

CAN GRADE OF 17 JEWELED PATENT REGULATOR, FULLY ADJUSTED. FILL UP AND SIGN THE ATTACHED CERTIFICATE AND RETURN TO ME

..... GENERAL SUPT.

..... 19

THIS CERTIFICATE TO BE RETURNED TO SUPERINTENDENT'S OFFICE AND ATTACH TO RULE

ILLINOIS TRACTION SYSTEM

NO.

THIS CERTIFIES, THAT ON ..... 19 .....

I EXAMINED THE WATCH OF ..... AND FOUND THE MOVEMENT IN GOOD ORDER AND CONDITION AND UP TO THE MINIMUM STANDARD OF EXCELLENCE REQUIRED BY THIS COMPANY, AND IN MY JUDGMENT ENABLE IT TO RUN (WITH PROPER CARE) WITHIN A VARIATION OF NOT TO EXCEED THIRTY SECONDS PER WEEK.

..... WATCHMAKER AND INSPECTOR

NO. OF MOVEMENT .....

MAKER .....

Watch Inspection—Certificate Used by Illinois Traction System

a sixteen or eighteen size. It must be in such repair that it will be able to run within a variation of thirty seconds per week. When watches are presented for inspection the local inspectors are instructed to exercise considerable care so as not to impose any hardship or annoyance on employees. In cases of doubt, the employee has the benefit if it can be given to him with safety to the service.

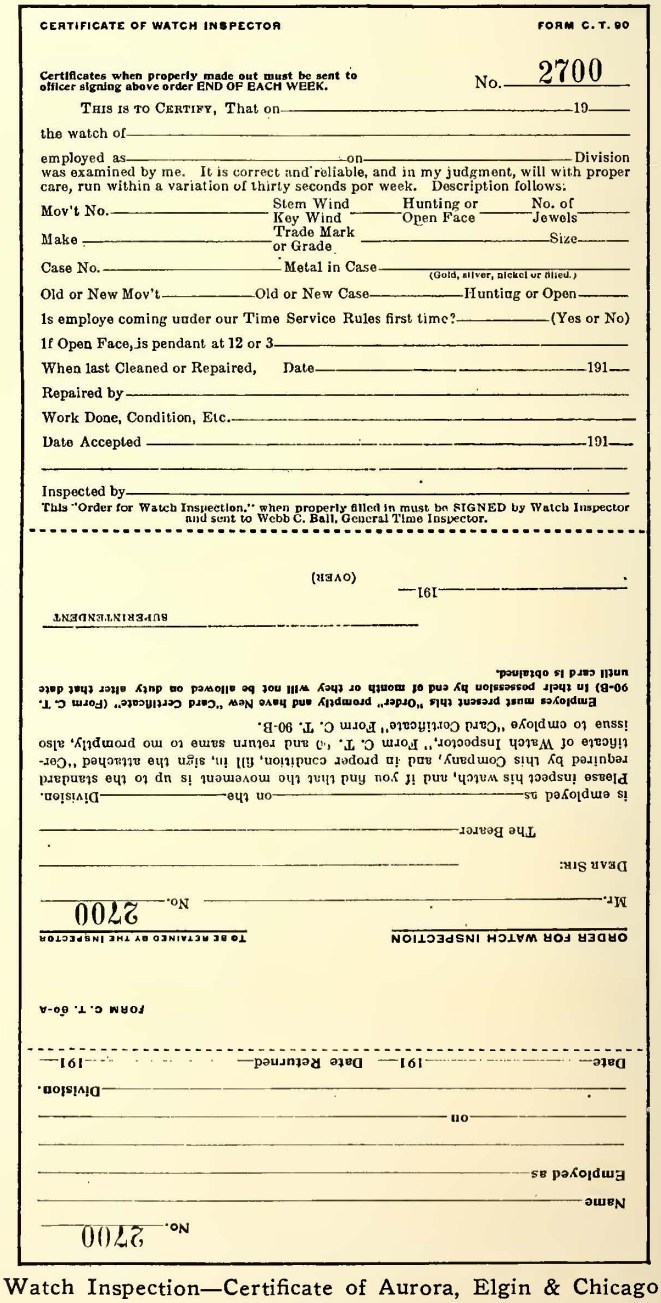
If a watch is accepted for service and later it becomes necessary to repair it, a standard "loaner" watch is furnished to the employee by the local inspector. When the loaner watch is obtained the employee leaves his time record certificate with his own watch, and a loaner card is given to him in its place. During the period his watch is undergoing repairs the employee must conform to the instructions as regards bi-weekly inspections. When his own watch is returned he receives his original certificate and leaves the loaner card with the inspector. To distinguish between the regular and the loaner certificates they are printed in different forms and on differently colored cards.

The transportation department of the Illinois Traction System has inaugurated a system of watch inspection which is essentially similar to that employed by the Aurora, Elgin & Chicago Railroad. Exceptions to this are that employees must submit watches for comparison and rating once each week and the variation must not exceed thirty seconds for that period. As to the standard of excellence adopted by the Illinois Traction System, in addition to meeting the foregoing specifications, watches must be fully adjusted to temperature and to at least five positions. About the same system of forms is employed, namely, the general inspection certificate, the weekly comparison card and a weekly comparison report to the superintendent, but, in addition, the local inspector maintains a permanent record of each employee's watch. This record is kept in a book containing 200 pages. Each employee's watch performance record appears on a certain page, and the result of each new inspection is recorded.

The Illinois Traction System does not employ a general watch inspector, but the local inspectors are appointed by the general superintendent and report to the division trainmasters. Arrangements have been made with the different local inspectors whereby an employee accepted for service who does not own a standard watch may purchase one on four monthly payments. The company makes deductions necessary to meet these payments from the payroll if the employee so elects.

As an additional check on the accuracy of trainmen's watches, the men are required to compare their time with each other and with the dispatcher before leaving the terminal at the beginning of a day's work. This system employed by the Illinois Traction System has been in operation for three years and has given good satisfaction. Not a single accident has occurred on account of errors in timepieces. At its inauguration the employees were earnestly requested to lend hearty co-operation to insure improved efficiency in train service and to provide additional safeguards against accident, thus affording greater security to life and property.

The Chicago & Milwaukee Electric Railroad Company, operating a high-speed electric road between Chicago and Milwaukee, also requires watch inspection by local inspectors appointed by a chief watch inspector. The latter is appointed by the company and is held responsible for the acccurate condition of all watches on the system. At present this chief inspector is a representative of one of the


CERTIFICATE OF WATCH INSPECTOR — FORM C. T. 90

Certificates when properly made out must be sent to officer signing above order END OF EACH WEEK. No. 2700

This is to Certify, That on ..... 19.....

the watch of .....

employed as ..... on ..... Division was examined by me. It is correct and reliable, and in my judgment, will with proper care, run within a variation of thirty seconds per week. Description follows:

Mov't No. ..... Stem Wind / Key Wind ..... Hunting or Open Face ..... No. of Jewels .....

Make ..... Trade Mark or Grade ..... Size .....

Case No. ..... Metal in Case ..... (Gold, silver, nickel or filled.)

Old or New Mov't ..... Old or New Case ..... Hunting or Open .....

Is employe coming under our Time Service Rules first time? ..... (Yes or No)

If Open Face, is pendant at 12 or 3 .....

When last Cleaned or Repaired, Date ..... 191...

Repaired by .....

Work Done, Condition, Etc. .....

Date Accepted ..... 191...

Inspected by .....

This "Order for Watch Inspection," when properly filled in must be SIGNED by Watch Inspector and sent to Webb C. Ball, General Time Inspector.

(OVER)

191...

SUPERINTENDENT

Employes must present this "Order" promptly and have New "Card Certificate" (Form C. T. 90-B) in their possession by end of month or they will not be allowed on duty after that date until card is obtained.

Dear Sir:

Please inspect his watch, and if you find that the movement is up to the standard required by this Company, and in proper condition, fill in, sign the attached "Certificate of Watch Inspector," Form C. T. 90, and return same to me promptly, also issue to employe "Card Certificate" Form C. T. 90-B.

Mr. ..... No. 2700

The Bearer .....

is employed as ..... on the ..... Division.

ORDER FOR WATCH INSPECTION — TO BE RETAINED BY THE INSPECTOR — 2700

FORM C. T. 60-A

Name .....

Employed as .....

on .....

Division .....

Date ..... 191... Date Returned ..... 191...

No. 2700

Watch Inspection—Certificate of Aurora, Elgin & Chicago Railroad

large jewelry houses in Chicago. Trainmen and dispatchers are required to have watches inspected by local inspectors each week. The result of this inspection, as in the other instances cited, is indicated on a card which the trainman carries at all times. The local watch inspector forwards a

complete list of these inspections to the superintendent of transportation every week. The chief watch inspector examines all watches annually, at which time they receive their proper rating. All watches must meet certain specifications, namely, no standard watch can be less than sixteen jewels nor smaller than a sixteen size case. It must be tested in three different positions and not vary more than fifteen seconds in any of them. All trainmen are required to compare their watches with the dispatcher before beginning their runs and must compare their watches with the standard clocks installed in each terminal station.

PUBLIC INSPECTION OF PROPOSED BROOKLYN SUBWAY CAR

Upon invitation of the New York Municipal Railway Corporation, a subsidiary of the Brooklyn Rapid Transit system, representatives of New York newspapers and civic associations inspected on Sept. 24 at the Thirty-ninth Street shops a full-sized model of the car which this company proposes to use for subway service. General plans for this car were filed for approval with the Public Service Commission, First District, New York, Aug. 19, 1913. An elevation and seating plan of this design were published in the ELECTRIC RAILWAY JOURNAL for Dec. 30, 1911.

In sending out its invitation, the company stated that it would appreciate any suggestions which would improve still further the facilities which this multi-side door car offers to the public, more particularly as regards the seating arrangement, ease of entrance and exit, lighting, comfort of the seats and plan of interior decoration. Views of the exterior and interior of the dummy car are presented in the accompanying halftones. Although three pairs of doors are provided on each side, it is proposed to operate only the center pair during the light hours. All doors will be pneumatically controlled by the guard, who will be elevated on a pedestal alongside the idle pair of center doors, from which position he will be able to see all passenger movement with ease. End doors will also be provided for going from car to car. The seating plan is of such character that permanent and temporary longitudinal seats are provided near and in front of the doors, while one row of transverse seats is placed midway between the doors. These transverse seats are of back-to-back design, one bench being wide enough for three passengers and the other for two. With all doors on one side in use the car will seat seventy-eight, but when operation is limited to the center doors it will seat ninety-eight passengers. It is announced that all cars will be motor cars, a desirable feature in view of their great capacity and length, namely, 67 ft.

The outside color of the cars will be dark green; the interior will be light enamel. The view of the interior shows a lighting scheme in which centrally placed tungsten lamps are used with holophane reflectors, but tests are being made also with other combinations and in different positions. Mechanical ventilators are to be used.

Model of Proposed Brooklyn Subway Car, Showing Arrangement of Three Pairs of Side Doors

Interior of Proposed Brooklyn Subway Car, Showing Seating Arrangement

The following comparisons are made by the New York Municipal Railway between its proposed car and that now used in the subway service of the Interborough Rapid Transit Company:

	N. Y. Mun. Ry. Car	Interboro Subway Car
Length	67 ft.	51 ft. 5 in.
Width	10 ft.	8 ft. 8¾ in.
Seats:		
In rush hours	78 persons	44 persons
In non-rush hours	98 persons	46 persons
Average walk per passenger from seat to door	82½ in.	90 in.
Length of train (eight cars)	538 ft. 4 in.	513 ft. 5 in.
Total space in train available for passengers	4,711 sq. ft.	3,702 sq. ft.

The company estimates that with a train load of 1200 persons, that now carried in the present ten-car subway trains during rush hours, eight cars only of the new type would be required. With 150 passengers per car seventy-eight would be seated and seventy-two standing. As there is 370 sq. ft. of standing space per car, each standing passenger would have an average of 5 sq. ft.

"KINKS" ON THE DENVER & INTERURBAN RAILWAY

On the Denver & Interurban Railway the air connections between the motor car and trailer are carried up on the dash several feet above the bumper instead of being under the bumper. This is claimed to have two advantages. One is that it is easier to couple up the connections when they are in plain sight in this way. The other is that the hose is out of the dirt and not so much subject to wear.

The carhouse adjoins the power station and an ingenious method is followed in keeping the lubricating oil warm in winter. The oil tank is surrounded by a box in which is a coil pipe supplied by steam from the power station so that the temperature of the oil when taken from the pump is about 90 deg. In consequence the company can use a heavy cylinder oil in its armature boxes.

In all cases the company puts a push-button stop signal for the use of the conductor in the jamb of the door in the rear end of the car.

COMMUNICATION

A QUESTION OF NAMES

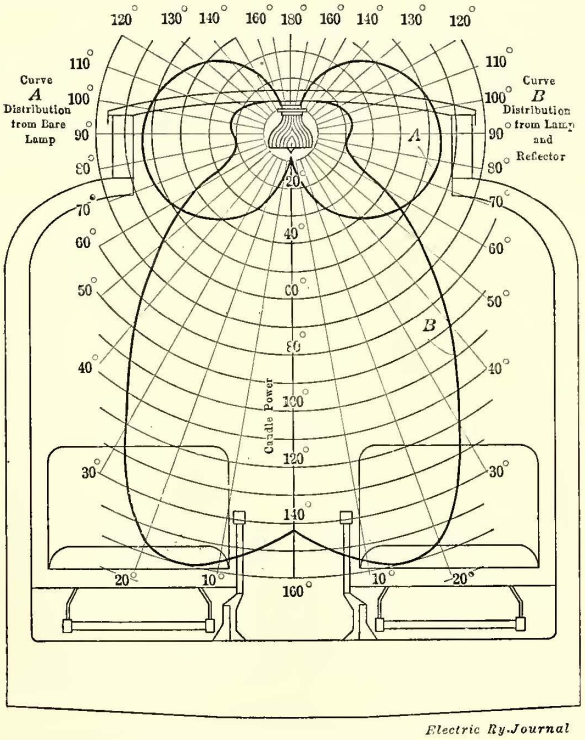
Lake Charles Railway, Light & Water Works Company
Lake Charles, La., Sept. 17, 1913.

To the Editors:

Referring to the discussion in your columns as to the name of the system to be used by the Norfolk & Western Railroad, it occurs to the writer that the "split-phase system" would seem to cover the case to the satisfaction of both factions. F. V. Gallaugher.

CAR-LIGHTING TESTS ON THE BAY STATE STREET RAILWAY

The Sept. 28, 1912, issue of the Electric Railway Journal contained an account of lighting tests in a 28-ft. car of the Bay State Street Railway, Boston, Mass. Since that time a second series of photometer tests has been conducted by L. C. Porter, of the General Electric Company, in co-operation with E. W. Holst, superintendent of equipment of the Bay State Street Railway. The latter tests, which were



Comparative Light Distribution from Bare Lamps and Lamps with Reflectors

made in two 34-ft. easy-access, semi-convertible cars, offer an interesting comparison between the old and new methods of car lighting. One car was furnished with ten 56-watt flexible-mount Mazda lamps, equipped with clear Holophane reflectors, and the other with twenty-five 64-watt carbon lamps. Photometer readings were taken with a Sharpe-Millar photometer on a horizontal plane 3 ft. above the floor. Five readings were taken at each station. Simultaneous readings were taken on a voltmeter, and each photometer reading was corrected to normal voltage. Three lines of stations were chosen—one down the center of the aisle, another halfway between the aisle center and the windowsills and a third along the windowsills. Stations were taken 1 ft. apart. The center-line stations were extended 3 ft. out over each platform. In addition to these, four stations were taken across half of each platform. Similar stations were taken in the carbon and Mazda cars.

In order to determine the average foot-candle intensity in the entire car body, all readings, aside from those on the center line, had double value given to them, to allow for the light on the opposite half of the car from that photometered.

The results of the test were as follows:

	Carbon Car	Mazda Car
Average foot-candle intensity along center line of aisle..	1.70	3.91
Average foot-candle intensity half way to windowsills....	1.46	3.15
Average foot-candle intensity along windowsills.....	1.26	2.14
Average foot-candle intensity across forward platform (platform lamps extinguished)	1.28	1.32
Average foot-candle intensity across rear platform (platform lamps lighted)	1.62	3.03
Total wattage on car	1600	560
Wattage in car body.....	1280	336
Effective lumens per watt in car body.....	0.41	2.37
Efficiency of light utilization, per cent.....	15.8	31.2

The effectiveness of the reflector is indicated in the accompanying drawing, which shows the light distribution from a clear 56-watt tungsten lamp and from the same lamp equipped with a reflector. Experience indicates that the best reflector for a trolley car having, say, an 8-ft. ceiling and a width of 8 ft. is one giving the intensive type of light distribution. When such reflectors are placed down the center line of the ceiling the maximum intensity of lighting is thrown where it will be of the most service, that is to say, directly on the reading matter of a seated passenger.

TIMETABLE MAKING IN BUFFALO

The International Railway Company, Buffalo lines, has given especial attention this year to the routing of cars and the making of scientific timetables. The lines in Buffalo are laid out somewhat like the ribs of a fan and were planned to bring passengers down town without transfer. The congestion in Main Street for a few blocks gradually became more serious until the maintenance of reasonable schedules was difficult. The plan of the present president, E. G. Connette, is gradually to introduce cross-town routes which will take care of passengers who do not wish to go down town. The new routes will not only prevent pocketing of cars in the down-town district but will reduce the number of transfers issued. They will also cut down the car mileage, for under the old arrangement passengers were obliged to go down town and to transfer out again because there was no direct route between two points in the up-town district. After one change of this kind the number of transfers issued was reduced by 1500 per day, and a cash saving of at least $36 per day was effected. This saving, however, was put back into the service by increasing the number of cars, so that the public benefited doubly, first by the passengers reaching their destinations more quickly, second by their losing less time in waiting for cars.

The timetable department comprises at present five men, one chief and four checkers and assistants. Two checkers are employed on this work continuously, the other two being used for special investigations. That the work of this force should much more than save the expense can be seen by a simple calculation of what can be made or lost by attention to timetables or the lack of it. Suppose that on a certain line using twenty-seven cars the headway is four minutes where a scientific checking of service requirements shows that a four-and-a-half-minute schedule would serve the purpose. The new headway reduces the number of cars to twenty-four. Estimating the cost of operating at the rate of $1.80 per car hour and the duration of service at eight hours per day for 365 days, the saving amounts to $5,256 per year. The difference of a half minute in the schedule would not be noticed provided that twenty-four cars were enough to accommodate the public riding on this line.

The foundation of good timetable making is, of course, accurate knowledge of traffic conditions. In Buffalo the checkers who gather this information are provided with

notebooks in which they record the number of passengers on each car passing the maximum load points between 6 a. m. and 12 midnight. The records are then entered, in the office, on sheets 10½ in. x 17 in. in size. From this a third form is made up to show the number of cars passing, the total seating capacity, the total passengers, the total passengers standing and the percentage standing. A third form is made up to show the number of cars passing the checking point in each fifteen minutes, together with the total corresponding number of passengers. The seating capacity of these cars is also entered and subtracted from the total number of passengers, giving the number standing. These results are not plotted in graphical form, but the uniformity of the car distribution is determined directly from the charts, and the timetables are laid out accordingly.

