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DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

Of this issue of the Street Railway Journal 8300 copies are printed. Total circulation for 1907 to date 362,950 copies, an average of 8248 copies per week.

Retrospect and Prospect

The present is the time when electric railway companies have before them the records of the business done last summer and are making preparations for the traffic to be carried during the coming winter. It may not be an inappropriate season also for us to review what the STREET RAILWAY JOURNAL has given its subscribers during the past year and to outline briefly the policy of the paper during the twelve months to come. Our last volume was that for the first six months of 1907 and, as shown in the statement published at that time, the reading pages of the paper were 14 per cent in excess of those of the corresponding volume during the first half of 1906. The increase in number of reading pages published in the STREET RAILWAY JOURNAL during the twelve months ending Nov. 1, 1907, as compared with the same period in 1906, was 190, or 8 per cent. The total number of reading pages printed during that time was 2734; the number of advertising pages for the same period was 4116, making a total of 6850. This is equivalent to practically twenty-three pages, nine reading and fourteen advertising, for one cent to our subscribers. Last month this average was materially surpassed, as during October we published 486 reading pages during the four issues, or an average of over 140 each week. This is exclusive of the Dictionary of Electric Railway Material, of 169 pages, which was published in book form and mailed under separate cover gratis to every subscriber. This monthly record is by far the largest with which we are acquainted in technical journalism, and the yearly figures are equalled by few papers in the country. Of the character of the articles we shall not speak, but many complimentary letters have been received in regard to recent issues, particularly our Convention Number, one of which, from a prominent electric railway engineer, says "it cannot fail to be extremely valuable to all, if simply for the interchange of ideas that will be effected by placing so much material of the same character in the same set of pages. It is worth more than a whole lot of theoretical treatises on the electrical equipment of steam railroads."

Speaking for the future, we expect to make the STREET RAILWAY JOURNAL the very best paper possible for all departments of the street railway business. We shall not intentionally neglect any branch of the work, as we believe that in an industry in which all branches are so interrelated as they are in a street railway company, and in which there are such frequent changes in the personnel, most of our readers desire to keep informed at least in a general way as to what improvements are being made in all departments. One can specialize if he wishes, in accounting, in electrical or steam engineering, in repair work, in the claim department, or in some other branch, but on the small road it is very necessary for each department to be in close touch with every other and on the large roads promotions to the managership or manager's office are very likely to come to him who, besides knowing all about his own work, has somewhat of an acquaintance with the practices followed in other services of the company. For those who prefer a narrower view and are interested only in their particular department we extend our assurance that their especial topics will be fully covered.

A publication of this kind could not and cannot be successful without the cooperation of the active workers in the field, and we realize that we owe a great debt to those

who have liberally supplied us in the past with information and contributions. To many busy operating men and successful consulting engineers with a large practice this has frequently involved a serious sacrifice of their time, but we believe that they have felt it not only a pleasure, but a duty to the profession in which they are engaged. Viewing the matter in a broad way, improvement and advance in any industry depends largely upon the exchange of experience among the practical workers in the field, and this object is accomplished more effectively and more frequently by the technical papers than by any other method. The necessary corollary to this proposition is that the larger and more influential the audience reached by a technical paper, the more effectively is the work done. The technical paper interferes in no way with the work of the associations. The latter can hold meetings only occasionally. The subscriber to the weekly technical paper enjoys the equivalent of attendance at a convention fifty-two times a year without being obliged to leave his desk.

Speculation in Copper

The wide fluctuations in the price of copper almost make speculation in the metal a legitimate phase of good electric railway management. By such speculation is meant the anticipation of the needs for the next three or four years. Such an investment might be the means of saving many a company several thousand dollars. Again it might result in direct loss inasmuch as the price of the metal may remain stationary, in which case the interest on the investment would be lost, or the price may drop and remain for some time below even the present figures. Again a manager does not care to dispose of scrap copper at the present low prices, particularly when he has purchased this same metal at almost double what he can get for it, and there is a strong temptation to let the scrap accumulate with the hopes of getting better prices. Such temptation is particularly strong to the company which has purchased any quantity of copper during the past two years and now finds itself, at present prices, a loser of several thousand dollars. The increase in price of the metal during the past week emphasize the ease with which such an advance can be brought about. This much is certain, the existing price should act as a wonderful stimulant to new construction.

The Economies of the Motor 'Bus

We have several times recently commented on the motor 'bus situation, and were it not for the fact that some interesting studies on the cost of operation have recently been made abroad, we should hardly care to follow up the matter. In a recent number of the London *Electrical Engineering* some figures, however, are given which are exceedingly pertinent and are of considerable value in showing both the sphere and the natural limitations of this type of vehicle. In the past year or two the motor 'bus has been extensively exploited in London, and its use has reached the stage in which the effects of competition in the reduction of fares have been keenly felt. One must bear in mind at the start that a 'bus line can be started in London without much difficulty, so that competition for good or ill must be regularly expected. The two years past have enabled the investigator to substitute facts for fancies in his estimates, and, as usual, the facts are less encouraging than the fancies. An estimate of the cost of working a 'bus line with gasoline-propelled vehicles, made less than a year ago, added up to 19 cents per mile run. This estimate figured depreciation at 20 per cent, which is not unreasonable, but underestimated the cost of fuel, taking it at about 18 cents per gallon, as against an ordinary cost in London of nearly 30 cents. Under American conditions, the former figure would be sufficient, but the costs of labor would run enough higher to make up the difference with something to spare.

On the other hand, the auditor of the London Power Omnibus Company reported last July that the expenses actually came to 36 cents per 'bus-mile, which is a very different story. The depreciation in this case was taken at 22.5 per cent, and the striking fact was brought out that the up-keep had been thrown back upon the company by a contractor who had undertaken the maintenance at 9 cents per 'bus-mile. Here seems to be the chief trouble with the system. Not only is the actual item of repairs considerable, but the fact of repairs requires the purchase and maintenance of a considerable number of spare cars, apparently 40 to 50 per cent of those in continuous service. Still another recent estimate based on the London situation was recently made which footed up to about 24 cents per mile, which would have to be raised at least another cent if one took American rates of wages for drivers and conductors, to say nothing of other labor. It would seem, therefore, within conservative limits to say that in this country such a 'bus service would cost at least 25 cents per 'bus-mile exclusive of fixed charges, and would more than likely run to 30 or even 35 cents per 'bus-mile. The London motor 'bus carries some 34 passengers at a pinch and is assumed to cover about 100 miles in, say, a sixteen-hour working day. Evidently, if it could be kept well filled all the time, the chances of paying would be good. But the auditor of the London Power Omnibus Company reported that the earnings were only 22 cents per mile, so that the net result was a serious deficit. Certainly it is evident that the motor 'bus demands either fairly dense traffic or higher fares than in London to stand a chance for good returns.

As regards American conditions there are some favorable and some adverse factors to be considered. Fixed charges, labor and maintenance costs are all higher here than in London. Fuel is somewhat less, but as fuel in the English estimates constitutes only about 20 per cent of the operating costs, the gain here is not very great. But while expenses will probably exceed the English figures, there is good reason to believe that the receipts would increase in a higher ratio. American cities have bad and costly public carriage service, *e. g.*, New York, with the worst and dearest, so that a good 'bus service with carefully planned routes has a capital field for competition, with everything in its favor. The tramway service, rather meager in London as compared with an American city of the first rank, is here pretty effective, for the main lines of traffic, but it leaves a large opportunity for really non-competitive work with 'bus lines. Particularly in cities like New York and Chicago there is ample opportunity for every available means of transportation, since the congestion is so extreme that any material aid will be welcomed. 'Bus service in these circumstances need not feel compelled to get into

competition with tramways at all. By charging moderate fares and picking routes carefully a metropolitan motor 'bus line could find a profitable field ready to be worked even were its operating expenses higher by considerable than the London figures. The tramway lines would never know the difference, and the atrocious cab service would neither deserve nor get sympathy. From the viewpoint of street railway operation, a motor 'bus service on the basis of the London costs is not seriously to be feared in competition, while from the viewpoint of the public it is a thing to be encouraged as a relief from extortionate cab rates.