The checkers not only obtain information as to distribution of cars, but their records also show irregularity of schedule and departures from the timetables. When such are noted they are recorded on 8½-in. x 8½-in. sheets, which are first shown to the superintendent of transportation and are sent to the division superintendent for explanation. The explanations are entered on the sheets, which are then returned to the chief of timetables, who files them for reference in making timetable changes.

The timetables are made up in the form of charts for the guidance of division superintendents. In these four kinds of runs are recognized—"day," "splits," covering some hours each in day and night, "straight lates" and "owls." The day crews are off on Sunday; the owl, late and split crews work seven days per week. The usual practice is followed in assigning crews to the various runs. Once adopted, the timetable stands until good reason arises for changing it, but troubles with the timetable are kept track of by means of a daily deviation sheet. The mileage records are made up on the basis of the regular timetable, modified by the deviation record, the timetable department sending to the auditor a statement for each line showing the number of miles normally made by each car together with the times at which the car goes into and leaves service. This statement is modified for every change in timetable.

The results of the work of the new timetable department are already showing in improved service.

REPORT OF PROPOSED ELECTRIFICATION OF LONDON & PORT STANLEY RAILWAY

In 1854 the city of London, Ont., built a railroad to Port Stanley, on Lake Erie, and since then it has leased the line to steam railroads. The last lease will expire Jan. 1, 1914. The original construction cost was $765,311, but as the city has never received more than $18,000 per annum from the leases, the deficit since the year 1854 has cost the taxpayers of London nearly $1,500,000.

Recently the Hon. Adam Beck, of London, who is the chairman of the Ontario Hydro-Electric Commission, engaged employees of the Hydro-Electric Commission and other engineers to report on the feasibility of electrifying this line. The ensuing study indicated that electrification would give a net annual revenue of $40,000 after payment of all fixed charges on the original investment and also on the investment required for electrification. Following this investigation the municipality of London engaged A. N. Warfield & Company, consulting engineers of that city, to make a report on the cost of operating the line by steam throughout; with steam freight and Edison storage battery passenger cars; by electricity from hydroelectric sources, and by electricity from a steam turbine plant. They were also requested to report on the cost of double-tracking the line between London and St. Thomas. The freight traffic on this railway has always been very heavy. In fact, it is believed that there is not another line of equal length (24 miles) on which so much freight is handled.

The accompanying tabulated recapitulations of the operating and income accounts from the report of the Warfield company show an annual deficit of $33,644 for all-steam operation, a net revenue of $17,636 for combined steam freight and storage battery passenger car operation and a net revenue of $38,062 for all-electric operation. The unit costs were calculated as follows: Steam freight, based on 8,200,468 ton miles, operating cost, 0.948 cent per ton mile, and fixed charges, 0.206 cent per ton mile; steam passenger, based on 198,580 car miles, operating cost, 31.1 cents per car mile, and fixed charges, 8.54 cents per car mile; steam freight in case of storage battery passenger operation, based on 8,200,568 ton miles, operating cost, 0.993 cent per ton mile, and fixed charges, 0.252 cent per ton mile; storage battery passenger operation, based on 367,650 passenger miles, operating cost, 14.88 cents per car mile, and fixed charges, 5.63 cents per car mile; electric freight operation, based on 8,200,468 ton miles, operating cost, 0.804 cent per ton mile, and fixed charges, 0.279 cent per ton mile; electric passenger operation, based on 431,775 car miles, operating cost, 10.5 cents per car mile, and fixed charges, 5.31 cents per car mile. It was also estimated that the fixed charges on the original cost of the road would be as follows: For steam or electric freight, 0.233 cent per ton mile; steam passenger, 0.64 cent per car mile; storage battery passenger, 5.2 cents per car mile; electric passenger, 4.44 cents per car mile.

The cost of double-tracking the road for steam is given as $17,823.73 per mile.

RECAPITULATION OF THE OPERATION AND INCOME OF THE THREE SYSTEMS

*I—Steam Operation.**

Total operating expenses and taxes	$139,686.93
Interest and sinking fund on money required to reconstruct and equip the railway, at 6.8 per cent on $497,190.68	33,808.97
Interest on money expended on the first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$211,761.45
Total gross earnings from operation	178,117.40
Deficit	$33,644.05

*Rolling stock: Freight equipment to consist of four locomotives and two cars; passenger equipment, four first-class and two second-class coaches.

II—Combination Steam Freight and Storage Battery Passenger Car Operation.†

Total operating expenses and taxes	$136,025.01
Interest and sinking fund on moneys required to reconstruct and equip the railway, at 6.8 per cent on $607,127.90	41,284.70
Interest on moneys expended on first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$215,575.26
Total gross earnings from operation	233,211.92
Net revenue	$17,636.66

†Rolling stock to include six accumulator cars and four passenger tractors, with steam freight equipment as above.

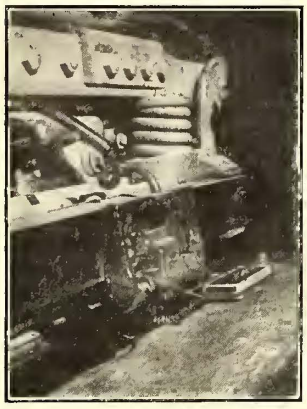
III—Electric Operation with Catenary Suspension.

Total operating expenses and taxes	$111,197.90
Interest and sinking fund on moneys required to reconstruct and equip the railway, at 6.8 per cent on $671,857.13	45,686.28
Interest and depreciation on storage battery (value $35,000) charged in price of power.	
Interest on moneys expended on the first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$195,149.73
Total gross earnings from operation	233,211.92
Net revenue	$38,062.19

The annual meeting of the Empire State Gas & Electric Association will be held on Oct. 2 at the Engineering Societies Building, New York. President C. G. M. Thomas will review the work of the past and offer suggestions for the coming year. Reports of other officers and committees will be made, and the plans for the advertising campaigns of the Society for Electrical Development and of the National Commercial Gas Association will be explained and discussed. Addresses will be made by Martin S. Decker, chairman of the Public Service Commission of the Second District, New York, and by M. R. Maltbie, commissioner of the First District. Accident prevention and fire prevention will be discussed at the afternoon session.

RENEWABLE PLATE FOR THIRD-RAIL SHOE

The Central California Traction Company, whose line connects Stockton, Cal., with Sacramento, Cal., was one of the first 1200-volt lines to be built in this country and the first to use a 1200-volt third rail. An underrunning shoe of the usual type is employed, but to avoid the necessity of scrapping an entire shoe, a wear plate is used. This plate is the invention of W. E. Rose, master mechanic of the company. The plate is of soft steel, ¾ in. x 3 in. x 6 in., and is attached to the upper or wearing part of the shoe by tapering copper rivets so that as the plate wears away the rivets also wear down and the plate remains on the casting of the shoe. It has been found practicable on the lines of the Central California Traction Company to wear the plate down to ⅛ in. thickness. It can then be scrapped and a new plate attached at the cost of a few cents.

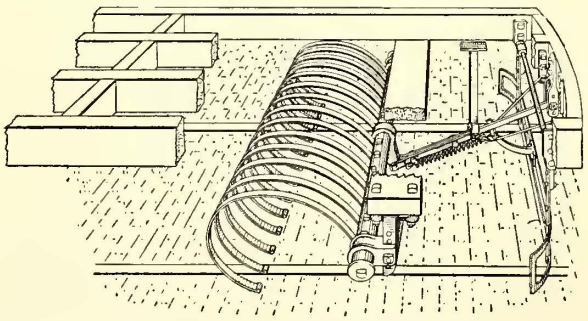


Renewable Third-Rail Shoe

A SPRING-TOOTH WHEEL GUARD

The Root Spring Scraper Company, Kalamazoo, Mich., has recently placed on the market the spring-tooth wheel guard shown in the accompanying cut. In principle this wheel guard resembles the ordinary type, but its construction is like that of a farmer's hay rake. Although now first offered for general use, the new scraper has already been tried out satisfactorily on the Kalamazoo city lines.

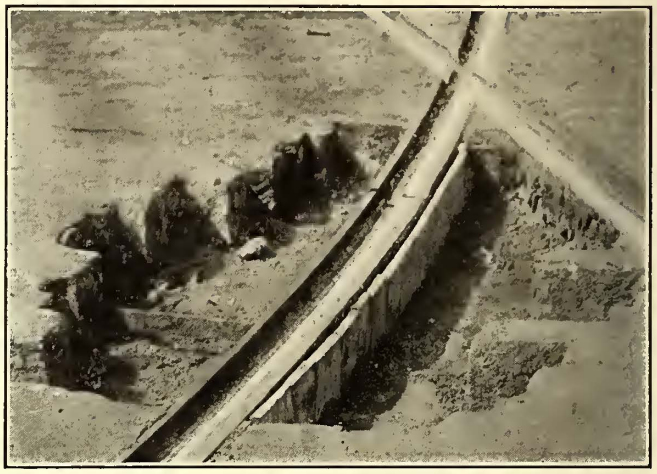
The essential parts of this guard include a tripping fender which when engaged with an object breaks a trigger joint, thereby allowing the guard to drop to the rails. This fender, however, is not affected by the vibration incidental to ordinary car running. A pedal on the platform is used to restore the wheel guard to its original position. The guard basket will pick up an object from the track without the jarring which is unavoidable with a rigid basket because it is constructed of fourteen curved teeth made from 1½-in. x ¼-in. spring steel. These spring teeth are spaced 4½ in. apart and are secured to a hanger board which in turn is fastened to the car-body sill. The lower end of each tooth is rounded slightly in order to give a sleigh-runner effect when the teeth drop into operating position. As each tooth is made independent of the others, the teeth upon being lowered conform readily to the crown of the track and pavement, thus making it impossible for an object to escape them. The entire combination also forms a spring basket which will prevent any pick-up from falling back onto the track.



Spring-Tooth Wheel Guard

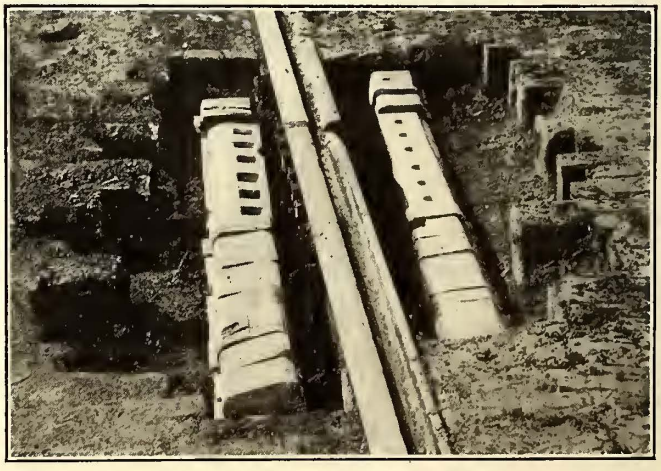
JOINT PLATE PROTECTORS OF WOOD

During the past winter the Virginia Railway & Power Company installed on about 1 mile of track in Norfolk a new form of joint plate capping of wood which accomplishes the twofold object of protecting the bolts and nuts and of permitting a perfect connection with the paving. These protectors were furnished by Edward Alcott, Manassas, Va., whose oak keys and wooden filler blocks for rails were described in the Electric Railway Journal for July 27, 1912.



Filler Block at Curve Including Keyed Pavement

As shown clearly in the accompanying illustrations, the protectors consist of blocks in which square and round holes have been bored to cap the projecting ends of the joint fastenings. The blocks are 2½ in. thick and the holes 1 in. deep. As the nuts fit snugly into the square holes, they are prevented from turning and thus the effect of a nut lock is secured. At the same time, the fastenings are protected from the grinding action of the paving. When the blocks have been applied a perfectly flat surface is offered for the adjacent paving so that no grouting is necessary nor are any unsightly gaps formed. These blocks are used in connection with the rail filler blocks and wood keys previously described to form a perfectly tight pavement.

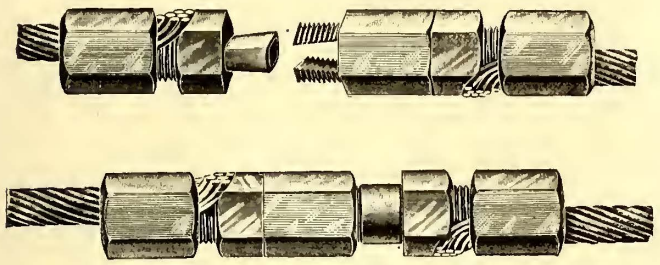


Oak Keys Applied to Old Rail Joint

Plans for a tube railway in Sydney, Australia, have been approved by the New South Wales Cabinet. The Minister of Works stated that the matter will be submitted to Parliament as early as possible this session, in order to start the work without unavoidable delay.

A QUICK DETACHABLE CABLE CONNECTOR

The accompanying illustration shows a new type of quick detachable connector which has just been placed on the market by the North Western Construction Company, New York City. This has been designed so that it can be taken apart easily and quickly and so that it will combine mechanical strength and a good electrical contact. One



Cable Connector With and Without Soldered Terminals

end of the connector is shaped in the form of a dovetail wedge, while the opposite end is milled properly to fit the wedge. The end in which the wedge fits is threaded, and over this is screwed a nut. When the wedge end of the connnector is placed in the slotted end, the nut is screwed over the wedge portion, making contact between the slot and the wedge.

This connector can be furnished with either soldered or solderless terminals.

The two illustrations herewith show the connectors with soldered terminals, assembled and disassembled. These terminals are drilled to accommodate the proper size wire or cable. The illustrations also show the connector with a new form of solderless terminals in which the use of solder has been entirely eliminated by threading and grooving the ends of the connector. When the connector is attached, the nut is forced over the cable and the end of the cable is placed in the groove in the threaded end of the connector. The nut is then screwed on and the threads bite into the cable, giving a maximum of conductivity and tensile strength. This connector is manufactured to fit any size ranging from No. 6 wire to 500,000-circ. mil cable.

NEW CARS FOR TORONTO

The Toronto Municipal Railway has recently purchased twenty prepayment cars from the Niles Car & Manufacturing Company. These are arranged for double-end operation and have a symmetrical seating plan with 5-ft. longitudinal seats holding four passengers at the corners and 35-in. cross-seats in the center portion of the body. The total seating capacity is forty eight, the cross-seats being

New Prepayment Car for Toronto Municipal Railway

spaced on 2-ft. 5½-in. centers on either side of a 22-in. aisle. The length over bumpers is 45 ft. 1 in., and the platforms from the bulkhead line to the outside of dashboards are 6 ft. 6 in. long. The width over side posts is 8 ft. 5½ in.

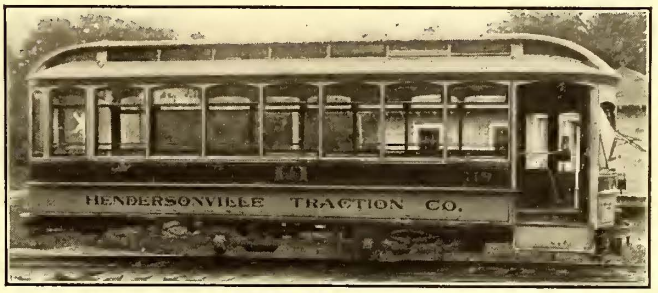
The trucks, which are designed for a track gage of 4 ft. 10⅞ in., are spaced on centers 18 ft. 7 in. apart and are of the Baldwin K type. They are equipped with 33-in. cast-iron wheels on 5-in. axles, and each has two Canadian General Electric No. 80 motors which will operate with 550-volt direct current.

The underframe is of composite steel and wood, and the outside sheathing is narrow tongue-and-groove oak on double-side walls having drop sashes. The interior finish is of quartered oak with Agasote ceiling. The seats are Hale & Kilburn No. 199-A, and the other interior equipment includes Pantasote curtains, Forsyth fixtures and Rex rollers, sanitary hand straps, electric buzzers, Knutson trolley retrievers, Peacock brakes, Hunter signs and hot-air heaters with forced ventilation.

The rear vestibule has two sets of two-panel folding doors opening inward and folding steps controlled by the same handle as the doors. This handle is on a shaft extending down through one of the pipe supports for the single curved railing which separates the exit and entrance passageways. No bulkheads are installed, as the vestibules are completely inclosed. The exit at the front end of the car has a sliding door with a folding step which is controlled by the motorman.

SELF-PROPELLED ONE-MAN CAR

The Hendersonville (N. C.) Traction Company has been operating for several months the straight gasoline type of self-propelled car shown in the accompanying illustration. This car is of single-truck, single-ended design, 30 ft. over all and built for one-man prepayment operation. The



One-Man Gasoline Car for Hendersonville Traction Company

capacity of the longitudinal seating is forty-five, although a load of 103 passengers has been carried up a 7 per cent grade. No car space whatever is required for machinery as the four-cylinder horizontal opposed motors are located directly under the front platform, whence they can be removed and replaced in twenty minutes. A feature of the truck is that the wheels, which are mounted on special tapered roller bearings and revolve on the axles, make it possible to take the car around curves of very short radius. A storage battery is provided for lighting.

The report of the operation of this car for August, 1913, shows that it covered 3200 miles, using $71.87 of gasoline at 19 cents per gallon and $14.25 of oil at 30 cents per gallon. At this rate the cost of power per car mile is 2.8 cents, and even this low figure will soon be reduced considerably by using a gasoline which costs but 15 cents per gallon. The speed of the car is 25 m.p.h. The car is operated in accordance with standard prepayment principles. The motorman, who sits on the left-hand side of the vestibule, is provided with a cash box of the type shown. The equipment of the car was designed by Charles A. Carlson, mechanical engineer, New York. Mr. Carlson believes that a car of this type is well suited for towns of, say, 5000 to 15,000 population, where a standard overhead system would be too costly.

The Rockland, South Thomaston & St. George Railway, Rockland, Maine, has recently built a swimming pool, 100 ft. x 50 ft., at Ginn's Point, for the use of its patrons.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Alabama.—Nuisance Caused by Power Plant—Damages.

A nuisance from noise and vibration caused by the operation of machinery in a power plant injuring the adjoining property of plaintiff and causing her personal discomfort is not necessarily a permanent nuisance but is subject to abatement by stopping the machinery. But where at the time of the trial of an action for the nuisance the machinery has stopped the damages recoverable are not measured by the difference between the value of the property before the nuisance was started and its value afterward. (Birmingham Ry., Light & Powr Co. v. Bruce, 57 Southern Rep., 1011.)

Connecticut.—Additional Servitude—Action for Damages.

Where a street railway was chartered to carry passengers and was at most only authorized to carry their hand baggage, a complaint in trespass against the road for imposing an additional servitude on the fee of the highway, which alleged that the road is operated as a carrier of property by means of cars designed for and carrying property exclusively and that the cars run from terminus to terminus without stopping to receive or discharge contents and receive and discharge such freight at the two termini only, is not defective on demurrer in failing to charge an additional servitude. (Cadwell v. Connecticut Co., 83 Atlantic Rep., 215.)

Montana.—Contracts for Municipal Work Performed by Railway Companies.

Even though the city council does not exceed its power by the provision of a street railway's franchise that the city when taking up any tracks for the purpose of installing a sewer shall remove and replace them at its own expense, yet the city's contract with the railway company that the company shall take them up and replace them at the city's expense is void, not having been let, as required by Rev. Codes, Sec. 3278, to the lowest responsible bidder. (Missoula St. Ry. Co. v. City of Missoula, 130 Pac. Rep., 771.)

New Jersey.—Receivers—Insolvency—Claims for Traffic Exchange and Maintenance Not Preferred Claims.

Under P. L. 1896, page 277, revising the laws concerning corporations, claims against railroads in receivership for traffic exchange and for maintenance incurred prior to the receivership are not preferred. (Massey v. Camden & T. Ry. Co., 82 Atlantic Rep., 917.)

New Jersey.—Powers of City Council Over Stops.

Under the power given by the charter of Camden to the City Council to regulate the streets and prescribe the manner in which corporations shall exercise any privilege granted to them in the use of any street, an ordinance may be passed requiring street cars running from Merchantville and Moorestown through Camden to the Philadelphia ferry to stop for passengers at the intersection of all cross streets. Such an ordinance is an exercise of the police power. (City of Camden v. Public Service Ry. Co., 86 Atlantic Rep., 447.)

New York.—Additional Burden—Rights of Abutting Owners.

An abutting owner who has no title to the fee of the street may not complain of the construction and operation under a franchise of a street surface railroad operating by horse or electric power. (Pfohl et al. v. International Ry. Co., 136 New York Sup., 175.)

New York.—Compensation—Additional Servitude—Ownership of Lots and Fee of Street.

When a lot abutting on a street and the fee of the street in front of it are owned by different persons, and a street railroad was constructed on the street, without acquisition of legal right, the owner of the lot cannot maintain an action for the additional servitude, and the owner of the fee of the street is entitled only to nominal damages. But when the ownership of the lot and the fee of such part of the street are merged in the same person before commencement of the action he can recover substantial damages, the fee when so owned having a different value from that which it has when owned alone. (Mayne v. Nassau Electric R. Co. et al., 136 New York Sup., 375.)

LIABILITY FOR NEGLIGENCE

Alabama.—Interurban Railroads—Crossing Signals—Statutes—"Locomotive."

Code 1907, Sec. 5473, providing that the engineer having the control of the running of a locomotive on any railroad shall give specific signals in designated situation, does not apply to a street or interurban railroad operated by electric power, for a street car, in its popular sense, is not a "locomotive." (Birmingham Ry., Light & Power Co. v. Green, 58 Southern Rep., 801.)

Indiana.—Live Stock—Duty to Fence.

Burns' Ann. St. 1908, Sec. 5707, giving interurban railroad companies a year from the date of the completion of any part of the line in which to fence it against stock, did not relieve such companies from liability for injuries to stock on a part of their lines completed within less than a year by failure properly to fence the right-of-way. It simply imposed an additional duty upon such companies to fence their tracks within a given period. (Terre Haute, I. & E. Traction Co. v. Phillips, 97 Northeastern Rep., 1014.)

Indiana.—Crossing Accident to Infant—Wilfulness.

Evidence that defendant's motorman saw plaintiff's child, a boy seven and one-half years old, approaching the track engrossed in reading a postal card when the car was a quarter of a mile away and watched him continuously until within 50 ft. or 100 ft. of the point where the boy was struck and did not sound the whistle or gong or make any effort to stop the car and gave no reason for his failure to do so authorized a finding that he was guilty of wilfulness. (Terre Haute, I. & E. Traction Co. v. Baberry, 100 Northeastern Rep., 401.)

Indiana.—Passenger Leaving Train in Motion.

It is not negligence per se for a passenger to alight from a slowly moving train.

A carrier owes the highest degree of care to set a passenger safely down at his destination, and where the conductor of a street car knew, or should have known, the speed at which his car was running, and that plaintiff was intending to alight, he was bound to warn her that the car was still in motion. (Indiana Union Traction Co. v. Swafford, 100 Northeastern Rep., 840.)

Kentucky.—More Evidence Required Under Federal Employers' Liability Act Than Under State Law.

Where a motorman engaged in interstate commerce was killed by the derailment of his car, due to alleged defective condition of the wheels, mere proof of the existence of defects in the car, though sufficient to establish a prima facie case of negligence under an Ohio statute, was insufficient since the case was governed by the federal employers' liability act (act April 22, 1908, Chap. 149, 35 Stat. 65 [U. S. Comp. St. Supp. 1911, page 1322]), under which plaintiff could not recover except on proof that the defect was due to the master's negligence. (South Covington & C. St. Ry. Co. v. Finan's Adm'x, 155 Southwestern Rep., 742.)

Kentucky.—Duty to Passengers on Rear Platform of Crowded Car.

While a carrier is not liable for injury inflicted by a fellow passenger if the injury could not have been reasonably foreseen by the carrier's employees, as where a fellow-passenger in alighting from a car not overcrowded carelessly or intentionally shoves or pushes another passenger, a street railway company is liable for injuries sustained by a passenger who, on account of the crowded condition of a car, was compelled to stand on the rear platform and was injured by a rush of passengers in leaving the car at a transfer point, if the company's employees failed to use a high degree of care to avoid such injury. (South Covington & C. St. Ry. Co. v. Harris, 154 Southwestern Rep., 35.)

Maine.—Duty to Passengers After They Leave the Car.

When a street railway company maintains or adopts a platform or station at a stopping place, it is bound to provide passengers with a reasonably safe way by which to leave the platform or station and reach the sidewalk. But this rule does not apply to ordinary stops on public streets, where the company is merely bound to use proper care in selecting a place for passengers to alight. (Carleton v. Rockland, T. & C. St. Ry., 86 Atlantic Rep., 334.)

Maine.—Riding on Rear Platform—Care Required.

A passenger is not negligent *per se* in riding upon a rear platform of a street car, but if he voluntarily chooses to ride there he is held to the exercise of a high degree of care to avoid the dangers known or to be reasonably apprehended.

A street railroad permitting a passenger to ride on the platform is bound to take into account that he is thereby subjected to greater risks and to observe a high degree of care in the running of the car at points where there is danger that he may be thrown off. (Blair v. Lewiston, A. & W. St. Ry., 85 Atlantic Rep., 792.)

Massachusetts.—Car Started After Instructions from Passenger.

When the conductor of a crowded car, while in the front end collecting fares, knew that the car had stopped to take on passengers, and on assurance from one or more passengers upon the rear platform that it was "all right," and that he should "go ahead," started the car, the question of his negligence in acting upon such assurance was for the jury. (Pickford v. Boston Elevated Ry. Co., 100 Northeastern Rep., 548.)

Massachusetts.—Boarding Car Without Knowledge of Conductor.

While a car was momentarily stopping to allow the passage of a team, a man attempted to board it. Until he did so he had shown in no way his intention to become a passenger, nor was there any proof that the conductor knew of his presence. Held, that he was not a passenger and the starting of the car was not in violation of any duty owed to him. (Lauchtamacher v. Boston Elevated Ry., 100 Northeastern Rep., 1068.)

Missouri.—Time When a Person Becomes a Passenger.

A street railway company impliedly extends an invitation to persons at a regular stopping place to enter the car when it stops, and the relation of carrier and passenger begins at the time such person indicates his acceptance of such invitation. (Fields vs. Metropolitan St. Ry. Co., 155 Southwestern Rep., 846.)

Montana.—Obligation of Motorman in Case of Unmanageable Horse.

A motorman need not stop his car on first observing one approaching on horseback, or on observing that the horse is becoming unmanageable. But he is chargeable with the duty, on observing that the horse is likely to go in front of the car, to take immediate precautions to avoid a collision. (Singer v. Missoula St. Ry. Co. et al., 131 Pacific Rep., 593.)

New Jersey.—Care Required in Crossing Street.

A pedestrian was guilty of contributory negligence barring recovery for injury received by being struck by a street car, where he attempted to cross the track before another car, which obstructed his view of the approach of the car which struck him, had moved far enough away to give him a clear view of the approach of any car on the track upon which he was struck. (Devine v. Public Service Ry. Co., 86 Atlantic Rep., 260.)

New Jersey.—Ejection of Drunken Passenger.

In ejecting a drunken passenger from its car, the carrier is bound to exercise reasonable care to avoid injuring him. The servants of the carrier should use due care not to expel a passenger (or even a trespasser) at a time or place which is dangerous, and the carrier will be liable for negligence in that regard, not only for injuries directly suffered in connection with such expulsion but also for subsequent injuries proximately due thereto, such as an injury from other cars which the ejected passenger could not reasonably avoid, the probable consequences of improper exposure, and the like. And it will be no answer that the person was injured by reason of his helplessness due to intoxication or like cause, if his condition was known to the servants of the carrier and the consequent injury resulting from such expulsion could have been reasonably anticipated. (McCoy v. Millville Traction Co., 85 Atlantic Rep., 358.)

Pennsylvania.—Punitive Damages for Intentional Injury Only.

In an action against a street railway to recover for injuries from collision between two of defendant's cars, it is reversible error to submit the question of punitive damages to the jury, where there was no evidence that the action was wilfully intentional or that it resulted from anything other than the negligent operation of the car. (Wright v. Philadelphia Rapid Transit Co., 84 Atlantic Rep., 669.)

Pennsylvania.—No Damages for Nervous Shock or Fright.

There can be no recovery for nervous shock unaccompanied by physical injury, but if the nervous shock follows as the result of physical injury it is part of the physical injury, and plaintiff can recover for that. (Samarra et ux. v. Allegheny Valley St. Ry. Co., 86 Atlantic Rep., 287.)

Pennsylvania.—Duty of Motorman When Path Adjoins Railway Track.

It was the duty of the motorman to keep a constant lookout ahead so as to see and be prepared to avoid dangers to pedestrians rightly making use of a cinder walk alongside the track, especially where there was no well-marked division line between the walk and the track. (Kennewig et al. v. Pittsburgh Rys. Co., 86 Atlantic Rep., 702.)

Pennsylvania.—Injuries to Trespasser—Liability of Road.

Where a boy twelve years old climbs on the back bumper of a street car without the conductor's knowledge and rides thereon and is warned of his danger by the motorman of a following car, he cannot recover for injuries by a collision with such car, where the motorman of the latter car was not guilty of wantonness in its operation. (Coyne et al. v. Pittsburgh Rys. Co., 86 Atlantic Rep., 524.)

South Carolina.—Injuries to Persons on Tracks—Punitive Damages.

Where persons on a street railway track were injured in a collision resulting from the intentional act of the motorman in running the car at an unlawful speed, punitive damages may be awarded. (Kramer v. Greenville, S. & A. Ry. Co., Kramer et ux. v. Same, 77 Southeastern Rep., 738.)

Texas.—Injury from Being Struck by Fender.

Where plaintiff, about to board a street car, got too close to the track and was struck by the overhang of the fender as the car was rounding the curve, he was negligent as a matter of law, and therefore could not recover for negligence of the motorman in failing to keep a proper lookout. (Townsend v. Houston Electric Co., 154 Southwestern Rep., 629.)

Texas.—Projection of Track Proximate Cause of Injury.

Where it is shown that car tracks project too far above the street and that the occupants of a vehicle, in attempting to get off the track on seeing an approaching car, were prevented by the projection, which caused the wheels to skid, and the car ran into them, the projecting track was the proximate cause of the injury. (San Antonio Traction Co. v. Cassanova, 154 Southwestern Rep., 1190.)

West Virginia.—Injury to Passengers Transferring from One Car to Another.

One in transit from one car to another substituted therefor because of an obstruction remains a passenger and is entitled to the protection that the highest degree of care on the part of the carrier can afford under the circumstances. (Killmeyer v. Wheeling Traction Co., 77 Southeastern Rep., 908.)

West Virginia.—Injury to Traveler Driving in Dark on Track.

It is negligence to drive in the darkness of the night closely along or on the track of an interurban railway that occupies part of the highway and on which the running of cars at any moment must reasonably be anticipated, when there is ample width of road to drive clear of it, and where one guilty of such negligence is overthrown by a car handled with reasonable care in the emergency, and is injured thereby, he cannot recover. (Boyles v. Wheeling Traction Co., 76 Southeastern Rep., 673.)

Wisconsin.—Assumption of Risk of Conductor from Riding on Running Board.

An experienced street car conductor, who had many times daily for more than a month passed over the line, riding on the running board of an open street car, must be held to have known of and appreciated the risk of injury from a defect in the roadbed of a street railroad, where two rails joined, making them spring and jolting a car whenever it passed over the joint at the usual speed, as was the case when he was thrown therefrom. (Luebben v. Wisconsin Traction, Light, Heat & Power Co., 141 Northwestern Rep., 214.)

News of Electric Railways

Franchise Revision Completed in Kansas City

The conferences between the receivers of the Metropolitan Street Railway and representatives of Kansas City, Kan., and Kansas City, Mo., in regard to the franchise submitted by Mayor Jost on Aug. 13, have been completed. The Electric Railway Journal of Sept. 20, 1913, contained a digest of the first sections as they stood after all revisions. The latter sections, dealing with the questions of control, rights of interurban lines and forfeiture, have now been completed, and the ordinance is ready to be printed.

The steps now to be taken in connection with the proposed franchise are these: Within a short period of time public hearings will be announced, at which the negotiators will receive suggestions from any person or interest that may be affected because of the proposed franchise. In the meantime the receivers will submit the tentative draft of the franchise to their bankers to learn whether the company can be financed under its terms. The franchise will also be submitted by the Mayor and by the receivers to experts other than those who have taken part in the negotiations. Committees representing bondholders and stockholders of the Metropolitan Street Railway also must examine it before it goes to the Council. It is probable the measure will be introduced in the Council some time in October. Then will come another series of public hearings before committees. Once out of the Council, the franchise must go to the State Public Utilities Commission for approval and then to Judge Hook of the federal court. If it has the approval of both the commission and the court, it will be submitted to the voters, probably not before December.

Receiver Ford F. Harvey, who took no part in the present negotiations, has yet to approve the tentative draft.

Before the ordinance goes to the Council there will be inserted in blank places left for that purpose the names of the two men who are to compose the board of control and the three directors to represent the city. L. R. Ash, city engineer, who made the appraisal for the city, has been mentioned as the city's representative on the board of control, and Philip J. Kealy, representative of Bion J. Arnold in the appraisal for the receivers, as the representative of the company.

One of the most important points decided by the later conferences had to do with the power and authority of the board of control. This board is to consist of one engineer named by the city and one by the company, with their action to be reviewed on all matters pertaining to schedules and routing by the city's members of the board of directors. They are to pass also on extensions and determine what shall be charged to capital value and what to maintenance and operation. If the two members of the board of control disagree on where an extension shall next be made in the limitation fixed, any two of the city's three directors are to arbitrate the question.

An expenditure of $7,500,000 for extensions and betterments of the system is also provided. This is to be taken out of the earnings of the company and applied to the purposes before either the city or the company gets any interest in the earnings. Within three years after the ordinance is adopted by a vote of the people, the entire system is to be rehabilitated.

The present system of universal transfers, secured to the city under the peace agreement negotiated by James A. Reed, has been sustained It is provided that the present transfer privileges between Kansas City, Kan., and Kansas City, Mo., shall obtain unless this privilege shall operate to the prejudice of Kansas City, Mo.

The general provisions of the section of the franchise dealing with interurban traffic within the city limits are:

"Connections with interurbans shall be compulsory at points designated by the board of control. Entrance to any downtown passenger and freight depots built by or for interurban lines is guaranteed.

"The same fare shall be charged within the city limits on interurbans as is charged by the Metropolitan and the same transfer privileges given.

"The Metropolitan shall not charge the interurbans more for conveying their passengers and freight than it charges for traffic in its own cars.

"The Metropolitan is to take all interurban cars at the city limits, thereby assuming all responsibility for them, including damage suits.

"It is to collect and receive fare and freight charges for traffic within the city and is to pay to the interurban companies such part of the proceeds as may be decided by a commission composed of the two members of the board of control and one man named by the interurban companies.

"Package freight cars and cars for the conveyance of all sorts of produce are to be operated for the interurbans over city lines from midnight until 6 o'clock of each day, and access to the city market is to be assured.

"The Metropolitan board of control, of which the city has one of two members, is to have charge of all routings and schedules of the interurban cars within the city, subject to the approval of the city's directors."

Some of the interurban companies wanted written into the ordinance a provision relieving the company from taking on and discharging passengers on the "out" trips, except at transfer points and downtown depots. The object of this provision was to get rid of the strictly city business, which crowds outgoing interurban cars and forces interurban passengers to stand for several miles. This matter was at last left to the Metropolitan board of control.

In regard to the disposition of earnings and defining the city's purchasing power the following provisions were made: There shall be taken first from the earnings of the company all reasonable expense of management and operation, together with all taxes and the like. There shall go to the company an amount equal to 6 per cent of its value. The remainder of surplus earnings shall go to the company, but shall be credited as the city's payment upon the property until a certain sum, yet to be fixed but probably $7,500,000, is invested in extensions. This is to make the physical value equal to that of capital value.

After the two values are equal, the surplus earnings are to be divided, one-third going to stockholders and two-thirds going to the city. The city's share can be used to pay off the funded debt, to reduce fares or to build extensions. Certificates of ownership are given in return for the city's money and it is provided in the franchise that the city's share in the property is to be recognized by all future holders of it, regardless of whether or not the property goes through bankruptcy proceedings.

No extensions built out of the city's share of the surplus are to increase the capital upon which the company draws interest, and as fast as the city makes payments to decrease the bonded debt or the stock of the company, interest upon that much of it is to cease.

The city reserves the right to purchase the property under two conditions. The first is when the debt on the property shall have been reduced to one-half of the physical value. It is then to be entitled to take the property by assuming the rest of the debt. The city may pay this sum out of its surplus, or by cash raised by other means, it being provided that if it shall purchase before the time when the surplus would pay off half the debt, a concession must be made to the company in the way of payment for the earnings that would have belonged to it had the company been left in possession until the surplus had made purchase possible.

Under like conditions, the city may purchase at any time it can obtain the money, it being provided, however, that it shall pay the company for the company's part of the surplus as yet uncollected. In the event this transaction should involve the redemption of bonds, the premium upon the bonds is not to be more than 3 per cent.

The forfeiture clause, which was the last important point in the franchise, was settled in the following manner: It is provided that if the company fails to abide by the terms of its agreement the city shall hold the company's share of the surplus earnings while legal proceedings determine whether the city shall take over the management of the property. If the court finds that there is cause for for-

feiture, the city will own the company's share of the surplus which has accumulated during the proceedings and will further have 25 per cent of the company's share in the surplus to apply to extra betterments and improvements, to which it would not have been entitled if the company had not forfeited management of its properties. It is also provided that the city, by mandamus, may force the company to comply with the terms of its contract.