Electric Railway Appraisals

Few engineering problems in the traction field are more difficult than the appraisal of a large electric railway system. In connection with the sale or purchase of an electric road, an appraisal on the basis of earning capacity is quite as important as the valuation of the physical property belonging to the system; and in relation to the issue of securities, determination of rates, replacement of partly worn equipment by new apparatus, assessment for taxation, the engineering appraisal and the valuation of the expert accountant, each has a legitimate place. Clear ideas of the results desired and of the permissable assumptions and methods are absolutely essential in this class of work.

Mental confusion leading to valueless reports is not seldom found in railway appraisals. Very few electric railway appraisals have as yet been published in detail, with full explanation of the methods employed, and it is not strange, therefore, that engineers called upon for such work, carry it out along individual lines. Contrary to the old customs, the engineer is being called upon more and more to appraise steam and electric railway properties, and the reason is not far to seek. The dividing line between accounting and the advisory work of consulting experts along technico-financial channels is no longer clearly defined, for knowledge of technical equipment and processes has become necessary throughout the whole industrial structure. In electric railway work, particularly, the problems are of so technical a nature that neither the engineer nor the accountant can stand alone in appraising a transportation property from the combined standpoints of existing equipment value and earning capacity. The work as a whole may be done by a single expert, but several different attitudes must be taken.

The object of an appraisal must be definitely settled at the outset. In theory, the value of a piece of ordinary property is the same, no matter for what purpose it be appraised. The principle of a fixed value cannot rightly be held, however, to apply to railways. It depends very much upon the purpose of an appraisal as to whether the interest of the owners leans toward a high or a low valuation. In an appraisal for total valuation, as for sale or purchase, the interest of one road or company will lean toward a high, and of the other, toward a low valuation. In appraisals made in reference to the issuance of securities or for determining permissible rates the interest of the owners leads toward a high valuation, and in an appraisal for taxation, the same interest leads toward the lowest possible valuation. It is also perfectly proper to include in the value of a property for the first purpose expenditures which are not part of the value for the purpose of taxation, as shown in a recent issue of this paper.

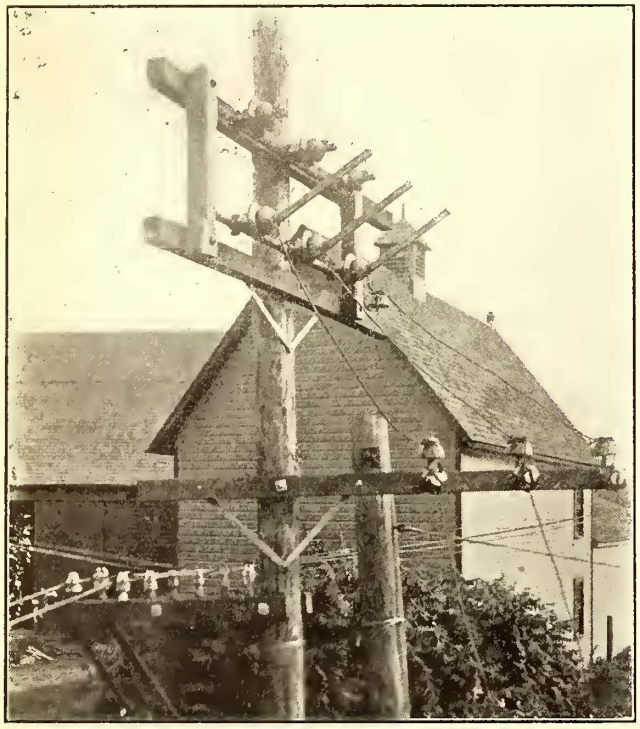
The purpose of an appraisal alone can settle many of the disputed points which are sure to come up during the progress of the estimate. Important as it is to have a sound reason for every departure from straightforward computations, it is equally essential to note the reason at the time, and to incorporate it in the final report so that every step can be followed at any subsequent date. If the valuation of the property is taken on a physical basis, it must be decided whether the cost of reproduction of the property with all equipment new, or with all equipment in the existing deteriorated condition shall be used. The argument is sometimes advanced that no deductions should be made for depreciation in the value of materials and machinery on account of wear and use, because it is held that a company should at all times keep its property in first-class condition. As a matter of fact few companies are able to keep their physical plant within 75 or 85 per cent of the condition it was in when new and it is doubtful if even these figures can be maintained over a large system where the service is severe and where apparatus of one kind or another is constantly being replaced by new and improved designs of equipment. In connection with the issuance of securities and the determination of rates it would appear that an appraisal should include the cost of reproduction with all properties new, without a depreciation allowance, but including all construction expenses and the cost of work abandoned later for one cause or another. An appraisal made for sale or purchase would, on the other hand, take into account the depreciation of the property, or its appreciation in the case of real estate and right of way. The same point of view applies to an appraisal made for taxation purposes. Although it would be an absolute impossibility to reproduce an electric railway with its tracks, trolley suspension, poles, rolling stock, power and substations, shops, car houses and other buildings in the exact condition found at any single time, it ought to be clear that the taxation, sale or purchase of such a road should allow for the deterioration which cannot be made good by maintenance, but calls for periodical replacement.

The maintenance of careful records of construction cost, life of equipment, expense of replacement and current market quotations on electrical apparatus, mechanical equipment, real estate and structural materials, is a great help to the engineer charged with an electric railway appraisal. Seldom do such records exist in complete form, but as far as they go they are almost invaluable. There should be little difficulty in appraising a trolley system on the basis of its earning power, but the value of franchises and the necessity of operating at a high ratio of expenses to gross earnings should be carefully analyzed as well, before an expression of the value of the whole property in round millions or hundreds of thousands, is attempted. In annual reports the grand total cost of construction to date may be taken as an appraisal of value satisfactory to stockholders, but the chances are that more detailed estimates will be required before many years, if the power of publicity continues to be manifested in the handling of public service corporations.

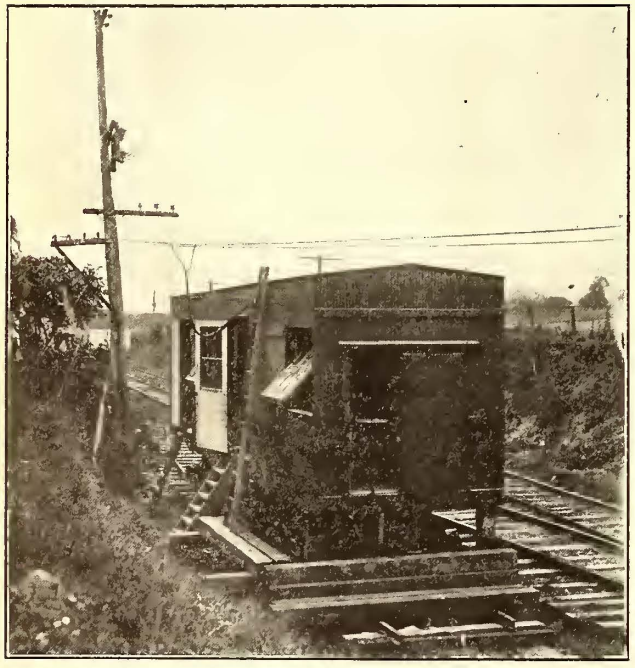
PORTABLE SUB-STATION FOR ROCHESTER & SODUS BAY RAILWAY

BY B. C. AMESBURY, SUPERINTENDENT ROCHESTER RAILWAY COMPANY.

The Rochester & Sodus Bay Division of the Rochester Railway Company operates between the City of Rochester, N. Y., and Sodus Point, at the junction of Sodus Bay and Lake Ontario. The route followed is approximately 40 miles long and for the greater part of the distance is along the Ridge Road, a public highway running parallel to the southern shore of Lake Ontario and about 4 miles from it. The road runs through a rich fruit district and in the spring when it is lined with apple blossoms from nearly one end to the other, the railway company makes a special feature of its "Apple Blossom Excursions."



HOOK SWITCHES ON POLE OUTSIDE OF CAR



ROTARY CONVERTER AT LOW-TENSION END

The Rochester & Sodus Bay Railway has a steam generating station at Float Bridge, about 5 miles from the west, or Rochester end of the line. The power generated in this station is 11,000-volt 25 cycles and supplies a rotary converter in the station and also rotary converters in two sub-stations, one located at Sodus, about 7 miles from the east terminal and the other at Ontario, slightly over half way from Float Bridge to Sodus. Each of these sub-stations has three 100-kw air-blast transformers and a 250-kw rotary converter. More recently a couple of storage batteries have been installed, one being at Webster, about midway between Float Bridge and Ontario, and the other at Williamson, about midway between Ontario and Sodus. The trolley line is thus divided into six sections of from 5 to 7 miles in length. The steam plant originally supplied all the power used, but since the line has been operated by the Rochester Railway Company the 11,000-volt transmission running east from Float Bridge Station has been extended westward into Rochester to the Rochester Railway & Light Company's hydraulic station at the Lower Falls of the Genesee River, and the steam plant at Float Bridge is now only used as a reserve.