The Boston Arbitration Hearings

Consideration of the working conditions in the department of wires and conduits on the Boston Elevated Railway occupied the board of arbitration in the labor hearings at the close of the week ended Sept. 20. A recess was then taken until Sept. 25 to enable the employees' counsel further to analyze wage data submitted by the company. Before the work of this department was taken up evidence was presented to show that the average pay of a coal-hoisting engineer in a representative case was $35.26 per week, covering a period of one year. The engineer selected by the union as a typical man worked on the average sixty hours per week. His regular pay averaged $19.96 per week and his bonus pay $15.30. Long shifts were required when emptying vessels, and the maximum pay earned in any one week of the year was $71.63. In emergencies it was necessary to work almost continuously for four days and three nights on a stretch. It was contended by the engineer that a preferable compensation would be $23.50 per week, on the basis of a nine-hour day, five and one-half to six days per week, with no docking for holidays and time and one-half and meal hours for overtime work.

The duties of a power station clerk were outlined to the board. These consist in the main of making up station attendants' time cards and preparing the payroll, with the distribution of labor costs to proper accounts; the instruction of new men in time-card entering, supplying them with rules, checking the station log book and keeping a card record of the stock account at each plant. At the Lincoln power station from fifty to seventy-five requisitions on the stock room are filled daily. The stock used per month cost about $1,000.

James P. Boyden, superintendent of wires and conduits, occupied the witness stand for several sessions. From 180 to 200 men are employed in his department and he has charge of the hiring and the recommending for discharge. On outside work employees are classified as foremen, sub-foremen, linemen, sub-linemen, cable splicers, cablemen, sub-cablemen, inspectors, groundmen, teamsters, stablemen and laborers. On inside work there are foremen, sub-foremen, wiremen and sub-wiremen, helpers and occasionally cadets learning the business, inspectors, stockroom men, clerks and a tool keeper. Regular linemen are rated at from 30 to 34 cents an hour, depending upon length of service and individual capacity. The usual line of advance is from groundman up. Mr. Boyden said that the work of a lineman is not so dangerous as that of the man employed in modern steel building construction. In case of accident a man receives half pay covering the first two weeks' absence from the service. Longer disablements are covered by insurance. Prior to April 1, 1913, there had been no compensation of this character in the first fortnight following an injury. A groundman who works two weeks on the line wins a lineman's rating. In emergencies it is sometimes necessary for an employee of one rating to do work of another rating without advance in pay. Sub-foremen are classified by the number of men in their respective gangs and by seniority. Promotion depends upon seniority and the ability of the individual as shown under observation by his superiors.

Mr. Boyden stated that groundmen perform mainly unskilled work. They help linemen, paint poles, dig post-holes, etc. Outside of Boston the wires of other companies are often located on the poles, but in most cases such wires are far above the wires which belong to the railway. Line workers receive special cautionary instructions in regard to the avoidance of other wires than those of the railway. The company provides insulated tools for men who work on the live third-rail. Groundmen are no longer required to perform linemen's work. Cable splicers are paid 40 cents an hour and sub-linemen 22.5 cents. It was stated that the work of a cable splicer is less hazardous than that of a lineman. The cable splicer, however, is obliged to know more than the latter. He must necessarily be a good plumber, machinist, practical electrician and carpenter.

John Hamilton, chief electrician in the wires and conduits department, testified that the ratings of the men under him are passed upon by the superintendent of wires and conduits in all cases. Under him are one general foreman, three sub-foremen, six head wiremen at 38 cents an hour, an inspector at 41 cents, and wiremen earning from 34.5 to 30 cents. Sub-wiremen are paid from 30 to 28 cents. They are recruited from boys who start at 12 cents an hour and advance by steps to 24 cents as helpers. All the interior wiring and lighting service of the company falls under the direction of Mr. Hamilton. A monthly inventory of stock carried by emergency crews is taken, and time sheets are filled out daily which show the actual hours of service inside and outside the station. A crew responds to 1100 or 1200 emergency calls a year. Emergency linemen are allowed two days off per month. The average time per day spent on outside work is about four or five hours. Night emergency men are paid 26 cents an hour. Special care is taken to keep in touch with all feeder conditions and switch locations, which are constantly changed to meet the requirements of a shifting traffic.

Service and Order Restored in Dublin

The general strike situation in Dublin continues serious. So far as the strike of the employees of the Dublin United Tramways is concerned, conditions are practically normal again, except that the traffic has fallen off on account of threats of intimidation. There have been, however, no recurrences of the terrible disorder which followed the declaration of the strike. The extent to which the strike among other trades in sympathy with the tramway workers has gone is instanced by the fact that even farmhands in some localities have been induced to join the sympathetic movement. On Sept. 16 a number of vessels were reported to be lying in the harbor of Dublin unable to discharge their cargoes.

The strike movement which began in the city of Dublin seemed likely on Sept. 17 to be extended to London, for on that date a strike of the employees of the motor bus and the underground railway employees was threatened. The whole dispute in London seems to have arisen over the question whether the employees should be permitted to wear their union badges while at work. A cable from London on Sept. 22 said that the pending strike of the employees of the bus lines had been averted at a conference that day at the Board of Trade. It was said unofficially that the union of the employees is to be recognized and that representatives of the union are to be permitted to serve as members of the board of arbitration which is provided to adjust disputes between the men and the officers of the companies. The men are to be permitted to wear their union badges, but are not to engage in sympathetic strikes.

In an editorial, "Morals of the Dublin Strike," the London *Times* in a recent issue called attention particularly to the inability to compel the representatives of the unions to live up to the obligations of strike settlement agreements. In this connection the *Times* said in part:

"How is collective bargaining to be made effective? Our Dublin correspondent states that the employers and the trade union delegates who were in conference found themselves at issue over two points. One was the local but always delicate question of the reinstatement of the workers who had been locked out. The other was the far more fundamental problem of the guarantees for the observance of whatever settlement might be reached. This latter question is, indeed, or is rapidly coming to be, the gravest with which trade unionism in these islands is confronted. But of all the adverse signs the growing and pronounced inability of the trade union leaders to control their members and to suppress local and individual and sectional revolts seems to us the most disquieting. It springs from many and divers sources—from the impossibility, in these days of gigantic organizations, of looking after local interests and grievances and of allowing for local conditions with the old particularity; from the change that has overtaken not only the type but the outlook of trade union

leaders and rendered them in many respects almost as remote from the average workingman as the employer himself; from the gradual attrition of interest in the provident and economic sides of the movement and the growing habit of looking upon the unions less as industrial organizations than as effective and wealthy machines for securing and maintaining labor representation in the House of Commons; from the spread of a class consciousness, unfortified by any real knowledge of economics and reverting more and more to Marxian theories. All these influences, and many others, have contributed to a revolution in the spirit and practices of trade unionism that might well, one would have thought, have merited discussion last week by the trade union congress. It is a revolution that threatens, in Dublin and elsewhere, to make collective bargaining almost a waste of time and to secure for industrial anarchy and warfare a new lease of life."

Larkin, the strike leader in Dublin, has again been remanded on the charge of sedition.

Elevated Railway Franchise Recommended in Los Angeles

The Board of Public Utilities of Los Angeles, Cal., has recommended to the City Council the granting of the Pacific Electric Railway's application for a franchise to construct and operate an elevated railway running east from the Pacific Electric station at Sixth and Main Streets to San Pedro Street, Los Angeles. The total cost of the improvement will be $500,000. The elevated structure will be built on a private right-of-way between Sixth and Seventh Streets, the incline rising across San Julian Street and crossing Wall Street and Maple Avenue. The four tracks will stop at Los Angeles Street. Umbrella sheds will extend down between the tracks to Maple Avenue, where the four tracks become two tracks for the rest of the distance to San Pedro Street, at which point the elevated tracks will connect with the line now being installed on San Pedro Street. The proposed franchise is for forty years with the exception of the temporary turnout at San Pedro Street to connect with the San Pedro Street line, now almost completed.

Paul Shoup, president of the Pacific Electric Railway, says:

"The immediate purpose of this overhead construction is to give the greatest utility possible in the use of San Pedro Street in making better and quicker connection between the heart of Los Angeles and all the territory to the east and south of the city reached by our lines. A temporary connection will be made by descending to grade at San Pedro Street. The flyer service to and from the territories described can be very much improved by being brought in on San Pedro Street and thence over this elevated road into the main waiting room of the Pacific Electric terminal, thus avoiding the delays incident to the busy sections of streets and the annoyance that would follow the operation of two stations.

"The further purpose of this elevated road is that it provides the first step in an elevated system which will be of such manifestly great benefit to the city and the outside territories served."

Convention of the Amalgamated Association

The biennial convention of the Amalgamated Association of Street and Electric Railway Employees of America was held at the Hotel Utah, Salt Lake City, Sept. 8 to Sept. 18. Perhaps the most important matter which came before the delegates was the proposed lifting of the suspension of C. O. Pratt and the 2600 members of the Philadelphia local union suspended two years ago. At the opening session on Sept 8 W. D. Mahon, president, stated that since the last convention the officers had reached practically every system throughout the United States and Canada in their efforts to unionize the unorganized systems. The recommendation of short-term contracts made at a previous convention was reiterated. The representatives of the old organization in Philadelphia not accredited at the convention objected to the ruling that C. O. Pratt is ineligible to hold office in the Philadelphia local union and is also ineligible to membership in that local, and that the union at Philadelphia was guilty of insubordination in voting against requesting the international officers to represent the local union in negotiations with the Philadelphia Rapid Transit Company.

At the session on Sept. 11 Mr. Mahon proposed that on account of the growth of the association the number of international vice-presidents should be increased from seven to ten and that two of the vice-presidents be selected from the Canadian carmen. On Sept. 13 the question of the suspension of Pratt and the members of the Philadelphia union came up on appeal and was tabled. Pratt and the representatives who were with him from Philadelphia hired the Salt Lake Theater on Sunday, Sept. 14, and made a direct appeal to the delegates for their support.

A disturbance almost amounting to a riot was precipitated on Sept. 15 when W. L. Merrill, the national organizer for the American Federation of Labor, urged the delegates to reconsider the action in dismissing the appeal of Pratt for reinstatement. At the session on Sept. 16 Mr. Mahon announced that the action of the executive board in regard to the reinstatement of Pratt and the Philadelphia delegation was final. On the same day it was voted to increase the salary of the president from $5,000 to $6,000, the salaries of the other officers from $7 to $9 a day and the salaries of the local organizers from $5 to $6 a day. On Sept. 17 all the officers of the association were re-elected and Rochester, N. Y., was selected as the convention city for 1915. Three additional vice-presidents were elected in accordance with the plan previously mentioned to give representation to Canada.

The convention adjourned without reconsidering the appeal of Pratt and he secured a court writ ordering officials of the association to appear before the district bench and show reason for their action. Service of the writ was accepted by William H. King, who has been retained as counsel by the general executive board to represent the officers of the association in the case.

New York Transit Contracts Modified to Expedite Construction

The Public Service Commission for the First District of New York has executed two agreements with the New York Municipal Railway Corporation (Brooklyn Rapid Transit) for important modifications of the dual system subway contracts, by which the construction and operation of two important links in the Brooklyn system will be expedited. Under the dual system contracts it was provided that the commission should let all contracts for the construction of city-owned lines. In the agreements just signed this provision is modified so as to allow the Brooklyn company to do the construction work in question, provided it charges up to the cost of construction only the actual cost of the work. The Brooklyn company, therefore, will make no profit out of the construction, and it undertakes the work solely because of its desire, which the commission shares, to have the work done in the shortest possible time. One agreement covers the construction of the Thirty-eighth Street line, in Brooklyn, from Fourth Avenue to Tenth Avenue, a stretch of road which will be part subway and part open cut and which will connect the Fourth Avenue subway with the new elevated roads to be built over the routes of the Culver line and the new Utrecht Avenue line to Coney Island. The other agreement applies to the remaining reconstruction work in the Centre Street subway loop, in Manhattan, already under partial operation in connection with the elevated trains of the Brooklyn company. At present only the two westerly tracks in this subway are in operation. Under the new agreement the other two tracks will be equipped for use, certain crossovers will be constructed, the Essex Street station of the Williamsburg Bridge will be reconstructed, and the station at Chambers Street, underneath the Municipal Building, altered so as to permit the entrance of the track connection with the Brooklyn Bridge now under construction. The Brooklyn company agrees to have the work under both agreements completed within eighteen months.

The form of contract for another section of the Seventh Avenue subway, in Manhattan, to be operated by the Interborough Rapid Transit Company, has been completed by the Public Service Commission for the First District and submitted to that company for its criticisms and suggestions. This subway, which will be a four-track line running from Times Square south through Seventh Avenue,

Varick Street and other streets, to the Battery and to Brooklyn, while built by the city, will be paid for out of the money which the Interborough company contributes toward the cost of the new work under the dual system contracts. For that reason the form of contract must be first submitted to the company and approved by it before being finally adopted by the commission. The section for which the form of contract has just been submitted to the company is known as "Section No. 3" and begins at a point under Varick Street about 100 ft. south of the southerly building line of Beach Street and runs northerly under Varick Street and the Seventh Avenue extension to a point opposite the southerly building line of Commerce Street. The Interborough company will return the contract to the commission by Oct. 1, after which it will be adopted and advertised for bidders. The section immediately south of this one is now being advertised and bids therefor will be opened on Oct. 1.

Entertainment Committee

S. K. Colby, vice-president in charge of entertainment of the American Electric Railway Manufacturers' Association, has announced the appointment of the entertainment committee for the Atlantic City convention. The names of the members of the exhibit committee and finance committee have already been published. The entertainment committee will be composed of:

Henry G. Pearce (chairman), Standard Steel Works, Philadelphia.
H. G. Barbee, Maryland Steel Company.
Samuel T. Bole, The J. G. Brill Company.
Edward F. Chaffee, The O. M. Edwards Company, Inc.
Robert Coe, Carnegie Steel Company.
Thomas Cooper, Westinghouse Electric & Manufacturing Company.
J. T. Cunningham, Allis-Chalmers Manufacturing Company.
J. H. Denton, Railway Utility Company.
John R. Dickey, Philadelphia Holding Company.
Clarence Dodson, Standard Steel Works.
E. L. Folsom, Railway Materials Company.
N. M. Garland, Ohio Brass Company,
Allan E. Goodhue, Midvale Steel Company.
Alfred Green, Galena-Signal Oil Company.
A. A. Hale, Griffin Wheel Company.
H. A. Hegeman, U. S. Metal & Manufacturing Company.
Herman H. Helms, Aluminum Company of America.
E. J. Hunt, ELECTRIC RAILWAY JOURNAL.
William P. Hunt, Jr., The Buda Company.
W. G. Kaylor, Westinghouse Traction Brake Company.
H. J. Kenfield, *Electric Traction.*
M. T. Kirschke, Jr., Baldwin Locomotive Works.
W. A. Lake, The Pantasote Company.
Charles H. Machen, Standard Roller Bearing Company.
E. R. Mason, E. R. Mason Company.
James G. Mowry, Patton Paint Company.
W. M. McKee, Electric Equipment Company.
H. N. Ransom, Westinghouse Electric & Manufacturing Company, New York.
Robert W. Read, Pennsylvania Steel Company.
W. H. Wilkinson, Pressed Steel Car Company.
W. L. Wright, Wm. Wharton Jr. & Company, Inc.

Extensions Approved by Utilities Committee of Detroit Council

Alderman Hess introduced a resolution in the Common Council of Detroit, Mich., on the evening of Sept. 16, authorizing the Detroit (Mich.) United Railway to extend its Fourteenth Street line to Marentette Street and build a loop to Fifteenth Street, passing the entrance to the new station of the Michigan Central Railroad, and returning to Fourteenth Street. This is intended to be temporary, as an approach is to be built later on and changes will be necessary. The station will probably be opened for use in November. It is understood that the Detroit United Railway has approved the plan.

On Sept. 19 the depot extension, together with the Junction Avenue and Kercheval Avenue extensions, were approved by the public utilities committee of the Council. There is to be double track on Junction Avenue between West Jefferson Avenue and Michigan Avenue, single track on Thirty-fourth Street north to Warren Avenue, on Thornton Avenue north to Seebald Avenue, and on Seebald Avenue east to Grand River Avenue, looping on Grand River Avenue to Larchmont Avenue, west on Larchmont to Van Court Avenue, south on Van Court to West Warren Avenue and south on Thirty-third Street to Michigan Avenue. For the Kercheval Avenue extension there is to be double track on this thoroughfare east of Jean Avenue and south on St. Jean Street to Jefferson Avenue, the cars to run out Jefferson Avenue and Alter Road and return by the same route.

The public utilities committee of the City Council asked the company to consider the construction of double track on some of the other lines, but F. W. Brooks, general manager of the company, insisted that its plans for the present have been made and the finances provided, so that it will be impossible to take up anything additional.

Progress with the Toronto Valuations

R. A. Ross, who is appraising the assets of the Toronto (Ont.) Electric Light Company in connection with the proposed street railway deal, promised Mayor Hocken on Sept. 19 that his report would be in the city's hands by Oct. 1. The Mayor expects that the report from Messrs. Arnold and Moyes, who are appraising the property of the Toronto Railway, will be submitted earlier than that of Mr. Ross. If the Hydroelectric Power Commission of Ontario approves the two reports on the street railway deal, a by-law concerning the proposed purchase will probably be submitted to the ratepayers of Toronto some weeks before the end of this year. Mayor Hocken is determined not to have the issue involved in the municipal elections on Jan. 1, while Comptroller Church favors the vote on that day. Mr. Church is quoted as follows:

"If there is an attempt to submit this railway deal to the ratepayers any time but January, an injunction will be applied for. After spending $25,000 on a traffic expert's report we are not going to be so foolish as to submit the question without a legal offer from the company. To get a legal offer would require three months. The shareholders must be consulted and must indorse the proposition. I should like to know if the Mayor instructed the experts to place a value on the railway as it will be at the expiration of the franchise. This proposed railway deal has stopped us from getting better car service, from going in for motor buses for the outlying districts, and from proceeding with the plan for civic and radial car lines mapped out by the experts."

Terms of Extensions in Akron Under Consideration

A. B. du Pont met the members of the railroad and the bridge committees of the City Council of Akron, Ohio, on Sept. 17, and ways and means of securing the extensions to the local lines of the Northern Ohio Traction & Light Company were discussed. Mr. du Pont had talked with the officers of the company and said that an extension of one year to the franchise of the company for each mile of new track built and put into operation would be accepted by the company. Mr. du Pont was instructed to prepare another proposition.

At the regular meeeting of the City Council of Akron on Sept. 22 four members blocked an attempt to rush through legislation for the issue of $225,000 of bonds under suspension of the rules for the purpose of building a municipal railway to be operated in competition with the city lines of the Northern Ohio Traction & Light Company. The ordinance for this purpose had received its first reading at a special meeting a few days previously and City Solicitor Taylor had rendered an opinion to the effect that the rules might be suspended and the ordinance passed at this meeting. Councilman Whittamore argued that bond issues should not be passed without some specific purpose being fixed and that plans and specifications in this case should be made for the proposed line.

Mayor Rockwell is opposed to the attempt to secure municipal ownership of any car lines at this time on the ground that the city's finances will not permit the ex-

periment. He says it would be better to allow matters to go on until the expiration of the present franchise, eleven years hence, and when that time comes take over the company's property.

The City Council must now proceed along regular lines with this ordinance, and, if passed, the measure will then go to a referendum vote.

Boston Subway Construction

The Boston Transit Commission has awarded the contract for the Cambridge Street extension of the East Boston tunnel to the firm of Coleman Brothers, Boston. The successful bid was $86,130. Work is being steadily pushed on the section of the extension in the Scollay Square district, and the walls of the Scollay Square station are being cut away in preparation for a lowering of the grade at this point in order to insure a straight connection below the Tremont Street subway between the tunnel and its extension. Street widening will be carried out where the extension is brought to the surface in the West End. Work on the Boylston Street subway is making rapid progress, and it is expected that if no delay occurs service may be given through the new tube between the outer Back Bay and Park Street by the fall of 1914. The stations, as in the Washington Street tunnel, are to be 350 ft. in length, the platform width being from 20 ft. to 25 ft. on each side. At the Massachusetts Avenue station exits and entrances will be established on two intersecting streets and at the Copley Square station a portion of the Public Library esplanade will be used in this way. Heavy reinforcement of the foundations of the Old South Church tower has been necessary in connection with the work at Copley Square. Excavation will shortly be begun for the Church Street incline of the subway south of the Public Garden. Lawrence B. Manley is assistant on the Boylston Street subway in immediate charge of field work.

Petition for Compulsory Extension in Oregon Dismissed.—The Oregon Railroad Commission has dismissed the petition to require the Portland Railway, Light & Power Company, Portland, Ore., to extend its system to Mount Scott Cemetery.

Denver City Tramway to Pay Taxes.—Announcement has been made by the Denver (Col.) City Tramway of its intention to pay the city $263,813 in delinquent taxes for last year, preparatory to bringing suit against the assessor for a further reduction of $736,785, in addition to the $1,976,315 granted in August.

Temporary Fare Reduction Ordered.—James D. Mortimer, president of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has announced that the company will obey the order of the Railroad Commission for a reduction in the fare to the state fair park during fair week. The order virtually establishes a 6-cent fare each way, being one fare plus 2 cents.

Negotiations Regarding Subways in Chicago.—In an opinion to the local transportation committee of the City Council of Chicago Corporation Counsel Sexton held that a franchise for the operation of subways in Chicago cannot be made for a period of twenty years exclusive of the time required in the construction work of the tunnels. He maintained the Council has the right only to grant a franchise for twenty years, the time necessary for the excavation work to be included in that period. The local transportation committee of the Council has decided to request the surface railway interests to confer with the members of the committee with reference to the proposed rapid transit ordinance.

Control of Equipment Proposed for I. C. C.—A bill is to be introduced in Congress by Representative R. B. Stevens, of New Hampshire, chairman of a sub-committee of the House committee on interstate and foreign commerce, which will confer upon the Interstate Commerce Commission control over the physical equipment of railroads, with power to compel the roads to provide and maintain roadbed and equipment such as the commission may specify. The bill will provide for standard rules for the operation of trains, and, in a general way, the power of the British Board of Trade over the railroads of Great Britain will be conferred upon the Interstate Commerce Commission.

Personnel of Mesaba Railway.—The Mesaba Railway, Virginia, Minn., which was placed in operation early this year, has completed its departmental organization, which includes the following: Oscar Mitchell, president; R. W. Watson, vice-president; Philip Saltenstall, treasurer; H. S. Newton, general manager; H. K. Greenwood, assistant general manager; L. J. Daly, chief dispatcher in charge of operation; D. H. Doughty, general traffic agent; Thomas Dwyer, chief engineer; O. A. Ericksen, auditor and purchasing agent; Robert Anderson, master mechanic, and W. B. Hale, roadmaster. The company has recently installed the Simmen block signal system.

Jovian Campaign to Assist the Society for Electrical Development.—The Jovian campaign to secure subscriptions for the Society for Electrical Development in compliance with the resolution passed by the Eleventh Jovian Congress at the recent meeting at Niagara Falls, is progressing satisfactorily. Some forty-five Jovian leagues have reported to the central office indicating their interest in the work and their determination to win the prizes offered by the society. Through the courtesy of Edwards & Company, New York, Thomas H. Bibber, Jovian statesman-at-large, will for the period from Sept. 15 to Oct. 1 assist Eleventh Mercury E. C. Bennett in the work of managing the campaign for the society.

Further Study of Compensation Acts by the National Civic Federation.—The joint commission on the operation of workmen's compensation acts in the various states which was created by the National Civic Federation has decided to extend its investigation by visiting Washington, Oregon and California. The operation of the Washington act is to be studied because that State is the only one in which compulsory state workmen's compensation insurance is in force. The members of the commission have just returned from a trip through Massachusetts, Michigan, Ohio, Wisconsin and Illinois, and they purpose to ascertain the facts with regard to the operation of the workmen's compensation laws, rather than to report recommendations. These facts will be utilized by the workman's compensation department of the Civic Federation in formulating a new model law for uniform state legislation.

St. Paul Litigation Ended.—At a recent conference between the officials of St. Paul, Minn., and the officers of the Twin City Rapid Transit Company it was agreed that official notification of the dismissal of the litigation carried to the United States Supreme Court by the St. Paul City Railway will be followed by the City Council considering the compromise recently advanced by the company in regard to the right of the city to stipulate in the matter of extensions which shall be built to the railway system. Horace Lowry, vice-president of the company, is quoted as follows: "We have decided, without official action on the part of the Council, to dismiss our appeal in the Maryland Street case, and then put our proposition in the hands of the Council. This action will establish the right of the city to order a line on any sewered street where necessity demands, and puts the city in the same position as if it had argued the case before the Supreme Court and won."

Final Mississippi River Development Bulletin.—The Mississippi River Power Company has issued the final bulletin, No. 10, of its attractive series entitled "Electric Power from the Mississippi River," describing the completion of its large hydroelectric plant at Keokuk, Ia. The section just published contains a description of the work accomplished from March 1 to July 1, 1913, and illustrations of the work at various stages of construction, the object being to present a brief review of the progress made. On July 1 the dam was entirely finished and the level of the Mississippi was raised to form the lake which reaches to Burlington, 40 miles north. Ten of the fifteen turbo-generators installed in the station are in operation. They supply power to Keokuk and St. Louis and will soon supply power to Hannibal, Quincy, Alton, Fort Madison and Burlington. The new government lock is in successful operation and the dry dock is nearing completion.

Improvements of the Pennsylvania Railroad at Baltimore.—The directors of the Chamber of Commerce of Baltimore,

Md., have made a report approving in the main the Pennsylvania Railroad's proposition for enlarged terminals in the vicinity of Calvert Station. A few modifications have been suggested, the chief one the building of a viaduct or an elevated street over Centre Street and the widening of Calvert Street 10 ft. for the length of the railroad's improvement. It is also suggested that the city shall widen Calvert Street from Bath to Lexington to the same dimensions. In regard to electrification, the report shows that business expediency was the controlling motive of its authors. It takes the ground that all that should be required of the railroad is to promise that it will change from steam to electricity whenever the latter can be practically adopted. This, the report says, should be within a reasonable time.

Valuation of Tacoma Company Reported.—F. S. Burroughs, engineer of the Public Service Commission of Washington, has completed his report upon the value of all the physical property of the Tacoma Railway & Power Company, Tacoma, Wash., and the report has been presented to the commission. According to the report the entire railway plant of the company could be reproduced at a cost of $4,585,388, exclusive of real estate holdings, and the depreciated value at present is $3,567,034. The gross earnings of the company in 1912 are set down as $1,046,093, and the expenses at $798,805. The amount of annual depreciation upon the plant is figured at $118,478. The real estate holdings, however, show steady appreciation. Mr. Burroughs announced that he expected to be able to complete his real estate estimates by Oct. 1. When the estimates of real estate holdings have been completed and the final valuation has been placed upon the property, the commission will continue with the hearing in the Spanaway rate case.

The Proposed Hamilton-St. Catharines Electric Railway.—Norman M. Todd, president of the Galt, Preston & Hespeler Electric Railway, who has charge of the electric railway projects of the Canadian Pacific Railway, met the members of the City Council of St. Catharines, Ont., on Sept. 12 in reference to the building of a high-speed electric railway from Hamilton to St. Catharines. An agreement was drawn up which will be laid before the Canadian Pacific Railway officials at Montreal and if agreeable will be incorporated into a by-law that will be submitted to the people of St. Catharines for approval, probably before the end of the year. St. Catharines is to contribute $100,000 toward the construction of a bridge across the old Welland Canal. The company agrees to commence work within six months of the passage of the by-law and have the line completed within two years, although it is expected that it will be constructed within one year. A maximum rate of 2 cents a mile for passengers was agreed to. It is understood that the line will not be extended to the frontier, but may later be run to Merritton and Thorold.

Booklet on 1913 Flood Issued by the Pennsylvania Lines.—The Pennsylvania Lines, Pittsburgh, Pa., have issued a 72-page booklet entitled "The 1913 Flood and How It Was Met by a Railroad," written by Lewis S. Bigelow. This is a graphic description of the disastrous floods which swept the Central West, principally Ohio and Indiana, from March 23 to April 15, 1913. The Pennsylvania Railroad was affected to the extent that for some time beginning March 26, when the flood was at its height, three of its most important branches were completely paralyzed, as shown in one of the maps in the booklet. The story records the difficulties the floods heaped up and how they were surmounted and overcome. The booklet is divided into six chapters as follows: "The Coming of the Flood," "The Fight for Existence," "Caring for Passengers," "Rescuing the Railroad," "Relief Work," "The Floods Subside." Many illustrations are presented showing the damage done to bridges, stations and roadbed on the various divisions in the territory which was flooded. In bridges alone there were seventy-four steel structures entirely destroyed or rendered unsafe. The washouts, of which there were thousands, ranged from comparatively small breaks to sections of roadbed 2 miles in length. It is estimated that the direct property loss to the Pennsylvania Railroad was about $3,600,000.

Financial and Corporate

Stock and Money Markets

Sept. 24, 1913.

The tendency of the prices of the securities traded in on the New York Stock Exchange was downward to-day and sufficient pressure developed to cause a net decline of half a point in the general level of quotations. The notable exceptions to the decline were the New Haven and the Rock Island issues. The money market continued easy. The government bond market again lacked support. Rates in the money market to-day were: Call, 2½@3 per cent, with the last loan at 2¾ per cent; sixty days, 4¼@4½ per cent; ninety days, 4½@4¾ per cent; four, five and six months, 5 per cent.

Very little interest was manifested in the market in Philadelphia to-day. Trading was light and without feature.

The Chicago market was broad to-day, but the volume of transactions was small. The market for bonds was good.

The Boston market was weak to-day. Activity and strength in New Haven issues were the features of the afternoon.

The market for stocks in Baltimore was very narrow to-day and the volume of transactions was small. The demand for bonds was good.

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

	Sept. 17	Sept. 24
American Brake Shoe & Foundry (common)	92	92⅝
American Brake Shoe & Foundry (preferred)	133⅞	135
American Cities Company (common)	37	37½
American Cities Company (preferred)	65	65
American Light & Traction Company (common)	354	354
American Light & Traction Company (preferred)	105	105
American Railways Company	39⅝	39⅜
Aurora, Elgin & Chicago Railroad (common)	41¼	42
Aurora, Elgin & Chicago Railroad (preferred)	83	84
Boston Elevated Railway	88	86½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	56½	56½
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	43	43
Brooklyn Rapid Transit Company	89¼	89¼
Capital Traction Company, Washington	a116¼	116
Chicago City Railway	160	165
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	94½	94
Chicago Railways, ptcptg., ctf. 2	29	30⅜
Chicago Railways, ptcptg., ctf. 3	8	8
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	103	120
Cleveland Railway	101	102⅝
Cleveland, Southwestern & Columbus Ry. (common)	5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	28¼	*28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	104	*104
Detroit United Railway	69	69
General Electric Company	147	146
Georgia Railway & Electric Company (common)	117	117
Georgia Railway & Electric Company (preferred)	86	87
Interborough Metropolitan Company (common)	15⅝	15⅜
Interborough Metropolitan Company (preferred)	61	60⅜
International Traction Company (common)	30	*30
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	20	22
Kansas City Railway & Light Company (preferred)	30	30
Lake Shore Electric Railway (common)	5	*5
Lake Shore Electric Railway (1st preferred)	89	*89
Lake Shore Electric Railway (2d preferred)	24	*24
Manhattan Railway	129	130
Massachusetts Electric Companies (common)	14	14
Massachusetts Electric Companies (preferred)	68	a68
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	27½	*27½
North American Company	75	73
Northern Ohio Light & Traction Company (common)	65	63
Northern Ohio Light & Traction Company (preferred)	100	97
Philadelphia Company, Pittsburgh (common)	44	43⅜
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23	23
Portland Railway, Light & Power Company	55	55
Public Service Corporation	114	114
Third Avenue Railway, New York	40⅝	42½
Toledo Traction, Light & Power Company (common)	a30	a30
Toledo Traction, Light & Power Company (preferred)	a80	a80
Twin City Rapid Transit Co., Minneapolis (common)	107½	106
Union Traction Company of Indiana (common)	*5	*5
Union Traction Company of Indiana (1st preferred)	*80	*80
Union Traction Company of Indiana (2d preferred)	*20	*20
United Rys. & Electric Company (Baltimore)	27	26⅞
United Rys. Inv. Company (common)	19	22
United Rys. Inv. Company (preferred)	39	40
Virginia Railway & Power Company (common)	52	56
Virginia Railway & Power Company (preferred)	93	94
Washington Ry. & Electric Company (common)	89	89
Washington Ry. & Electric Company (preferred)	89	89½
West End Street Railway, Boston (common)	72	70
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	72	70½
Westinghouse Elec. & Mfg. Company (1st preferred)	114	115

*Last sale. a Asked.

ANNUAL REPORTS

Boston Elevated Railway

The Boston (Mass.) Elevated Railway failed to earn the dividends paid during the fiscal year ended June 30, 1913, owing largely to the fact that the strike of 1912 carried over into the accounts of the last fiscal year. Had not the miscellaneous income fallen off $450,000 from the preceding year the results would have been different, for the deficit was but slightly in excess of this amount.

The operating revenue was $904,800 greater than in the preceding year and operating expenses were but $158,900 larger, making really an increase of $745,900 in the operating net. The year's deficit of $496,377 compares with a deficit of $491,632 the previous year, both of which can be ascribed directly to the strike. Interest charges were increased by an addition of $4,000,000 funded debt, and the capital was also increased $3,929,400, but the dividend did not accrue on this stock during the year.

Following is the statement for the year ended June 30, 1913, as reported to the Massachusetts Public Service Commission, in comparison with the preceding year:

	1913	1912
Operating revenue	$16,808,908	$15,904,046
Operating expense	11,135,581	10,976,634
Operating net	$5,673,327	$4,927,412
Miscellaneous income	159,419	618,495
Total income	$5,832,747	$5,545,907
Charges	5,132,124	4,840,539
Balance	$700,622	$705,368
Dividends	1,197,000	1,197,000
Deficit	$496,377	$491,632

The traffic statistics for the past two fiscal years ended June 30 compare as follows:

	1913	1912
Revenue car miles	57,784,319	54,790,173
Revenue passengers carried	326,352,863	310,310,009
Employees	9,882	9,998
Maintenance of way and structures	$1,761,842	$1,593,013
Maintenance of equipment	1,282,655	1,428,574
General expense	1,773,597	1,857,126
Traffic expense	16,048	35,784
Transportation expense	6,301,400	6,062,136
Ratio of operating expenses to operating revenue	66.25	69.02

Railway & Light Securities Company

The semi-annual report of the Railway & Light Securities Company, a corporation organized by Stone & Webster for the purpose of investing and dealing in public utility securities, contains a profit and loss statement for the twelve months ended July 31, 1913, as follows:

Underlying and investment bond interest received and accrued		$205,498
Dividends on investment stocks		52,183
Interest on notes, etc		17,187
		$274,868
Collateral trust interest paid and accrued	$85,681	
Taxes	3,991	
Expenses	8,757	98,429
Profit from income		$176,438
Profit on securities bought and sold	$47,074	
Premium on collateral trust bonds	3,045	44,029
		$220,467
Preferred stock dividends		
3 per cent paid Jan. 31, 1913—No. 16	$45,000	
3 per cent paid July 31, 1913—No. 17	45,000	
Common stock dividends		
3 per cent paid Jan. 31, 1913—No. 7	30,000	
3 per cent paid July 31, 1913—No. 8	30,000	150,000
Net profit carried to surplus		$70,467
Surplus as of Aug. 1, 1912		400,537
Total surplus		$471,004

The Railway & Light Securities Company has outstanding $1,500,000 of 6 per cent preferred stock and $1,000,000 of common stock, on which dividends of 3 per cent semi-annually are being paid. Under its charter the company may issue its own collateral trust bonds secured by the bonds of other companies as collateral. It has outstanding $1,601,000 of thirty-year 5 per cent collateral trust bonds. These bonds are secured by bonds of other companies of at least 25 per cent greater value than the face of bonds issued. Of these bonds $349,000 mature May 1, 1935, $500,000 mature May 1. 1939, $369,000 mature Nov. 1. 1939, and $383,000 mature May 1, 1942. The semi-annual report contains a list of the underlying bonds deposited as security for each of the four collateral series issues.

Melbourne Tramway & Omnibus Company

According to a report recently submitted to the shareholders of the Melbourne Tramway & Omnibus Company, Melbourne, Australia, the traffic receipts for the year ended June 30, 1913, amounted to £755,091, which, added to interest received of £38,112 and miscellaneous income of £1,888, made a total income of £891,082. From this amount deductions were made to the extent of £24,372 for salaries, £252,269 for wages, £1,668 for depreciation of leaseholds, £8,261 for income and land taxes, £74,250 for interest on debentures, £$49,500 for the sinking fund, £7,313 for a reserve for a renewal of tramways, £144,000 for dividends paid, leaving a balance on hand for the period of £202,754. From this amount the directors of the company propose to pay a final bonus of £48,000 and to carry £105,741 to a reserve for the return of capital, which leaves a total of £49,013 to be carried forward for the ensuing fiscal year. The tramway receipts show an increase of £35,567, while the omnibuses show a decrease of £1,284, a total increase of £34,282. The number of passengers carried by the tramways amounted to 89,359,248, an increase of 4,432,536; the omnibuses carried 493,516, a decrease of 147,726, making a total increase of 4,284,810. The train miles run by the tram cars amounted to 11 839,473, an increase of 526,261, while the same statistics for the omnibuses are 95,783 train miles for the year, a decrease of 9,846, or a total increase of 516,415.