The rotary equipment at this Float Bridge power house was originally a duplicate of those at the sub-stations, but during the past spring a new outfit of double this capacity was installed at the station and the old outfit has been turned into a portable sub-station for use at such points on the line as may at any time require special power. To facilitate this use the 11,000-volt transmission has been extended to a point about half way from the sub-station at Sodus village to the eastern terminal at Sodus Point and a siding put in just outside the Rochester City line near the western terminal, so that this portable sub-station can now be located very nearly at either terminal of the line. During the past summer the car has been located at the latter place, supplying power for the large Saturday and Sunday crowds to Glen Haven, an amusement park between the city and Float Bridge near the head of Irondequoit Bay.

HIGH-TENSION END OF CAR

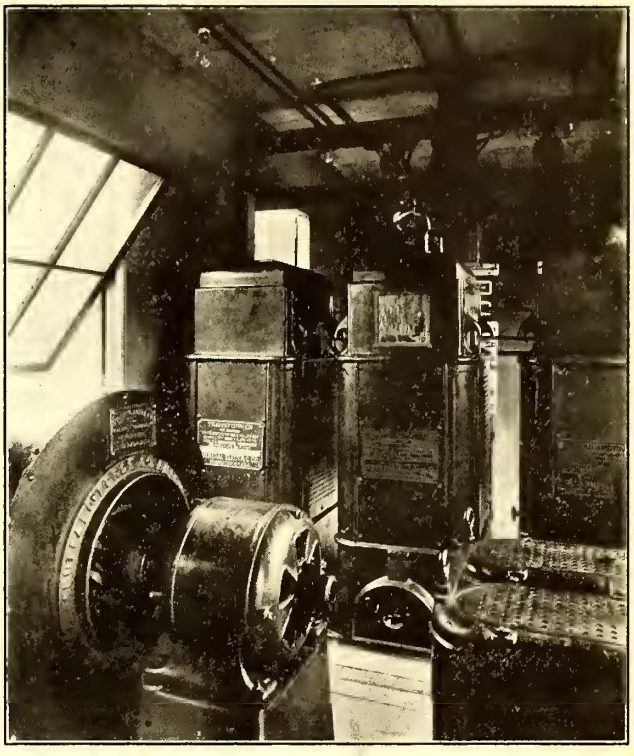
The car is 33 ft. long inside and is 7½ ft. wide. In height it is 8½ ft. from the floor to the ceiling and 13 ft. 7 ins. from the track to the top of the roof. The 250-kw rotary converter is placed over the truck at one end of the car and provision for its entrance into the car and future

removal, if ever desired, has been made by making a removable section or panel in the end of the car. This removable section is the full width of the car and 7 ft. in height. The three 100-kw air-blast transformers are about 8 ft. from the other end of the car and are placed alongside of each other across the car, thus forming an effective barrier between the attendant and the high-tension apparatus; the high-tension lightning arresters, hook switches, series transformers and oil switch being located between the transformers and the end of the car, and it is necessary for him to go outside the car and re-enter it to reach them. Removable panels similar to that for the rotary are provided opposite the transformers on either side of the car for use if required. The air blast for the transformers and also for the two reactive coils is obtained through an air box under the car to which it is supplied by a motor-driven centrifugal blower between the transformers and switchboard.

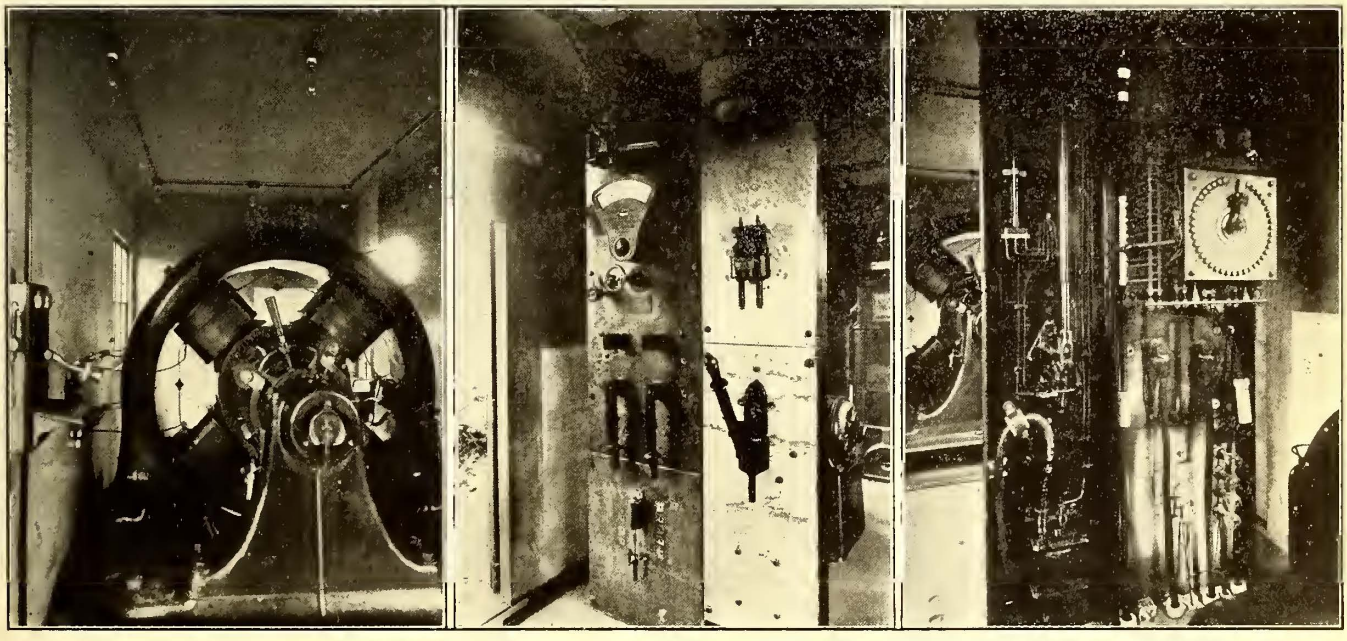
The alternating current enters the car through sheltered vertical bushings, passes through hook-disconnecting switches, choke coils, series transformers and an oil switch to the high-tension side of the transformers. The oil switch is of the remote control type, operated by an alternating-current trip with a double pole relay and diaphragm-type inverse time element. The wiring between transformers, switchboard and rotary has been carried under the floor of the car as far as possible.

The switchboard is composed of two marble panels placed crosswise of the car near the center. The a. c. panel has an ammeter, the time-limit relay, and the oil switch handle and trip. The d. c. panel has a circuit breaker, ammeter, bracket voltmeter, line switches and a make-and-break switch for the end-play device on the rotary.

The accompanying views were taken while the car was at the city end supplying power to the summer traffic to and from Glen Haven Park. It will be noticed that the rotary end of the car has been blocked up somewhat, this being done to do away with the vibration noticed when starting or stopping the rotary. The views show not only the outside of the car and the apparatus inside, but also the hook switches which were mounted outside the car in order that the 11,000-volt power might be entirely cut out of it when not in use.



REACTIVE COILS AND BLOWER TRANSFORMERS



ROTARY CONVERTER, LIGHTS AND TELEPHONE

FRONT AND REAR VIEWS OF THE SWITCHBOARD

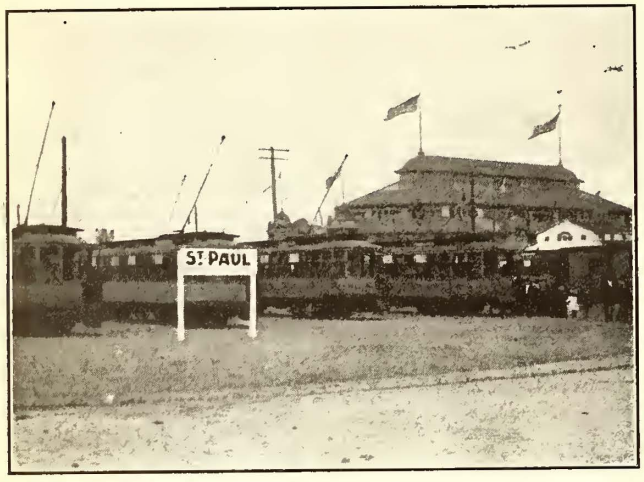
The ventilation of the car is taken care of not only by the doors and windows, but also by a number of ventilating openings placed in the sides of the car near the ceiling. Three of these openings are provided on each side of the car and all six are protected from the weather by hinge-cover flaps which open outward and can be shut.

All inside woodwork, including the floor, walls, ceiling, is protected from fire by being covered with asbestos board, thus making the car as nearly fireproof as can be done with a wooden-bodied car.

The car has proved a considerable help in handling the traffic at its summer location and is likely to prove of equal or greater assistance at its next location, which will probably be at one of the permanent sub-stations where alterations are contemplated for the coming winter.

HANDLING TRAFFIC AT THE MINNESOTA STATE FAIR

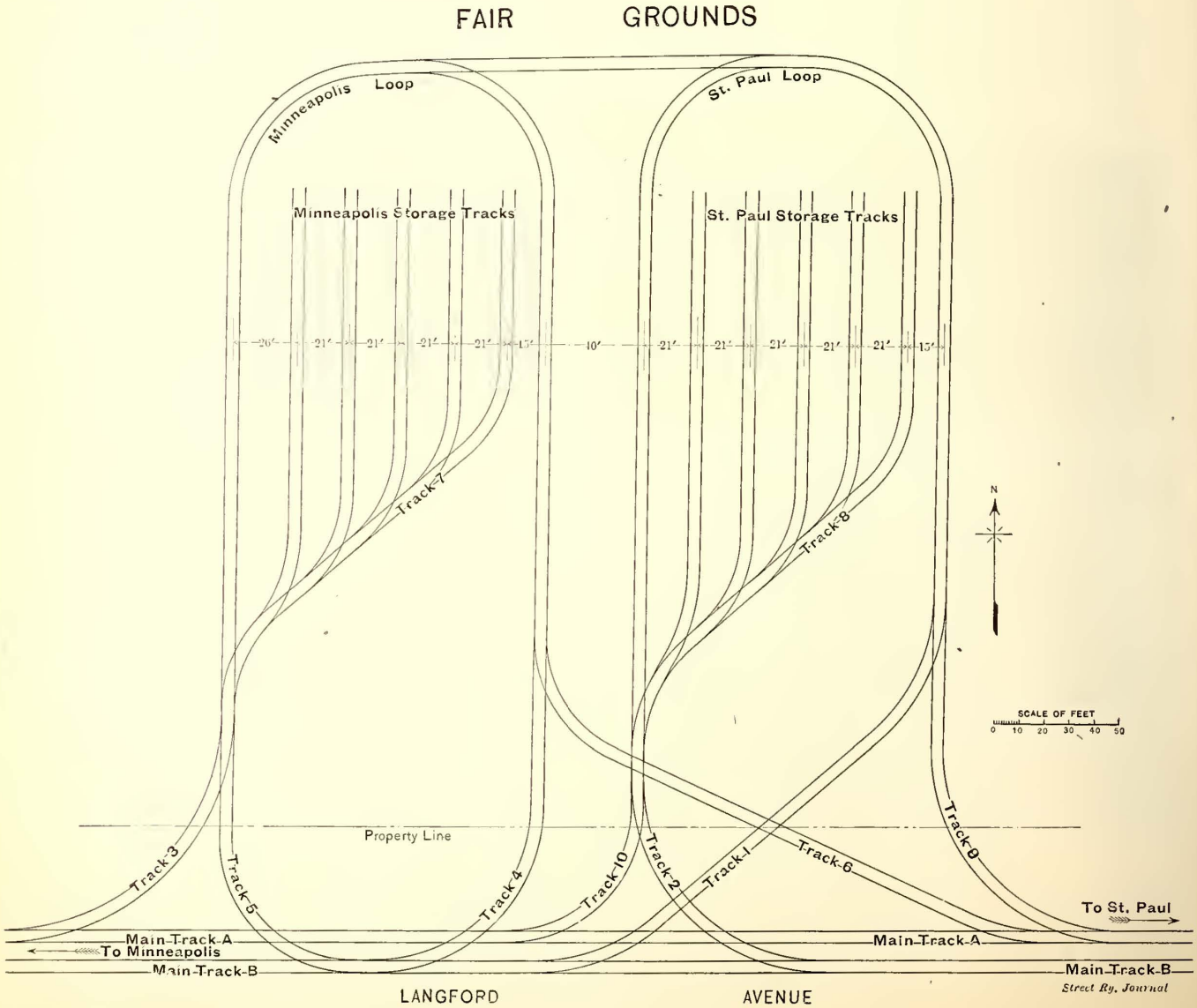
To handle the immense crowds attending the Minnesota State Fair during the first week of every September the Twin City Rapid Transit Company, which operates the street car system of Minneapolis and St. Paul, has built an extensive and interesting terminal station at the fair grounds. During the six days of the fair this year, from Sept. 2 to 7, the company carried approximately 250,000 people to and from the grounds; the heaviest single day was Sept. 2, Labor Day, when the attendance mounted to 80,000.



ST. PAUL CARS ON STORAGE TRACKS, WITH CAR ON THE RIGHT UNLOADING

The fair grounds are located midway between Minneapolis and St. Paul on the Como-Interurban car line. As is seen from the accompanying plan, the terminal consists of two great loops, enclosing five storage tracks between each loop. This duplicate arrangement is adopted to separate the Minneapolis and St. Paul traffic; the St. Paul cars enter and leave on the east or St. Paul loop, while the Minneapolis cars use the west or Minneapolis loop. Large signs direct the passengers to the proper points and absolutely no confusion occurs. The main loops are so connected to the two main tracks that cars can be run in and out of the terminal in almost any conceivable manner, making a very flexible arrangement.

The method of handling and dispatching cars in and out of the terminal is as follows: Through service, running on a five-minute schedule, is maintained between Minneapolis and St. Paul. These cars come from Minneapolis on main track B and enter the St. Paul loop by means of track 1. They proceed around this loop, stopping at the upper end to receive and discharge passengers, and then go out to



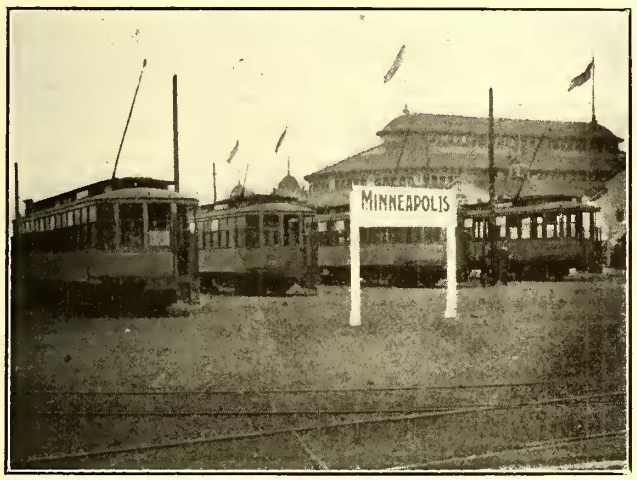
GENERAL TRACK PLAN AT THE MINNESOTA STATE FAIR GROUNDS

main track B again via track 2. Through cars from St. Paul enter the Minneapolis loop from main track A via track 6, proceed around the loop, stopping at the loading platform at the upper end as described above and then leave the terminal over track 3 which switches the car again on to main track A.

Local cars are run from both cities on a 1¼-minute schedule. The Minneapolis cars enter from main track B via track 4 and proceed to the unloading platform, from which they return either to Minneapolis over track 3 or enter the storage yard via ladder track 7. St. Paul cars are run around the St. Paul loop in a similar manner. This method gives a continuous, uninterrupted stream of both through and local cars, all moving in the same direction on each loop; the traffic from each city is completely separated, an important feature in operating a terminal of this nature. While under normal conditions the cars are dispatched as described above, the main line connections are purposely arranged to permit any variation from the usual procedure that an emergency may dictate.