Buffalo Reorganization Hearings Continued

At the hearing on Sept. 19 in Buffalo before the members of the Public Service Commission of the Second District of New York counsel for the petitioning bondholders of the Buffalo & Lake Erie Traction Company and for the banking house of Bertron, Griscom & Company, New York, intimated that the reorganization of the Buffalo & Lake Erie Traction Company and the acquisition by the reorganized company of the capital stock of the Buffalo, Lockport & Rochester Railway and the Canadian-American Power Corporation will eventually include the International Railway.

Under the provisions of the new $60,000,000 mortgage recently executed by the International Railway it cannot absorb other lines. When Edward G. Connette, president of the International Railway, was asked about this new phase of the situation, he merely said he did not believe the company would be included in the merger scheme.

Since the merger plan has been before the Public Service Commission, little or nothing has been said about the Frontier Electric Railway, which is to be built from Buffalo to Niagara Falls, N. Y., to connect with the new MacKenzie-Mann line from Toronto to Niagara Falls, Ont. More than 95 per cent of the right-of-way has been secured by that line and Mr. Connette has admitted that the interurban cars of the International Railway will operate between Buffalo and Niagara Falls over the new line. The present Niagara Falls line will be used only for freight service.

The International Railway has been double-tracking its line from Tonawanda to Lockport, N. Y., and the cars of the Buffalo & Lake Erie Traction Company will operate over this line and connect with the Buffalo, Lockport & Rochester Railway at Lockport. Mr. Connette says the reorganized lines will have a trackage agreement with the International Railway to run interurban electric trains over the city lines and interurban tracks as far as Tonawanda and Lockport.

The Canadian-American Power Corporation, which proposes to import 46,000 hp at the international boundary, has on its board of directors members of the banking firm of Bertron, Griscom & Company and Mr. Connette.

It developed at the hearing before Commissioner Decker on Sept. 19 that the petitioning bondholders will confer soon in New York with counsel representing the minority bondholders who are protesting against the proposed plan of reorganization and merger.

The next hearing will be held in Albany at the request of Chairman Decker of the commission. The date of this hearing has not been fixed.

References to Electric Railway Holdings at the New Haven Bond Hearing

Brief references to the electric railway properties of the New York, New Haven & Hartford Railroad were made at the hearings during the week ended Sept. 20 upon the petition of the company to the Massachusetts Railroad Commission for authority to issue debenture bonds to the amount of $67,552,000. Howard Elliott, president of the company, and Samuel Rea, president of the Pennsylvania Railroad, appeared before the board at its offices in Boston on behalf of the proposed issue. Mr. Elliott said that if the commission authorizes the issue $7,000,000 will be expended immediately to increase safety of travel on the New Haven lines. He said that at this time he is unable to make any statement regarding the future policy of the company toward its electric railway and steamship holdings. Mr. Rea, who is a director of the New Haven company, said that it would be impracticable to dispose of the electric railways and steamship holdings of the road as a means of avoiding a bond issue of the size desired. Such a disposal would have to be made on a piecemeal basis, if at all, and would cause enormous loss to the stockholders. Mr. Rea said that he did not know whether the New Haven company had accepted the Massachusetts act of 1913 relative to electric railway extensions in the Berkshire district. He understood that the Interstate Commerce Commission had merely suggested that the company dispose of its electric railway holdings. He was opposed to railroads holding other property. He said:

"The company purchased the electric railways to protect itself. I was not a member of the board of directors at that time, but I have no doubt that the directors thought the electric railways threatened very serious competition. The Pennsylvania Railroad at one time suffered from the trolley lines which parallel its line to Wilmington, Del. In the first year the Pennsylvania lost $50,000 in traffic from the territory and it was a question whether the railroad would not have to buy the electric railways. In time we got the long-haul and they the short-haul traffic."

H. M. Kochersperger, vice-president of the New Haven company in charge of financial matters, said at one of the sessions that the directors have appropriated $668,000 for the electrification of the passenger service on the Harlem River branch and $753,000 for the electrification between Glenbrook and New Haven.

Chicago (Ill.) Railways.—The proxy committee of the Chicago Railways, consisting of Wallace Heckman, Seymour Morris and Henry A. Blair, on Sept. 15 issued a circular criticising the contents of the circular sent out recently by the Chicago Railways Protective Association, mentioned in the ELECTRIC RAILWAY JOURNAL for Sept. 20, 1913. It is claimed that the statement made by the protective association that the signing of the proxy sent out by the proxy committee of the company would authorize the company to sell, lease or merge its property without further consent of the certificate holders is false, for all the powers under the formal proxy are strictly confined to the steps provided by the participation certificate to be taken relative to the election of the directors for the present year.

Columbus Railway & Light Company, Columbus, Ohio.—On Sept. 15 Judge Dillon in the Court of Common Pleas overruled the contention of the stockholders of the Columbus Light, Heat & Power Company that the proposed organization plan of the Columbus Railway, the Columbus Edison Company, the Columbus Light, Heat & Power Company and the Columbus Railway, Power & Light Company, referred to at length in the ELECTRIC RAILWAY JOURNAL of May 3, 1913, should have been approved by shareholders of the various companies before being submitted to the Public Service Commission. The court held that the statutes are silent as to whether the proposition of purchase and sale should be submitted to the stockholders and then to the commission or vice versa, and that either course could be followed. It is reported that since the decision some of the stockholders of the Columbus Light, Heat & Power Company have indicated their willingness to consent to the plans of the management. Final action on the consolidation of the four constituent companies has been postponed by the directors until Nov. 15, when the stockholders will act on the matter.

Consolidated Cities Light, Power & Traction Company, New York, N. Y.—An initial quarterly dividend of one-half of 1 per cent has been declared on the capital stock of the Consolidated Cities Light, Power & Traction Company, payable on Oct. 1 to holders of record of Sept. 15.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—Bertron, Griscom & Company, New York, N. Y., are offering for sale 6 per cent debenture gold notes of the Elmira Water, Light & Railroad Company, dated May 1, 1913, and due May 1, 1914, par value $1,000, $10,000 and $50,000. The total authorized issue is $1,250,000 with $602,000 outstanding. The following statement was issued by the bankers: "This issue is to pay underlying bonds and unfunded debt and to permit new construction and improvements, including the cost of a new central power station. The work on this station will be pushed to completion and it is expected that it will add materially to the net earnings. The company covenants that it will not during the life of these notes (a) issue any of its first consolidated mortgage 5 per cent bonds; (b) create any new mortgage on its property without including these notes as part of such mortgage; or (c) create any other indebtedness except for current operating account save with the consent of 75 per cent of the note holders."

Evansville (Ind.) Railways.—The Evansville Railways has filed a mortgage with the Pittsburgh Trust Company, Pittsburgh, Pa., to secure an authorized issue of $5,000,000 of 5 per cent forty-year bonds, of which $1,331,500 are set aside to retire three underlying issues, the balance to remain in the principal for future extensions or improvements, except $800,000 which will be used immediately.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—At a meeting recently held by the directors of the Fresno, Hanford & Summit Lake Interurban Railway the question of issuing preferred stock was discussed. The matter of advertising for the stockholders' meeting to secure permission to issue this stock is only a formality, as all of the stock was represented by the owners or proxies at the directors' meeting, but the sixty days' advertising is required by law. The preferred stock is to be issued in order to clear up the outstanding business of the company and to change the 5 per cent fifty-year mortgage to a 6 per cent forty-year type.

Galveston-Houston Electric Company, Galveston, Tex.—The stockholders of the Galveston-Houston Electric Company will vote on Oct. 6 on authorizing an increase in capital stock from $4,000,000 of common stock and $3,000,000 of preferred stock to $5,000,000 of common stock and $4,000,000 of preferred stock. Various improvements to the system in Galveston and Houston and to the interurban line between the two cities are contemplated during the coming year. The principal items are an increase of power facilities, the purchase of new equipment, construction of carhouses and extensions of track. The stock will be issued from time to time as required.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—The stockholders of the Greenville, Spartanburg & Anderson Railway have authorized an increase of $2,500,000 in the capital stock, which makes the total authorized issue $7,500,000. The new capital will be used in financing the new line of the company of about 50 miles between Gastonia and Spartanburg. This link will connect the northern and southern divisions of the Piedmont Northern lines, and with its completion there will be a through route of 205 miles between Charlotte, N. C., and Augusta, Ga.

Joliet & Southern Traction Company, Joliet, Ill.—The property of the Joliet & Southern Traction Company has been advertised for sale under foreclosure of its mortgages at Geneva, Ill., on Nov. 18.

New Hampshire Electric Railways, Haverhill, Mass.—The Massachusetts Northeastern Street Railway, a subsidiary of the New Hampshire Electric Railways, has petitioned the Massachusetts Public Service Commission for the following: (1) an increase of capital stock from $1,455,000 to $2,175,000 by an addition of $675,000 of preferred stock and $45,000 of common stock for the following pur-

poses: (a) $415,000 of preferred stock to be exchanged dollar for dollar for the bonds of the Hudson, Pelham & Salem Street Railway, the Haverhill, Plaistow & Newton Street Railway and the Lowe & Pelham Street Railway; (b) $260,000 of preferred stock and $45,000 of common stock to buy pleasure grounds and additional property, including the property of the Canobie Lake Company in Salem, N. H., a bridge across the Hampton River and land owned by the Granite State Land Company; (2) an issue of $1,000,000 of a proposed $2,000,000 issue of twenty-year 5 per cent mortgage bonds, $670,000 to pay the floating debt of the company and $330,000 to retire the ($23,000) bonds of the Citizens' Electric Street Railway and the ($100,000) bonds of the Amesbury-Hampton Street Railway.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hayden, Miller & Company, Cleveland, Ohio, after having sold about $1,250,000, are offering at par and interest the remainder of the $1,500,000 new collateral trust 6 per cent gold notes issued with the approval of the Ohio Public Service Commission to take up the $800,000 collateral trust 6's of 1909 and to provide for additions and improvements, as noted in the Electric Railway Journal of Sept. 20. These notes are dated Aug. 1, 1913, and due $100,000 annually on Nov. 1, 1914, 1915 and 1916, and thereafter $100,000 semi-annually ending Nov. 1, 1922, but redeemable in whole or in part at 101 and interest upon thirty days' notice prior to any interest date in the inverse order of maturities and numbers. The principal and interest are payable at the office of the Citizens' Savings & Trust Company, Cleveland, trustee, or at the office of the First National Bank, New York.

Philadelphia (Pa.) Rapid Transit Company.—Drexel & Company, Philadelphia, will offer on a 5.09 basis the 5 per cent equipment trust gold certificates, series C, of the Philadelphia Rapid Transit Company, issued under the Philadelphia plan, dated May 1, 1912, maturing in semi-annual instalments of $81,000 from Nov. 1, 1913, to May 1, 1923, inclusive, but callable at 102½ and interest. The Fidelity Trust Company, Philadelphia, is trustee. The total issue of $1,944,000 is secured by 500 new double-truck vestibuled cars, purchased from The J. G. Brill Company at a cost of $2,453,025, of which $509,025 has been met in cash.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—The Ontario Railway & Municipal Board will have its auditor investigate the operation of the Sandwich, Windsor & Amherstburg Electric Railway before passing on the application, heard on Sept. 16, to compel specific performance of the agreement between the township of Tecumseh and the railway. Under an agreement the Essex, Windsor & Tecumseh Railway was to make certain extensions when the road became profitable. The Essex, Windsor & Tecumseh Railway was subsequently leased to the Sandwich, Windsor & Amherstburg Electric Railway and the question now to be decided is whether the road is profitable.

Southern Pacific Company, San Francisco, Cal.—It was announced on Sept. 13 that Kuhn, Loeb & Company, New York, have sold on a 5¼ per cent basis $7,130,000 of equipment trust 4½ per cent certificates, representing 90 per cent of the cost of new equipment for the Southern Pacific Company.

Southwestern Traction Company, Temple, Tex.—A. F. Bentley, president of the Southwestern Traction Company, has announced that an amendment to the charter of the corporation, increasing its capital stock to $3,500,000, will be filed in the Secretary of State's office at Austin. Mr. Bentley says the purpose of this proposed increase of capital is to provide funds to extend the line from Temple to Waco, about 30 miles, and from Temple south of Austin, about 80 miles.

Toledo Railways & Light Company, Toledo, Ohio.—The reorganization committee of the Toledo Railways & Light Company has issued notices that all the holders of the New York Trust Company certificates of deposit of stock of that company who have not exchanged these for the voting trust certificates of the preferred and common stocks of the Toledo Traction, Light & Power Company must do so immediately.

Dividends Declared

Aurora, Elgin & Chicago Railroad, Wheaton, Ill., quarterly, 1½ per cent, preferred; quarterly, three-quarters of 1 per cent, common.

Chicago (Ill.) City Railway, quarterly, 2½ per cent.

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

Consolidated Cities Light, Power & Traction Company, New York, N. Y., quarterly, one-half of 1 per cent.

Germantown Passenger Railway, Philadelphia, Pa., quarterly, $1.31¼.

Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred; 2½ per cent, common.

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

Philadelphia Company, Pittsburgh, Pa., 3 per cent, cumulative preferred; quarterly, 1¾ per cent, common.

Porto Rico Railways, Ltd., Ponce, P. R., quarterly, 1¾ per cent, preferred; quarterly, 1 per cent, common.

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

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	August	'13	$498,976	.....	.....	.....	.....
1 "	"	'12	450,274	.....	.....	.....	.....
2 "	"	'13	1,003,044	.....	.....	.....	.....
2 "	"	'12	912,511	.....	.....	.....	.....

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

1 mo.	August	'13	$60,233	$30,403	$29,830	$654	$29,177
1 "	"	'12	56,221	28,269	27,952	467	27,485

BATON ROUGE (LA.) ELECTRIC COMPANY

1 mo.	July	'13	$13,774	*$8,522	$5,253	$2,082	$3,171
1 "	"	'12	12,479	*8,101	4,378	1,729	2,649
12 "	"	'13	151,510	*91,570	59,940	22,857	37,083
12 "	"	'12	137,813	*83,253	54,561	20,758	33,802

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1 mo.	July	'13	$16,883	*$10,177	$6,706	$1,117	$5,589
1 "	"	'12	15,476	*9,469	6,006	1,050	4,956
12 "	"	'13	123,511	*95,599	27,911	12,939	14,972
12 "	"	'12	119,329	*89,802	29,527	12,576	16,951

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1 mo.	July	'13	$32,543	*$17,616	$14,928	$6,082	$8,846
1 "	"	'12	33,116	*16,974	16,142	5,703	10,439
12 "	"	'13	373,216	*201,385	171,831	70,690	101,141
12 "	"	'12	348,338	*192,034	156,304	67,980	88,324

DALLAS (TEX.) ELECTRIC CORPORATION

1 mo.	July	'13	$175,352	*$101,295	$74,057	$24,852	$49,205
1 "	"	'12	144,534	*88,839	55,695	24,666	31,029
12 "	"	'13	2,039,099	*1,186,806	852,294	295,946	556,348
12 "	"	'12	1,728,517	*1,106,421	622,096	264,752	357,345

EL PASO (TEX.) ELECTRIC COMPANY

1 mo.	July	'13	$67,219	*$35,970	$31,249	$4,178	$27,071
1 "	"	'12	59,620	36,328	23,293	5,877	17,416
12 "	"	'13	873,223	465,728	407,495	49,848	357,646
12 "	"	'12	737,955	412,355	325,600	81,267	244,333

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1 mo.	July	'13	$228,910	*$121,141	$107,769	$35,469	$73,299
1 "	"	'12	180,558	*100,556	80,003	33,501	46,502
12 "	"	'13	2,265,182	*1,294,545	970,636	412,554	559,082
12 "	"	'12	1,778,397	*1,077,923	700,474	332,683	367,791

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1 mo.	July	'13	$31,758	*$15,998	$15,759	$5,629	$10,130
1 "	"	'12	30,784	*14,634	16,149	5,677	10,472
12 "	"	'13	312,500	*179,225	133,275	67,933	65,343
12 "	"	'12	300,671	*178,625	122,046	64,920	57,126

JACKSONVILLE (FLA.) TRACTION COMPANY

1 mo.	July	'13	$57,130	*$35,934	$21,195	$12,976	$8,220
1 "	"	'12	49,248	*23,100	16,147	9,810	6,338
12 "	"	'13	600,897	*402,285	198,512	130,161	68,351
12 "	"	'12	584,690	*367,170	217,521	113,409	104,112

*Includes taxes.

Traffic and Transportation

California Fare Complaint Dismissed

The Railroad Commission of California has dismissed the complaint against the Peninsular Railway, San José, Cal., in which unreasonableness of passenger rates was charged between Los Gatos and San José. The complaint was originally directed against the one-way fare, the individual monthly commutation fare and the family commutation fare of the Peninsular Railway, in effect between San José and Los Gatos, and also comprehended the service between these points. At the hearing the children's forty-six ride individual monthly commutation fare of $2.30 between Saratoga and Los Gatos, for a distance of approximately 4.3 miles, was alleged to be unreasonable and unjust as compared with the fare of $2.75 for the same class of service between Saratoga and San José for a distance of 11.3 miles. At the same time, the single-trip fare of 10 cents between Campbell and a station called Pines, and between Pines and certain adjacent points, was complained of as being unreasonable. These allegations, however, were entirely without the issues raised by the pleadings and no further consideration was given to them.

The service between San José and Los Gatos is practically hourly throughout the day and until 11.30 o'clock at night, and during some parts of the day cars leave San José for Los Gatos, via Campbell and via Saratoga, at practically the same time and thereby afford optional routes between San José and Los Gatos on practically the same schedule. The complainant had no fault to find with the number of trains between Los Gatos and San José, but with the manner in which they were operated.

A. D. Loveland of the commission said in part in his opinion:

"It is my opinion that the interest of the parties living in the territory between San José and Los Gatos should be fully considered in this matter before any change in the schedules of the trains is made. In view of the fact that it has not been possible to look into this feature of this matter, and that the testimony of the defendant was uncontroverted, that 90 per cent of its traffic on this part of its line originates and terminates at points intermediate to Los Gatos, and that the present schedules were specially arranged to take care of the traffic of the whole community, rather than of any particular section, I do not believe that it is proper at this time to make any change in the defendant's train schedules between San José and Los Gatos.

"I next come to the complaint against the passenger fares of the defendant. The fares which were particularly called into question in this proceeding are the one-way fare of 25 cents, the sixty-two-ride individual monthly commutation fare of $5, and the thirty-ride family six-month commutation fare of $5 between San José and Los Gatos. It is contended that these fares are excessive and unjust, for the reason that they are inconsistent with other fares of the defendant and exceed fares between other points on other lines in California where the transportation conditions and circumstances are similar, and in support of this contention the complainant points out, in comparison, the fares of the defendant between San José and Saratoga, the fares of the Pacific Electric Railway between Los Angeles and Pasadena and the fares of the Northwestern Pacific Railroad between San Francisco and Fairfax.