Two or three repair men and a dispatcher is all the operating force necessary at the terminal. A repair car is also maintained in readiness for any emergency.

Twin City standard cars are designed to load and unload from the rear platform only. At the fair terminal, however, special steps were provided so that passengers were unloaded from both platforms at once. Ninety-five per cent of the travel was either in one direction or the other. By using both platforms for unloading or loading, a car could be emptied or filled in practically one minute.



CARS READY TO LEAVE THE MINNEAPOLIS TRACKS

The fair exodus reaches a maximum at 5 and 10 p. m. To provide for these rush periods from thirty-five to fifty cars are stored on the Minneapolis tracks and from twenty-five to thirty on the St. Paul tracks. Cars are dispatched from these storage tracks in order of their occurrence, so that during the rush periods one-quarter-minute service is maintained to Minneapolis and St. Paul. This amounts to 240 cars per hour to each city. Each car carries about 100 passengers, which means that the maximum number of passengers moved per hour to each city is 24,000.

This record was actually attained several times during the week, and the traffic was handled without undue crowding or congestion. Every passenger did not get a seat, but this could not be expected. The company made an honest effort to provide and keep moving a sufficient number of cars to carry the crowds. By means of this terminal this was accomplished throughout the week without a single hitch.

FIREPROOF CAR HOUSE AND REPAIR SHOP FOR THE SPRINGFIELD CONSOLIDATED RAILWAY COMPANY

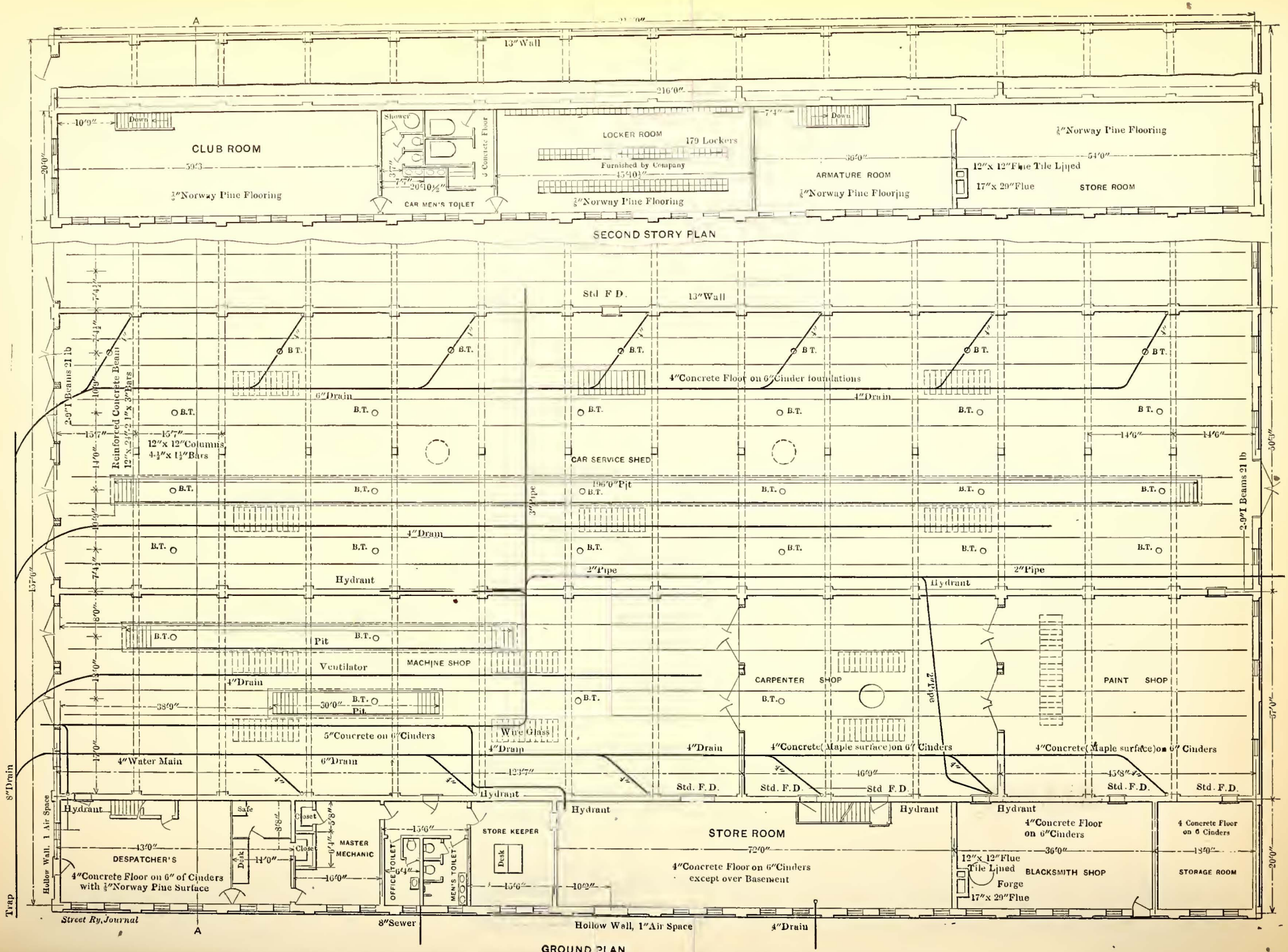
The Springfield Consolidated Railway Company, of Springfield, Ill., recently secured fifteen acres in the southern end of that city, where it is erecting a model car house and repair shop. This will be used as an operating depot and will include offices and store rooms. The latter will adjoin the car house and also contain locker and club rooms with bathing and toilet facilities for the trainmen. The building will be 216 ft. long and 107 ft. 6 ins. wide, but sufficient space is reserved for future extensions to the car house now under way. In the meantime extra cars will be stored in one of the company's old structures.

The installation is a notable one for a company of this size in view of the care given to secure a durable and fireproof construction. The walls are of hard brick with concrete foundations and the pits and floors, also of concrete throughout, except that in the carpenter and paint shop, the concrete floor is overlaid by ⅞-in. maple on 4-in. x 4-in. yellow pine stringers. The car house is divided into two sections by a 13-in. wall with a fire tile coping above the roof. The openings in this wall are protected by standard fire doors. The larger section, which is 50 ft. 3 ins. wide, is known as a "car service shed." It is furnished with three dead-end tracks and one through-pit track extending 196 ft. The other section is 37 ft. wide and contains the machine, carpenter and paint shops. Two dead-end tracks extend through this part of the building with a 30 ft. and a 70-ft. pit in the machine shop. The division walls between the shops are 13 ins. thick and have the track openings protected by standard fire doors. All of the track doors and windows in the car house are made with wire glass.

The roof is of reinforced concrete supported on reinforced concrete beams. Over the shop portion the beams are 20 ins. wide and 30 ins. deep with a reinforcement of three 1¾-in. x 3¾-in. Johnston bars. The beams over the car storage section are 12 ins. wide and 24 ins. deep with two 1-in. x 3-in. bars; these beams are supported at the center of this bay on 12-in. square concrete columns, reinforced by four 1½-in. x 1½-in. bars. The bottoms of all beams have bolted thereto 2-in. x 4-in. oak planking for trolley supports and lightning fixtures. The roof slabs are 4 ins. thick and are reinforced by ½-in. bars laid 16 ins. centers and one layer of 4-in. x 6-in. Nos. 9 and 11 wire fabric. The concrete mixture used in the roof work consists of one part Portland cement, two parts sand and five parts of crushed screened limestone. The roof is capable of bearing a live load of over 50 lbs. per square foot. It is finished with five layers of tar felt.

Aside from the doors and windows of the car house, plenty of illumination is secured through the wire glass skylights. There are six 4-ft. x 12-ft. lights in the roof of the bay section, but in the shop section there are four over the pits alone; there are also two lights in the carpenter shop and one 4-ft. x 20-ft. transverse skylight in the paint shop. The paint shop, being at the end of the building, also has side lights. The car house is ventilated by four 48-in. Burt roof ventilators, two in each bay. Inside fire protection is secured by four 2-in. fire hydrants placed as shown on the plan. These are supplied with water from the city waterworks through a 4-in. main. The general scheme of floor and pit drainage is clearly indicated on the plan and section.