"The testimony of the defendant that it is operating its entire line at a loss is uncontroverted, and from the exhibit offered in this case and from the records on file in the office of the commission it appears that there is a deficit of from $8,000 to $12,000 per month. As suggested by the complainant, this deficit may, to a large extent, be brought about by the payment of interest on outstanding stocks or bonds which do not represent actual values, but in the absence of any information or evidence to support such a statement it is obviously of small use. The commission's valuation of this property had not proceeded far enough to enable it to form its conclusions in regard thereto and ascertain therefrom some idea of the proper capitalization of this line.

"While it would, no doubt, as the complainant contends, be to the advantage of the residents and property owners of Los Gatos and intermediate territory to secure reductions in the present fares, and in the end might prove beneficial to the railroad itself, if the carrier is unwilling to experiment in this regard it does not follow that this commission should adjust the fares so as to bring about this result, this commission being empowered only to prescribe just and reasonable rates. The carrier should, in this regard at least, adjust its fares so that all discrimination between persons and localities is entirely eliminated and should provide in so far as possible relative rates for the various classes of service, which relation should generally be maintained without discrimination.

"From a consideration of all of these matters I am led to the conclusion that the facts do not sustain the complaint and recommend that it be dismissed."

The Toronto Safety First Movement

The Ontario Safety League is the title under which the new "safety first" movement will be started in Toronto. It was proposed at the organization meeting, held on Sept. 15, to provide moving pictures in connection with the schools, to circulate literature and perhaps arrange lectures, to place before the public the actual dangers they face and show the wisdom of exercising care when on the street. It was also suggested that a competition be held with prizes for the six best methods to avoid street accidents. In explaining the purpose of the meeting, Chairman McIntyre of the Ontario Railway & Municipal Board said that in Montreal and in a number of cities in the United States campaigns had been instituted to teach the public to avoid accidents. He said: "Toronto boasts that it is in the van of progress. This board thought it ought to bring the influential men of the city together, present the matter to them, and leave it in their hands to look after. Some permanent organization should exist to educate the public to avoid accidents."

For organization purposes four committees as follows were appointed: Membership, J. C. Eaton, J. T. Burke, Dr. Doolittle; organization, W. P. Gundy, J. E. Aitkinson, Dr. J. L. Hughes; finance, J. M. McIntosh, C. L. Wilson, O. Hezzlewood; campaign, W. R. McRae, G. G. Powell, W. F. Maclean. The league intends to interest practically all the organizations in the city in the movement. Although at first the educational campaign will be devoted to eliminating street accidents, the intention of the members is to have it embrace railroad and steamship traffic.

Railroad Commission of California on Napa Wreck

The Railroad Commission of California has rendered its findings in the matter of the investigation which it conducted into the causes of the wreck on June 19, 1913, on the San Francisco, Napa & Calistoga Railway, in which ten passengers and three employees were killed and twenty-five passengers and three employees were injured. The conclusions of W. C. Earle, chief engineer of the commission, follow:

"Circumstantial evidence indicates that Conductor Richmond (train 6) failed to call for his clearance before leaving Vallejo as required by custom of the company. Motorman Hough failed to obtain a copy of this clearance or verbal confirmation of it from the conductor before starting his train. Dispatcher O'Leary violated the rules in allowing an inferior train to move before restricting the superior train. The officers of the company were negligent in their duties in allowing single-track high-speed operation to be conducted without maintaining the proper observation of the rules on the part of all employees.

"It is necessary to make mention of the fact that had the railroad been equipped with automatic block signals the accident would have been prevented, assuming that sufficient discipline was maintained to obtain observance of signals.

"The direct causes of the accident were—

"(1) Failure of Conductor Richmond to call the dispatcher for a clearance before leaving Vallejo with train.

"(2) Failure of Motorman Hough to obtain the clearance from his conductor.

"(3) Dispatcher O'Leary's violation of the rule requiring him first to restrict the superior train before moving the inferior train.

"(4) Failure of the officers of the company to correct the above violations of the rules which had been occurring daily and had become an established practice.

"The indirect cause of the accident was—

"General violation of the rules, which ultimately results in such disasters as this one.

"The company should require its officers to operate the railroad under safe rules. They should examine men as to their fitness before allowing them to occupy positions that involve the handling of trains and train orders and should employ only competent men in such positions who are qualified to fill them. They should know that all rules are being observed."

Decision Fixing Joint Rate for Lumber.—In the complaint before the Railroad Commission of California alleging excessive rates on lumber on the lines of the Salt Lake Railroad and the Pacific Electric Railway, Los Angeles, Cal., between East San Pedro and Florence Avenue, outside the city limits of Los Angeles, the commission has rendered a decision holding that the lumber rate of 6 cents per 100 lb. between these points is excessive and discriminatory and the defendants have been ordered to publish a rate of $1 per ton on lumber in carload lots.

Notice of Through Routes and Joint Rates Filed.—The Louisville Board of Trade has received notice that through routes and joint rates have been established by the electric railways which operate between Louisville, Ky., and Indianapolis. A joint freight tariff has been filed with the Interstate Commerce Commission and has now become effective, this action following a recent order of the commission growing out of a complaint of the Board of Trade. The Board of Trade has taken up with the commission the question of having tariffs filed for joint rates and through routes from Louisville to points beyond Indianapolis which have not been provided for by the companies as yet. The commission will probably enter an additional order on the subject if this step is not taken by the lines affected.

Near-Side Stop Opposed in Detroit.—In Detroit, Mich., opposition to the near-side stop rule promulgated some time ago by Police Commissioner Gillispie has developed among individuals, shop and store organizations and club members. Mr. Gillispie holds, however, that the near-side stop is conducive to safety. At the meeting of the Mayor's cabinet on Sept. 18, S. T. McGraw, president of the fire commission, declared in favor of the far-side stop, to the surprise of Commissioner Gillispie and some of the other city officials. Several members of the Twentieth Century Club, a prominent women's organization, have voiced objections to the near-side stop. They believe that cars should stop so that they may be boarded from the crossing walks. The officers of the company are willing to have the public decide the matter.

Accident on Electric Division of Long Island Railroad.—Three men, employees of the Long Island Railroad, were killed and more than fifty passengers were injured on the morning of Sept. 22 in a head-on collision between two electric all-steel trains which met on a sharp curve of single track 500 ft. east of the College Point station. A statement issued from the office of J. A. McCrea, general manager of the Long Island Railroad, said: "We believe there is no question that the use of steel cars on the trains in the collision materially reduced the loss of life and injury to persons. We have equipped 218 of our smaller type of cars—that is, the subway type, operated on trains out of Flatbush Avenue—with the Hedley anti-climber, but we have not equipped the heavy type of steel cars, such as were in collision, with the device. These cars are a much heavier type than the subway car. The Hedley device was invented specially for the subway type of car. It has not been considered seriously for the standard type of steel car. That is the first serious accident of this kind we have had with the steel cars, and if our investigation shows that there is anything left undone in the construction or the equipment of these cars, we will, of course, take advantage of the knowledge which we gain."

Personal Mention

Mr. B. H. Doughty has been made general traffic agent of the Mesaba Railway, Virginia, Minn.

Mr. William H. Shelmerdine has been elected first vice-president of the American Railways, Philadelphia, Pa., to succeed the late William F. Harrity.

Mr. A. E. Blackburn has been made assistant general superintendent of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill. He was formerly traffic manager of the company.

Mr. W. B. Hale has resigned as roadmaster of the Hartford & Springfield Street Railway, Warehouse Point, Conn., to become roadmaster of the Mesaba Railway, Virginia, Minn.

Mr. A. M. Farrell has been appointed chief clerk to the general superintendent of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., with supervision over the traffic department.

Mr. J. O. Tucker has resigned as electrical engineer of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., to accept a position with the Central Illinois Public Service Company, Mattoon, Ill.

Mr. Lawrence J. Daly, formerly park manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., has been appointed chief dispatcher in charge of operation of the Mesaba Railway, Virginia, Minn.

Mr. Henry K. Greenwood, formerly superintendent of electric lines of the Hartford & Springfield Street Railway Company, Warehouse Point, Conn., has been appointed assistant general manager of the Mesaba Railway, Virginia, Minn.

Mr. Thomas Dwyer, whose resignation as chief engineer of the Hartford & Springfield Street Railway, Warehouse Point, Conn., was mentioned recently in the Electric Railway Journal, has been appointed chief engineer of the Mesaba Railway, Virginia, Minn.

Mr. W. J. Bowman, master mechanic of the Fox River division of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has had his jurisdiction enlarged to include the territory formerly under the supervision of Mr. E. P. Doyle, master mechanic of the third-rail division, whose resignation was mentioned in the Sept. 13 issue of the Electric Railway Journal.

Mr. Howard Elliott has been elected president of the New England Navigation Company, New England Steamship Company, Connecticut Company, New York & Stamford Railway and Housatonic Power Company. Mr. Elliott has also been made a director of the Millbrook Company and the New York, Westchester & Boston Railway. He will later be made chairman of the board of the Connecticut Company and the steamship companies.

Mr. Judson Zimmer has been appointed acting master mechanic of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to succeed Mr. John Sibbald, whose resignation is referred to elsewhere in this column. Mr. Zimmer was graduated from Union College, Schenectady, N. Y. He entered the service of the Fonda, Johnstown & Gloversville Railroad as assistant engineer, maintenance of way department, several years ago.

Mr. Frank L. Dame has joined the staff of Mr. Harrison Williams, New York. He has just been elected a director of the Central States Electric Corporation and the Appalachian Power Company. Mr. Dame was vice-president of the Electric Bond & Share Company, in charge of the operating department, from 1909 until Jan. 1, 1913. Since his resignation from that position he has been taking a long vacation. Mr. Dame is a graduate of the Massachusetts Institute of Technology. For some years he was connected with the General Electric Company interests on the Pacific Coast and afterward was general manager of the Union Electric Company, Dubuque, Ia.

Mr. John Sibbald has resigned as master mechanic of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to engage in industrial engineering and will have his offices in New York City. Mr. Sibbald was graduated from Rensselaer Polytechnic Institute at Troy, N. Y. He

entered the service of the Fonda, Johnstown & Gloversville Railroad as mechanical engineer in 1906. He was appointed master mechanic of the company on July 1, 1907. Mr Sibbald is a member of the American Electric Railway Engineering Association, the American Railway Master Mechanics' Association and the Rensselaer Society of Engineers and is an associate of the American Institute of Electrical Engineers.

Mr. Edward H. Howard, for a number of years chief engineer of the Boston & Worcester Street Railway, South Framingham, Mass., has resigned from the company to open an office in South Framingham as a consulting and general engineer. His resignation is to take effect on Oct. 1. Mr. Howard was graduated from Worcester Polytechnic Institute and is a member of the American Society of Civil Engineers and the New England Street Railway Club. He has been connected with the Boston & Worcester Street Railway about twelve years. Mr. Howard began his work as a division engineer in charge of preliminary surveys, locations and construction and was gradually advanced to take charge of the engineering of the entire system.

OBITUARY

W. W. Gamwell, a director of the Sheboygan Railway & Electric Company, Sheboygan, Wis., is dead. Mr. Gamwell was financially interested in a number of public utility companies and was formerly treasurer of the Stanley Electric Company, Pittsfield, Mass. He was stricken with apoplexy at the meeting of the directors of the Sheboygan Railway & Electric Company on Sept. 17 and died on Sept. 21. He was sixty-three years of age.

Richard Anderson, who was in charge of the south division of the track department of the Denver (Col.) City Tramway, is dead. Mr. Anderson was born in Moline, Ill., on Nov. 24, 1873. Before locating in Denver he resided in Chicago, where he learned the carpenter's trade. In 1900 he entered the service of the track department of the Denver City Tramway and rose to the position of foreman in 1903. Later, when the track department was reorganized and divisions established, Mr. Anderson was placed in charge of that territory known as the south division.

James Ross died at Montreal on Sept. 20, 1913, at the age of sixty-five years. Mr. Ross was born in Cromarty, Ross-shire, Scotland, in 1848. He was educated at Inverness Academy, Scotland, and in England. He came to America in 1868, and two years after was made resident manager of the Ulster & Delaware Railway and later its chief engineer. During 1873 he was resident engineer of the Wisconsin Central Railway and later he was with the Lake Ontario Shore Railway, afterward becoming first chief engineer and then general manager of the Victoria Railway. In 1878-1879 he supervised the construction of the Credit Valley Railway and became its general manager and was consulting engineer of the Ontario & Quebec Railway. In 1883 he took control of the construction of the Canadian Pacific Railway west of Winnipeg and in 1885 completed the line over the Rocky Mountains, Selkirk and Gold Ranges. Next he conducted the settlement of the location of the line east of Montreal, was instrumental in procuring the necessary legislation in Maine and then obtained the contract to build the remaining portion of the system. In 1888 Mr. Ross assisted in building the Regina & Long Lake Railway, 250 miles long, and the next year the Calgary & Edmonton Railway, 300 miles in length. In 1892, with Sir William MacKenzie, he purchased the Toronto (Ont.) Railway and equipped it with electricity. Through his instrumentality the Montreal Street Railway was reorganized in 1892 and equipped with electricity, as were also the railways of Winnipeg, Man., and St. John, N. B. In 1896, with Sir William MacKenzie, he acquired the tramways systems of Birmingham, Eng., and formed the City of Birmingham Tramways Company. The next year he secured rights to build electric tramways on the island of Jamaica. He has been vice-president and managing director of the Montreal Street Railway, vice-president of the Toronto Railway, president of the Winnipeg Street Railway, St. John Railway, Dominion Bridge Company, Dominion Coal Company and Mexican Light & Power Company. He was also a director of the Bank of Montreal, the Canadian General Electric Company and a number of other large corporations.

Construction News

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

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

RECENT INCORPORATIONS

Red Lodge (Mont.) Electric Railway.—Application for a charter will be made by this company in Montana to build a 9-mile electric railway to connect Red Lodge, Washoe and Bear Creek. Capital stock, $100. H. A. Glasmacher and C. L. Mayo, Seattle, are interested. [E. R. J., Aug. 30, '13.]

***Union Interurban Terminal Company, Dayton, Ohio.**—Incorporated in Ohio with a capitalization of $10,000. Incorporators: William A. Keyes, president of the Dayton Street Railway, R. V. Burkhard and H. G. Wagner.

FRANCHISES

Oakland, Cal.—The San Francisco-Oakland Terminal Railways has been asked by the Council to move its double-track line in Sixteenth Street to the center of the street from Wood Street west to the terminal of the line in Oakland.

Sacramento, Cal.—The Central California Traction Company, San Francisco, has received permission from the Railroad Commission to build over certain streets in Sacramento.

Santa Clara, Cal.—The Peninsular Railway, San José, has asked the County Board for an extension of time on its franchise to build the line from the Santa Clara city limits to Meridian Corners.

Visalia, Cal.—The Big Four Electric Railway has received a franchise from the Council in Visalia. [E. R. J., Sept. 20, '13.]

***Bradentown, Fla.**—C. A. Matson, Bradentown, has received a thirty-year franchise from the Council in Bradentown. This is part of a plan to build an electric railway from Bradentown to Braden Castle, via Manatee. Another branch will take in the Palma Sola peninsula and a third line is planned to reach Cortez.

***Milton, Fla.**—H. S. Laird, Milton, and associates have asked the Council for a thirty-year franchise to build an electric railway in Milton and extend it to Bagdad.

Athens, Ga.—The Atlanta & Carolina Electric Railway has asked for an extension of time on its franchise in Athens.

Pittsfield, Mass.—The Berkshire Street Railway has asked the Council for more time on its franchise in Pittsfield within which to fulfil the construction provisions of the law of 1910 for extensions of its lines. More time on the company's franchise is also asked of the Council in North Adams.

Brooklyn, N. Y.—The Nassau Electric Railway, a subsidiary of the Brooklyn Rapid Transit Company, has asked for a franchise for a line along Atlantic Avenue in Brooklyn.

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railroad & Utilities Corporation, Birmingham, Ala.—Engineers have completed surveys and estimates for the 47-mile line which this company, a subsidiary of the Birmingham, Ensley & Bessemer Railway, will build between Tuscaloosa and Bessemer. Interests associated with the construction of the new line say that a good route has been found, the maximum grade being seven-tenths of 1 per cent and the maximum curvature 4½ deg., while 70 per cent of the line will be tangent. At Tuscaloosa the new line will connect with the Tuscaloosa Belt Line, which is owned by the same interests, and at Bessemer with the Birmingham, Ensley & Bessemer Railway, which will give it an entrance into Birmingham. [E. R. J., Sept. 6, '13.]

Helena Street & Interurban Railway, Helena, Ark.—Surveys are being made by this company for an extension to the Chicago Mill & Lumber Company's plant in Helena.

*Fresno, Cal.—J. B. Rogers, Fresno, is securing right-of-way to build a 10-mile electric interurban railway from Fresno to Clovis. It is stated that the Mahoney Brothers, San Francisco, will finance the new line, and it is proposed to raise a bonus of $40,000.

San José (Cal.) Railways.—The Railroad Commission has rendered a decision directing this company to reconstruct as a standard-gage line its narrow-gage system from San José to Toyon station, a distance of 4½ miles. The company was also directed to make connection at Toyon station with the Peninsular Railway.

Peninsular Railway, San José, Cal.—Work will soon be begun by this company linking its Palo Alto line with the United Railroads, which has a terminal at San Mateo, thus giving San Mateo a direct line to San Francisco.

Stockton Terminal & Eastern Railway, Stockton, Cal.—This company has received permission from the Railroad Commission to construct its track at grade across eight public highways in Stockton.

Jacksonville (Fla.) Traction Company.—Grading has been completed by this company on its extension to the Florida Military Academy in Murray Hill Heights.

Carolina & Georgia Railway, Augusta, Ga.—At a meeting of the directors of this company, it was decided to increase its bonded debt from $2,000,000 to $3,000,000. It is planned to begin the construction within thirty days on its line from Augusta to Columbia, via Johnston and Greenwood. James U. Jackson, Augusta, president. [E. R. J., Sept. 13, '13.]

Rome Railway & Light Company, Rome, Ga.—This company has begun the construction of a 2-mile extension to East Rome. The work is being done by the company. Construction material has been purchased.

Belleville, Ill.—William R. Lorimer, has closed a deal by which his firm, the Lorimer-Gallagher Construction Company, Chicago, has paid $18,500 for 6 miles of roadbed and a few trestles between Belleville and Smithton. The property is incorporated as the Belleville & Interurban Railroad. The new company is said to be closely connected with the Southern Traction Company of Illinois, which is building a line from Belleville to East St. Louis.