The third section of the installation is devoted to miscellaneous purposes and extends the full length of the car house proper, but is only 20 ft. wide. It will be noted that

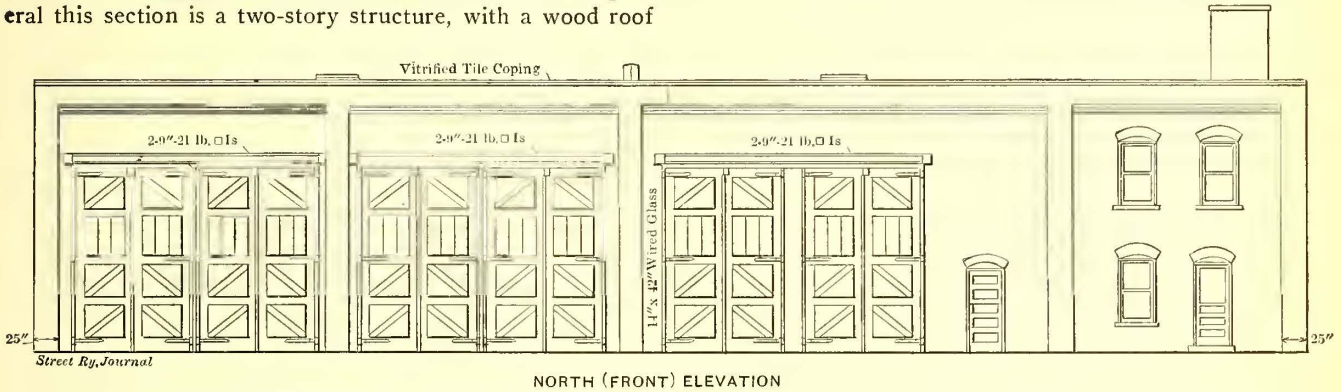


PLAN OF CAR HOUSE AND SHOPS OF THE SPRINGFIELD CONSOLIDATED RAILWAY COMPANY

the office section and main store room are not of fireproof construction, because the reduction in rates offered by the underwriters was not large enough to warrant the extra expenditure for fireproofing this portion of the work. However, protective means are secured by the installation of standard fire doors at all openings in the division wall between this section and the car house, as well as by the two fire hydrants. The blacksmith shop, constituting the main fire risk, is isolated from both store rooms by a 9-in. brick wall, and the flue is lined with fire tile to the roof. In general this section is a two-story structure, with a wood roof and hollow walls, except where joists are carried. There is no basement except under the large store room. This basement and all the rooms on the first floor have concrete floors, but in the offices there is a surfacing of ⅞-in. Norway pine on 4-in. x 4-in. yellow pine stringers. The floor over the basement is of 4-in. concrete, reinforced with 3-in. mesh No. 10 expanded metal, and is carried on 12-in. x 24-in. concrete beams placed 8-in. centers and reinforced with four 1-in. x 1½-in. bars. This floor is figured to carry a live load of at least 150 lbs.

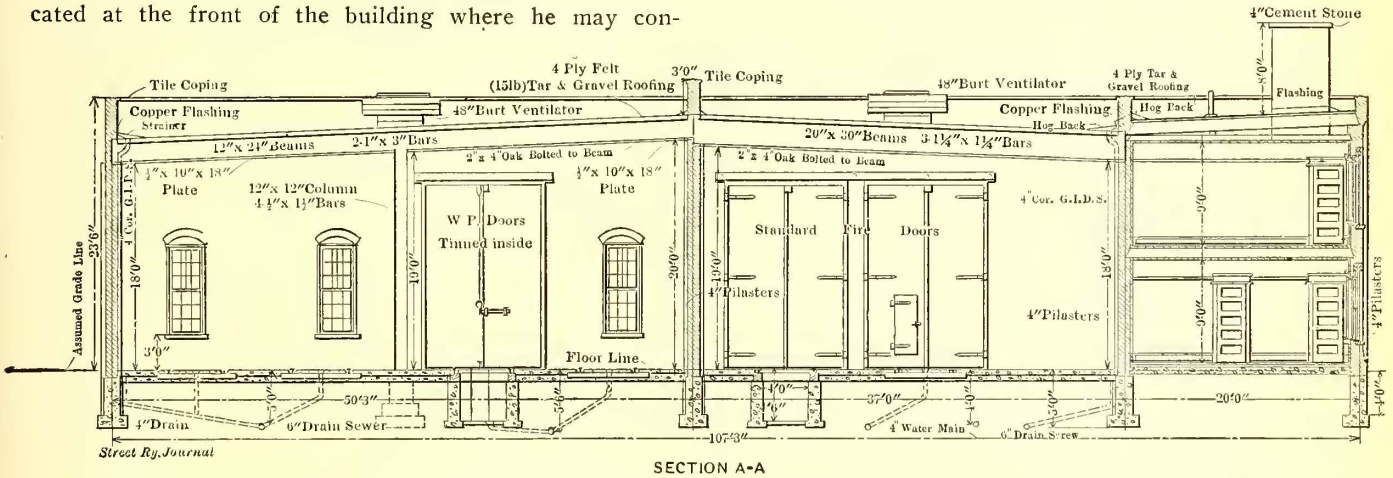
It will be noted that the dispatcher's room is located at the front of the building where he may conveniently see all passing cars and the trainmen who pass through his office before going up stairs to the club room. The master mechanic's office and the general office adjoin the dispatcher's room and communicate with the car house through the fire-door opening shown opposite the hallway. The employees' facilities rooms on the upper floor consist of a club room and toilet room with bathing arrangements and a locker room for 179 men. The rest of the floor is divided into an armature shop and store room. The upper flooring throughut is of ⅞-in. pine, except in the toilet room, which is of concrete. The roof of this section is of wood-frame construction.

No definite decision has been reached regarding cranes, hoists and machine tools. It is probable, however, that a locomotive crane will be used for handling all material outside of the car house throughout the storage yard, and a traveler of some kind installed in the shop portion. The present tools, consisting of lathe, drill-press, forge, emery wheels, field coil winding machines, and some few smaller tools of course will be placed in the machine shop. It is probable that some few additions will be made to this installation, principally in the way of woodworking machinery.



NORTH (FRONT) ELEVATION

FRONT ELEVATION OF THE SPRINGFIELD CONSOLIDATED RAILWAY COMPANY'S CAR HOUSE AND SHOPS



SECTION A-A

SECTION THROUGH THE CAR HOUSE AND SHOP OF THE SPRINGFIELD CONSOLIDATED RAILWAY COMPANY

The American Korean Electric Company operates at Seoul, the only street railway in Korea. On this railway the average number of passengers carried daily in 1904 was 11,442; in 1905, 12,963, and in 1906, 13,714. The car mileage was in 1904 (five months), 145,110 miles; in 1905, 326,793, and in 1906, 398,616. The equipment included thirty-seven passenger cars and eighteen freight cars. The company operates twelve miles and 408 feet of tracks with overhead electrical equipment. The gross receipts in 1906 were $98,221 and the net earnings $25,324, the increase in net earnings in 1906 over 1905 being 48 per cent. The company announces that the operating expense has been reduced from 80 per cent of the receipts in 1905 to 74 per cent in 1906, but with the decrease in the cost of coal and with an increased service without addition to the expense of management, it is hoped a further material reduction will occur in 1907. With the exception of an injury to a boy, who fell under the car when stealing a ride, no accidents occurred during 1906.

CONVENTION OF THE MUNICIPAL TRAMWAYS ASSOCIATION

The sixth annual convention of the Municipal Tramways Association of Great Britain was held at the town hall, Manchester, Sept. 25 to 27.

J. M. McElroy, general manager of the Manchester Corporation Tramways and president of the association, in delivering his annual address, referred to the discussion on the subject of private and municipal ownership of tramways which had been active recently. Mr. McElroy acknowledged that the policy of taking over the tramways by the municipalities had delayed the development of electric tramways in Great Britain for a number of years, but he believed that the final results of the policy had been in the interests of the public. In practically all the cities and towns in the kingdom the tramways are now being operated by the municipalities, and the benefits accruing to the traveling public, taxpayers and the employees have been enormous. During his recent visit to America he had noticed that there the tramway precedes the population; transit facilities are provided before a district develops. This is an excellent plan. He considered the success of any undertaking, municipal or private, depends upon the men who direct and control it. If municipal tramways have men of integrity, tact and judgment, the system will be a success.