Indianapolis, Linton & Vincennes Railroad, Indianapolis, Ind.—This company plans to build a line from Indianapolis through Mooresville, Linton, Bicknell and Vincennes to Patoka, connecting there with the line from Evansville. Branch lines are proposed from Linton to Jasonville and Sullivan. John A. Shaffer, who is the engineer in charge of the projected line, states that surveys are now being made and that right-of-way will be acquired as rapidly as possible. He expects that the work of construction may be started during the year 1914. Arrangements are said to have been made with Indianapolis brokers for handling the bond issue of the proposed line. [E. R. J., Sept. 20, '13.]

Madisonville, Ky.—James Breathitt, Jr., Hopkinsville, Ky., who is promoting the construction of a 12-mile line between Madisonville and Nortonville, Ky., has announced that arrangements for financing the work have been made in New York. The plan proposed by Mr. Breathitt is to purchase the municipal electric-light plant at Madisonville and enlarge it to serve as a power station for the electric railway. The Hopkins County Commercial Club, Madisonville, is assisting in the work of securing right-of-way and in preparing for a survey of the proposed line. [E. R. J., Sept. 13, '13.]

Olympian Springs Railway, Power & Light Company, Olympian Springs, Ky.—Work has been begun by this company on its 4-mile line between Olympia and Olympian Springs. S. F. Crecilius, Louisville, chief engineer. [E. R. J., Aug. 9, '13.]

Bay State Street Railway, Boston, Mass.—Work will be begun at once by this company on its new Ames Street extension in Montello.

Springfield (Mass.) Street Railway.—Plans are being made by this company to build its Sheridan Street extension at once. The company will soon apply for a franchise to build the line. The company is asked to consider plans to build a 1¼-mile line between Chicopee Falls and East Springfield.

Detroit (Mich.) United Railway.—Work will be begun in the near future by this company on its 9-mile extension from Romeo to Almont.

*Detroit, Mich.—An electric railway to extend from Detroit to Grand Rapids, is being promoted by H. M. Wallace, Detroit. He claims to have secured the capital and to have the necessary franchises and rights-of-way from the limits of the two terminal cities.

*Hillsdale, Mich.—W. E. Elliott, Hillsdale, has been securing right-of-way and will soon apply for a charter to build an electric railway between Hillsdale, Mich., and Pioneer, Ohio. It will conect with the lines of the Toledo & Western Railway at Pioneer. The plan is to extend this line eventually from Hillsdale to Elkhart, and then there will be a through line from Chicago to Toledo.

Mesaba Railway, Virginia, Minn.—This company is considering overtures made by the citizens of Biwabik and Aurora, Minn., to extend its lines beyond Gilbert. At the present time the managerial organization is engaged in gathering data on traffic and cost of construction with a view of presenting it to the holding company for consideration. Contracts have recently been closed with Hibbing, Gilbert and Biwabik to furnish light and power. A transmission line from the company's power house at Virginia, Minn., is being extended to these points so that it may begin rendering service by Oct. 1, 1913.

City Light & Traction Company, Sedalia, Mo.—This company has recently constructed considerable double track and built loops and switches in Sedalia.

*Helena, Mont.—John D. Ryan, president of the Montana Reservoir & Irrigation Company, states that he will subscribe $50,000 toward the construction of an interurban railway to Hauser Lake, provided the citizens of Helena will raise a like amount to complete the project.

Northern Ohio Traction & Light Company, Akron, Ohio.—The railroad committee of the City Council and City Solicitor Taylor, of Akron, have decided to request A. B. du Pont to formulate a new proposal for extensions of lines within Akron to be submitted to the Northern Ohio Traction & Light Company. Nothing has been done with the proposition that was offered some time ago, as the company found it objectionable in several particulars.

Poland Street Railway, Youngstown, Ohio.—Rails have been laid by this company as far south as 1 mile beyond the Poland-Youngstown township line road, on its 16-mile line to connect Poland and Youngstown, via Lansingville, Pine Hollow and Poland Heights. George E. Rose is interested. [E. R. J., Sept. 13, '13.]

Oklahoma Southern Interurban Corporation, Chickasha, Okla.—Plans are being made by this company to apply for a charter soon to build a 100-mile electric railway from Chickasha passing through the oil fields of Stevens and Carter Counties. The company will use gasoline motor cars from present indications. A. W. Thornley, Chickasha, is interested. [E. R. J., Aug. 2, '13.]

Toronto Suburban Street Railway, Toronto Junction, Ont.—The construction of this railway is being held up near Islington owing to some difficulties as to street crossing, to which the Etobicoke Council objects. A compromise is being arranged. Grading is practically completed for the greater part of the distance into Guelph, and considerable material for tracklaying has been delivered on the right-of-way from Cookville westerly, but so far no track has been laid. An extension to Erindale is planned by this company.

*Portland, Ore.—Property owners living in the Marquam Gulch District are working for the construction of a municipal line in that section of Portland.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company plans to soon rebuild a 6-mile loop in Eugene. New rails will be laid and the track ballasted.

Harrisburg (Pa.) Railways.—A contract for the reconstruction of the Dock Street bridge in Harrisburg is to be let within thirty days. Part of the cost will be assumed by the Harrisburg Railways.

Chambersburg & Shippensburg Railway, Shippensburg, Pa.—Grading has been completed and 3 miles of track have been laid between Chambersburg and Red Bridge Park by this company, which was recently chartered to build a 9-mile line between Shippensburg and Chambersburg.

It was only necessary to build from Shippensburg to Red Bridge Park. There it will join the Chambersburg, Greencastle & Waynesburg Railway tracks and use them to Memorial Square, Chambersburg, under a lease. T. M. Mahon, Chambersburg, president. [E. R. J., April 12, '13.]

Shippensburg, Newburg & Western Railway Shippensburg, Pa.—About 2½ miles of this company's line has been graded on its 13-mile line between Shippensburg, Middlespring, Newburg, McKenney and Roxbury. The company's repair shops will be located at Newburg, and it will purchase power from the Shippensburg Gas & Electric Company. It will operate four cars. Capital stock authorized, $100,000; issued, $60,300. Bonds authorized, $100,000. Paul Noftsker, Shippensburg, secretary. [E. R. J., Sept. 13. '13.]

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—About 60 per cent of the track is down, 75 per cent of the bridges are up and 98 per cent of the grading has been done on the line between Greenville and Spartanburg, according to a statement made by this company. Work is being rushed on the Enoree bridge, which is a viaduct across the stream approximately 950 ft. in length and 70 ft. in height.

Spartanburg & Glenn Springs Railroad, Spartanburg, S. C.—No definite plans have yet been decided upon by this company to build its 14-mile line between Spartanburg and Glenn Springs via Cedar Springs, Golightly and Pauline. W. F. Walker, Cedar Springs, is president, and F. H. Knox, Spartanburg, chief engineer. [E. R. J., June 1, '12.]

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has completed its new line up the Lookout Mountain, a short distance out of Chattanooga.

Jackson Railway & Light Company, Jackson, Tenn.—Provided a franchise ordinance which is now pending in the City Council at Jackson is adopted, this company will make a number of improvements in the system, chief among which will be an extension of the line to West Jackson. S. S. Bush, Columbia Building, Louisville, Ky., manager.

Cumberland Valley Interurban Railway, Nashville, Tenn.—Preliminary surveys are under way for this company's 80-mile line between Nashville and Sparta, via Greenvale, Auburn, Liberty and Alexandria. The company has a capital stock of $10,000, all of which has been sold for organization purposes and preliminary work. J. H. Cartwright, 410 Union Bank Building, Nashville, president. [E. R. J., Sept. 20, '13.]

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—Plans are being made by this company to build its line between Gallatin and Bowling Green.

Eastern Texas Traction Company, Dallas, Tex.—Preparations are being made by this company to begin laying rails at an early date. The entire grade was completed during August and pile driving for bridge work is now under way.

Blue Ridge Interurban Railway, Greenville, Tex.—At a meeting of the Greenville Chamber of Commerce held during the latter part of August it was unanimously decided to raise a $75,000 bonus to secure the extension of this company's line into Greenville. The fund is now being raised and construction is expected to start in the near future.

Texas City (Tex.) Street Railway.—This company is asked to consider plans to extend its line past the Pierce-Fordyce Oil Association refinery and thence along the bay to Virginia Point, connecting with the Galveston-Houston Interurban Railway and Galveston causeway.

Tyler City Light & Railway Company, Tyler, Tex.—Track laying has been begun by this company on its 7-mile line in Tyler. It is stated that 2 miles of this line will soon be placed in operation.

Ogden, Lewiston & Northern Railway, Ogden, Utah.—Arrangements have been completed by this company for financing the electric railway proposed between Alexander, Idaho, and Ogden, Utah. The plans embrace the erection of an 18,000-hp. power plant at some point in Idaho. Frederick W. Crockett, Logan, president. [E. R. J., May 10, '13.]

Lynchburg Traction & Light Company, Lynchburg, Va.—Work has been begun by this company on the cross-town line from Twelfth Street to Buchanan Street in Lynchburg. The company has been asked to extend its Cabell Street line to Daniles Hill.

Henrico & Chesterfield Railroad, Richmond, Va.—Plans have not yet been made by this company to resume the construction of its 3½-mile gasoline railway to Bon Air, where it will connect with the lines of the Virginia Railway & Power Company. Thomas S. Winston, Richmond, president and secretary; William C. Schmidt, vice-president. [E. R. J., May 27, '11.]

Virginia Railway & Power Company, Richmond, Va.—This company has completed and will soon place in operation its Hull Street extension from the head of Hull Street to Broad Rock Road.

Roanoke Railway & Electric Company, Roanoke, Va.—Work has been begun by this company double-tracking some of its lines in Roanoke.

Washington-Oregon Corporation, Vancouver, Wash.—This company has filed a mortgage in Olympia of $1,000,000 to secure funds to extend its lines in Olympia.

West Virginia Traction & Electric Company, Wheeling, W. Va.—Numerous improvements are being made by this company on some of its lines in Wheeling.

Chicago & Wisconsin Valley Railroad, Madison, Wis.—Work will be begun at once by this company on the section of its line between Portage and Madison.

SHOPS AND BUILDINGS

Clinton (Ia.) Street Railway.—It is reported that work has been begun by this company on its new carhouse in Clinton.

Rapid Transit Railway, Dallas, Tex.—Construction will soon be begun by this company on its new carhouses on Elm Street and Peak Street in Dallas. The structure will be 180 ft. x 155 ft. The machinery in the company's present carhouses and some additional equipment will be placed in the new building, leaving all the old carhouses for use for storage purposes only. The company has asked for permission to lay fourteen switch tracks and one cross-over track from the Peak Street lines westward into the property purchased on which the new carhouse will be built.

Texas Traction Company, Dallas, Tex.—This company has awarded a contract to E. S. Bose, Waxahachie, to build a baggage and express station on Jefferson Street in Dallas. The structure will be 50 ft. x 100 ft., one story and of brick construction. The cost is estimated to be about $12,000.

Tyler Traction Company, Clarksburg, W. Va.—This company has awarded a contract to Dayton & Francis, Martinsville, to build its new carhouse at Sistersville. The structure will be of brick, stone and cement construction.

POWER HOUSES AND SUBSTATIONS

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—During the next few weeks this company will award contracts to build an addition to its Ingalton substation and a new brick oil house. It plans to purchase two 500-hp boilers with stokers.

Houghton (Mich.) County Traction Company.—Contracts have been awarded by this company to Edward Ulseth for the entire remodeling of its substation at the carhouse in Laurium. It is understood that as soon as the necessary work can be completed the Calumet power plants of the Houghton County Traction Company and the Houghton County Electric Light Company will be centralized there.

Public Service Railway, Newark, N. J.—This company has awarded a contract to the Heddon Construction Company, Newark, to build its new substation at Burlington. The structure will be brick and stone construction. The company plans to build a new substation at Riverside. The building will be of brick and stone construction.

Citizens' Traction Company, Oil City, Pa.—Additions to the equipment at the power plant of this company at West End, which will mean an outlay of $85,000, are to be made this fall, the preliminary work to be begun at once. New automatic stokers for the boilers will be installed and two new boilers will be purchased. An order has been placed for a 1500-kw turbo-generator which will reinforce the smaller generators now in use. This addition will double the capacity of the plant. Another improvement decided upon is the placing of new panels in the switchboard at the power house.

Manufactures and Supplies

ROLLING STOCK

Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for one second-hand snow sweeper.

Brooklyn (N. Y.) Rapid Transit Company has received the approval of the Public Service Commission to obtain bids for the construction of its new type of steel subway cars described in an article on page 503 of this issue.

Chicago City (Ill.) Railway is asking for bids on 100 double-end, double-truck, closed motor cars, which will be equipped with maximum traction trucks and provide seating space for fifty-three people. The estimated weight is 38,000 lb. and the specifications provide for an all-steel underframe with the sides and roof of wood reinforced with steel.

Manhattan Bridge Three-Cent Fare Line, Brooklyn, N. Y., reported in the ELECTRIC RAILWAY JOURNAL of May 10, 1913, as having ordered six double-truck cars from the Cincinnati Car Company, has specified the following details for this equipment:

Number ordered.....six	Curtain fixtures. Cur. Sup. Co.
Type of car.....semi-conv.	Curtain material...Pantasote
Prepayment type, straight fare	Destination signs.....Hunter
Seating capacity.....52	Fenders or wheelguards. H.B.
Weight (car body only), 16,000 lb.	Gears and pinions.....West.
Bolster centers, length. 21 ft.	Gongs .....Dayton
Length of body..33 ft. 2½ in.	Hand brakes.....Peacock
Length over vestibule .....44 ft. 6½ in.	Heaters .....Consolidated
Width over sills.. 8 ft. 4 in.	Headlights .....Dayton
Width over all... 8 ft. 4 in.	Journal boxes....Symington
Height, rail to sills..30¾ in.	Motors, type and number, 2 West. interpole outside-hung
Height, sill to trolley base, 11 ft. 1 in.	Paint .....Sherwin-Williams
Body.....wood and steel	Registers .....International
Interior trim.....cherry	Sanders .....Cin. Car Co.
Headlining .....Agasote	Sash fixtures....Cin. Car Co.
Roof .....arch	Seats....Walkover, H. & K.
Underframe .....steel	Seating material.....rattan
Air brakes.....West. D-I-F	Springs..Standard Steel Co.
Axles....4½-in. heat treated	Step treads....Mason safety
Bumpers, Hedley anti-climber	Trolley catchers.....Lord
Cables.....wired in conduit	Trolley base..Nutall No. 13
Car trimmings.....bronze	Trucks....Baldwin Max, Tr.
Conduits and junction boxes .....steel	Varnish ..Sherwin-Williams
Control, type.....West. H-L	Ventilators, Hartley & Goodwin
Couplers. Cin. Car Co. radial	Special devices, conductor's emergency valve, Pullman drop brake handle.

TRADE NOTES

Buckeye Engine Company, Salem, Ohio, has appointed Herbert E. Stone, 63 Equitable Building, Boston, district sales agent for New England.

Stow Manufacturing Company, Binghamton, N. Y., has elected D. Walker Wear vice-president and director of this company. Mr. Wear was formerly purchaser of the Chicago Tunnel Company.

American Carbon & Battery Company, East St. Louis, Ill., has consolidated its office at St. Louis with its factory at East St. Louis, Ill., to which address all communications should be sent after Oct. 1, 1913.

Vacuum Car Ventilating Company, Chicago, Ill., has received an order from the Chicago City Railway for a sufficient number of ventilators to equip 125 near-side cars with the Cook system of car ventilation.

Frank S. Pritchard, Cincinnati, Ohio, formerly with the United States Graphite Company, has become associated with the Dearborn Chemical Company at Cincinnati, as assistant to Dan Delaney, for many years manager of its Cincinnati office.

Railway Utility Company, Chicago, Ill., has received an order to equip with ventilators the 200 new cars which are being built by the Chicago (Ill.) Railways and to install utility electric thermometer heating control in eighty cars which are now undergoing reconstruction in its shops.

Automatic Ventilator Company, New York, N. Y., has become general distributor for the Worcester Brush & Scraper Company's detachable broom for track and general purposes, and will exhibit this broom at the convention of the American Electric Railway Association in Atlantic City.

Union Switch & Signal Company, Swissvale, Pa., has received an order from the Illinois Traction System for complete signal equipment sufficient to equip its line between Springfield and Virden, Ill., a distance of 24 miles. The forty-nine style B semaphore signals required for this installation will form a part of the complete protection outlined by this company for its line between Springfield and St. Louis, a large portion of which already is protected. Work already has been started on the foundations and overhead lines and it is anticipated that the signals will be in operation before the end of the year.

ADVERTISING LITERATURE

Baldwin Locomotive Company, Philadelphia, Pa., has issued a catalog commemorating the completion, after eighty-two years of operation, of its forty-thousandth locomotive.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 148, describing and illustrating its valveless hand drills and portable gasoline-engine-driven air compressors.

Trussed Concrete Steel Company, Detroit, Mich., has issued a well-illustrated catalog, describing the following kinds of steel sashes and window equipment manufactured by it: sidewall sashes with pivoted or sliding ventilators; continuous sashes, center pivoted or top hung, for monitor and sawtooth roof construction; hinged and sliding doors; metal and glass partitions; casement sashes and special sashes.

Sanford Riley Stoker Company, Ltd., Worcester, Mass., has published a circular in regard to its new self-heating underfeed stoker, which is of the inclined type, that is, the fuel supply is forced up from beneath the point where the air is admitted and then is worked along toward the bridge wall. Instead of stationary dead plates, the Riley Stoker has moving, air-supplying grates, carried by the reciprocating sides of the retorts, and also moving overfeed grates, extending across the entire width of the stoker. Beyond these are pushers for continuously dumping the refuse. The travel of these reciprocating parts is adjustable so as to control completely the movement of the fuel bed and dumping of refuse.

NEW PUBLICATIONS

Safety. By William H. Tolman, Ph. D., director of the American Museum of Safety, and Leonard B. Kendall. New York: Harper & Brothers. 422 pages. Price, $3.

This handbook, which is said to be the only comprehensive work on safety that has yet appeared in the English language, contains practical information for industrialists showing how large economical saving in industries can be made by surrounding workers with adequate safeguards and by promoting shop hygiene. The book proves by examples taken from many sources the correctness of the author's contention that 50 per cent of industrial accidents are preventable. The book is fully illustrated with photographs of safety devices and methods used in various shops and plants. As director of the American Museum of Safety and as delegate to various international committees, the author has had unusual opportunity to study the subject.

Accident Prevention, Safety First. By James B. Douglas, United Gas Improvement Company. Philadelphia, Pa. 111 pages. Price, 75 cents.

The subject matter of this little book is an amplified revision of an illustrated talk on "Accident Prevention in Certain Public Utilities," presented at the public policy meeting of the thirty-sixth annual convention of the National Electric Light Association, Chicago, June 4, 1913. Emphasizing the great importance of the work of accident prevention from an economical as well as a humanitarian viewpoint, the writer clearly describes, by means of a series of illustrations secured from widely scattered sources in the industrial field, cases of preventable accidents resulting from three causes—use of a wrong method by a workman; carelessness by the workman of his own safety and that of his fellow employees, and defective or unguarded machinery.