RAIL CORRUGATION

A paper on this subject was read by A. L. C. Fell, chief engineer of the London County Council Tramways. Mr. Fell referred to a report on the subject presented by him in May, 1905, to the London County Council and published in abstract in the Street Railway Journal for Feb. 3, 1906. In this report he described the rail corrugations in England and America and suggested that the trouble was caused by unevenness of the rail surface setting up a slight jumping and bounding action in the car wheels. Later study has lead him to believe that corrugations are not due entirely to one cause. The following are in his opinion some of the chief producers of the trouble: (1) Original roughness of rail after rolling, (2) cold rolling of rails by the car wheels, (3) soft rails and heavy cars, (4) sand and grit on head of rail, (5) defective and open joints, (6) tight or wide gage of track or wheels, (7) loose or springy rails and points, (8) defective trucks being out of square and buckling, (9) slip of wheels at curves, (10) wheels not being same diameter, (11) flats on wheels, (12) rapid acceleration and retardation causing wheels to slip, (13) defective brake mechanism, or too rapid application of the brakes, causing chattering and a series of short skids. Referring to cause 12, the author made some experiments with a traveling crane in one of the London car houses. Its weight is fifteen tons and it is driven by one Westinghouse No. 200 motor. When the controller was turned rapidly to the fifth notch the wheels slipped badly and corrugations appeared with about 2-in. centers. The rails were then painted with grease, but the corrugations were not visible. This indicates, in the author's opinion, that corrugations caused by rapid acceleration are more liable to occur when the wheels have good metallic contact with the rail, and not when the latter is covered with a film of grease or soft ungritty matter. The speaker does not agree with Mr. Panton that the chief trouble is truck design. The following suggestions will, in the author's opinion, be found beneficial:

Track

(1) The rail should be anchored down at intervals of not less than 7 ft. 6 ins.

(2) A hard-wood packing block ¾ in. thick should be placed between the anchor and the rail flange.

(3) All joints should be close-butted and carefully filed. Possibly it would be an additional safeguard if the rail joints were welded.

(4) A water car fitted with carborundum grinding blocks should be run over the line to remove all irregularities before the cars commence running. This will be found a simple, quick and inexpensive process if carried out immediately after the track is constructed, and the development of corrugations will be deferred for a considerable time.

(5) Immediately the slightest sign of corrugation appears to grind the rails, as suggested above.

(6) By partly filling up groove of outer rail so that outer wheels run on flanges at sharp curves.

Rolling Stock

(1) Secure first-class trucks of good mechanical design which will not buckle or get out of square at sharp curves.

(2) See that the trucks are absolutely square.

(3) The diameter of the wheels should be kept equal as nearly as possible.

(4) By separately driving each wheel or by introducing differential gear, as in the case of a motor car.

(5) By using continuous flow sand boxes.

(6) By using magnetic track brakes as service brakes.

STAFF ORGANIZATION

A paper on this subject was read by James Dalrymple, general manager of the Glasgow Corporation Tramways. The first consideration in a municipal tramway organization is that the manager should have full control. Nevertheless, the manager is frequently appointed last, after the rest of the organization has been determined upon. In a large undertaking the manager should have three heads of departments, viz., a chief engineer, a traffic superintendent and a secretary. The engineering department should be sub-divided into departments in charge each of an electical assistant, a mechanical assistant, a civil engineering assistant and a chief draughtsman. The traffic superintendent would be directly responsible to the general manager, and would have control of the whole traffic staff, including inspectors, timekeepers, motormen and conductors, clerical staff in the traffic office and depots, ticket and cash clerks, etc. The secretary would have general charge over the office staff, including the accountants, cashiers, pay clerks, stores clerks, purchasing clerks, correspondence clerks, etc. This allocation of duties would embrace all the work of the tramways departments, except the work caused by accident claims, which might be either put under the traffic superintendent or under the secretarial staff. Of course, the organization of the smaller undertakings must differ very widely from the above. In a small tramways undertaking, the manager very often has to be mechanical engineer, electrical engineer and traffic superintendent all rolled in one.

The next point is whether a tramway department should have its own power station. In all large undertakings Mr. Dalrymple recommends a separate power station. For small undertakings the tramway department should purchase its power from the electric light department where there is such a department of the municipality. All track work should also be in charge of the tramway manager. In large undertakings the accounting staff should also be a part of the tramway department, but in small undertakings it should be undertaken by the principal accountant. The

author submitted an organization chart showing his ideal of a staff organization.

HOURS OF LABOR AND RATES OF PAY

A paper on this subject was presented by Alfred Baker, general manager of the Birmingham Corporation Tramways. He referred to a paper which he read on the subject at the meeting in Glasgow in 1903, and said that since that time there had been an increase of about 5 per cent in wages paid in the thirty-four towns mentioned in that paper. Other changes which had been made and questions which had come up during the last few years were also discussed. Thus, men were formerly paid only for the time actually on the car. They are now usually paid for the time at work, including that for inspecting the car before taking it out and while returning to the shed. In 1903 only two towns paid anything in excess of ordinary pay for Sunday work. To-day twenty-one towns pay overtime, usually a time and a quarter. Several companies have introduced the practice of paying bonuses for freedom from accidents. In Leeds the bonus is a half-penny per hour to all motormen who during any calendar month have been free from blame in the matter of accidents. During September, 1906, 97½ per cent of the men qualified for this bonus. The plan has recently been adopted in Birmingham. While theoretically it should not seem necessary to pay extra remuneration to a motorman for being diligent and cautious at all times, with the majority of men engaged in tramway work such an extra inducement seems necessary. It also has the good feature that it advertises the fact that the management is anxious to avoid accidents.

LONG WHEEL BASE TRUCKS

A paper on this subject was read by R. L. Ackland, manager of the Chesterfield Corporation Tramways, who advocated long wheel base single trucks. He presented drawings of single trucks used in Nuremberg, Vienna and Budapest, where the wheel base varied from 8 ft. 2 ins. to 11 ft. 10 ins. In these cases the flexible running gear used on the Continental steam railroads was employed. The double-truck car is less hard on the track, the truck frames and the car body than the single-track car, but is not so economical for city service. The objections to the single-truck car are largely avoided where a long wheel base is used with flexible axles to give the minimum amount of flange friction on short radius curves. In addition to this long wheel base truck the author is using in Chesterfield a V-shaped flange on the wheels.

TROLLEY EXPRESS ACTIVITY IN VICINITY OF BOSTON

Activities of the street railway companies on the outskirts of Boston to secure the right to carry freight and express matter are resulting in the framing up of a complete system for trolley express service from points south, west and north of the city, up to the outlying lines of the Boston Elevated Railway Company, which controls the business within city limits. Whereas two years or more ago a petition for trolley freight rights in the district around Boston was a novelty, hardly a week now passes without one going to the Railroad Commission.

Special stimulus was given this past summer by the passage of a state law allowing the Railroad Commission to grant a right through any city or town which appears to be blocking a through trolley express route that seems likely to be of advantage to other towns along the line, provided the obstructing community has had sixty days to pass on the matter. This law was the one under which the Old Colony Street Railway Company was very recently before the commission to get a grant through a remote section of Quincy. The city has had petitions for this grant pending for almost two years, but has neglected to act. The Old Colony Company needs only this short stretch in order to complete a wide ramification of freight and express routes, many of them now operating, extending from Providence, R. I., New Bedford, Taunton and Brockton to the end of the Boston Elevated Railway Company's Blue Hill Avenue line at Mattapan Square, touching Boston on the south.

On the west the Boston & Worcester now has its rights clear up to its junction with the Boston Elevated at Chestnut Hill; and the companies of the Boston Suburban Electric Companies, generally spoken of as the Newton System, have rights for the Lexington & Boston line, coming in from the northwest to a connection with the Boston company's tracks at Arlington Heights, and also in Newton, Waltham and other places having several points of contact with the Boston Elevated. The latest grant for this system now awaits approval of the Railroad Commission, covering Natick. There is also evidence that the comsome chance of being used to be delivered at once to the Boston & Worcester; and there is evidence that the company will be active this coming winter to secure a Boston entrance, although the proposed automobile truck service from Chestnut Hill into the city is not a probability now.

On the north of the city the Boston & Northern Company is meeting general success getting its local rights in the cities and towns between the end of the Boston Elevated system in Malden and the Merrimac River cities of Lowell and Lawrence. Very little opposition has been encountered, and the communities on the line exhibit a favorable sentiment toward trolley freight, especially since they have been informed that the company will use the wagons of the local express companies for local collections and deliveries. That is the system of delivery and collection now used by the sister company, the Old Colony, south of Boston. James F. Shaw of the Boston & Worcester says, however, that while his company intended to use the local expressmen as auxiliaries, it would have an express company of its own to systematize the handling of express matter by trolley, and relieve the operating department of all care of that branch of the business.

With the express system thus closing in around the city, there is at present no change in the Boston Elevated's situation as to trolley freight. The company has had a voluminous report made up as to trolley express experience in other large centers, and it has a petition for general rights on its surface lines pending in a committee of the Boston Board of Aldermen. But hearings on the petition have been from time to time postponed, without action. The local wagon expresses are warmly opposed to any carrying of express on the Boston cars, and have counsel engaged to fight the project at every point. Gen. Bancroft has stated publicly that the company is not opposed to carrying freight and express matter wherever it can be done without interfering with passenger traffic, and very likely, by the time the outside companies are all fully prepared to take the business up, the Boston company will find a way to get its cars in and out of the business district.

An interesting factor may be the bill giving railway companies the right to appeal to the Railroad Commission, now invoked in the Quincy case; for this bill, in the case of Boston, practically allows the company to put the whole question in the hands of the Railroad Commission, regardless of any local boards.

MEETING OF THE NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS

The large amount of space given to convention reports in the last two issues of the Street Railway Journal has prevented the publication of an account of the meeting of the National Association of Railway Commissioners, held at Washington, D. C., on Oct. 8 to 10. Several subjects were discussed of interest to electric railway companies. One of these was the question of standard classification of construction and operating expenses of electric railway companies. The committee on this subject was William O. Seymour, W. F. Ham, Martin S. Decker and Parker Spofford. Mr. Seymour in presenting his report referred to the annual meeting of the association at Denver in 1899, at which the standard classification of operating accounts of the Accountants' Association was adopted, and to the meeting in Portland in 1903 when the standard form of annual report of electric railways was adopted. He continued: "This system of classification and form of account has been generally satisfactory to the companies and the States which have adopted them. The substitution of electricity as a motive power in place of steam on a number of roads where the accounts are modeled after the forms of steam railroad accounting has introduced the question how the two forms of accounting can be combined so as to preserve the integrity of the accounts of the company while passing through this transition stage. The only cure for this state of things is eventually to apply the same system of accounting to both steam and electric roads. This can not be done without the co-operation of the accounting associations of both the steam and electric roads, and this can not be secured at the present time. Each of these associations is satisfied with its present forms of accounting and naturally shrinks from modifying or changing them. Hence, for the present, the only alternative seems to be to continue the use of special forms of accounting until some method making them uniform can be devised. The committee, therefore, asks to be discharged."

Mr. Ham, the representative on the committee of the American Street & Interurban Railway Accountants' Association, stated that the subject was to be taken up by that association at its Atlantic City Convention, and invited the members of the association, their statisticians and accountants, to be present. Mr. Decker, of New York, urged the importance of a uniform system for the two classes of roads. It was supposed last year that after the organization of the Interstate Commerce Commission that commission would prepare a schedule of accounts for the electric railway companies. In New York, owing to the appointment of the two Boards of Public Service Commissioners it is very necessary to have a standard form of accounting. Mr. Kilpatrick, of Illinois, referred to the fact that a number of electric railway companies in his State engaged in the sale of power and current for electric lighting and that the subject of the separation of these accounts from the railway business was a matter of serious consideration in that State. He suggested that this should also be taken up by the committee.

Another subject discussed was that of grade crossings. A. T. Siler, of Kentucky, the chairman of the committee, reporting on this subject, stated his belief that it is economical in the long run to abolish grade crossings, and recommended that in every State the grade crossings should be placed under the control of the railway commission. The discussion indicated a very wide range of practices in the different states in regard to grade crossings. One of the strictest rules was that of Connecticut, where Mr. Seymour stated the law prohibited new crossings of steam and electric roads at grade, and that all new steam roads must be built either so as to carry the highway over or under the railroad, not at grade. There is also a grade-crossing law which permits grade crossings now existing to be removed in three different ways; first, upon the application of the selectmen of the town, the warden and burgesses of a borough, or the Mayor and City Council of a city, to the railroad commission, and upon that application the railroad commissioners may order such crossing to be eliminated. If the petition proceeds from a municipality, one-quarter of the cost of eliminating the crossing is taxed upon the municipality and three-quarters upon the railroad company. Another way is by the railroad company bringing the petition, and in that event the railroad company pays the entire cost of eliminating the crossing. The law also prescribes that every railroad company in the State shall remove or apply for the removal every year of at least one grade crossing for every 60 miles of road operated by it. There is a third method by which the railroad commissioners can of their own motion, remove one grade crossing every year on every line of road in the State.

Mr. Kilpatrick, of Illinois, said their policy has been to separate grades wherever possible. At the last session of the Legislature the grade-crossing act was changed so that when the separation of grades is ordered by the commission the senior line may be assessed not to exceed one-third of the cost of separation. The question of highway crossings has not been taken up by the legislature or by the commission.

Mr. Whiting, of New Jersey, said that future grade crossings are prohibited in cities in that State without the consent of the municipality. The crossings of steam and electric roads are left to the discretion of the Court of Chancery. There is no law giving the power to the railroad commission or any other body in New Jersey to require the elimination of a grade crossing or to apportion the expense. The most that the State can do is to permit the municipalities and railroads to come together and contract for the elimination of grade crossings. Mr. Keith, of the Second District of New York said that in New York the State pays a portion of the expense. Any railroad company or municipality can petition for the elimination of a grade crossing. A hearing is then held and if the commission considers it desirable to do so the State pays one-fourth, the municipality one-fourth and the railroad company one-half. At the last session $300,000 was appropriated by the State for this purpose. He thought that highway grade crossings of high-speed electric roads were more dangerous than those of steam roads, and it was now a question as to extending the State law so as to provide for the elimination of grade crossings in connection with electric roads. Another question undecided in New York State is whether, where a street railway company's tracks occupy a highway at a grade crossing, the street railway company should bear any part of the expense of eliminating that grade crossing. At present the street railway company cannot be assessed.

In the discussion on safety appliances Mr. Fairchild, of Washington, said that the association should request Congress to pass a law requiring the adoption of a covering for third-rails on electrically equipped steam railroads.

The official figures of traffic for Old Home Week in Baltimore place the total passengers carried for the six days at 4,230,000.

PRACTICAL WOOD PRESERVATION

BY ERNEST F. HARTMANN

Any practical study of the subject of wood preservation must include an investigation of the causes of decay, for research has proved that living organisms, such as fungi and bacteria, or even insects in some localities, do far more to shorten the life of timber than wear through service. Decay, in fact, is the disintegration of the wood caused by the low organisms whose food supply is in the albuminous contents of living cells. The fungi prosper best in humid places where the temperature ranges between 60 and 80 degs. F. and there is enough air exposure to permit the settlement of spores. The most favorable place for decay in construction above ground is at points of contact, joints, and mortises; on posts, decay usually sets in at the ground line, and in water at the water line.

Considering the possible methods of preservation, it may be asserted at once that paints of tar, lead and oil, etc., do not prevent decay. While they may form an attractive coating, they only cover the surface of wood, close its pores and at best keep off dampness but for a limited time.

Impregnation of wood with preserving liquids, such as creosotes or heavy oils derived from coal tar by a vacuum process and forcibly injected, does protect wood against premature decay. This process however, requires costly machinery, making the treatment too expensive for general use. Again, if this or any other process requires artificial seasoning of the wood by superheated steam, it has the tendency to soften and thus weaken the wood. The coagulation of the albumen in the wood by steam will not help towards its preservation, just as a hard-boiled egg exposed to the atmosphere will soon decay. Furthermore, the grade and quality of the tar-oil used must be fully and carefully considered; a light volatile oil will quickly evaporate from the wood, and in case an oil contains naphtalene, a large percentage of phenols (i. e., carbolic acid), or other solvents in water, it will leach from the wood and also cause a weakening of the wood fiber. Professor Allerman in his paper on the quantity and character of the oil in well-preserved timbers states: "That it is the heavy, high-boiling compounds which stay in timber and are an efficient barrier to the entrance of water and to the attacks of fungi and borers." Purchasers should buy according to a known chemical standard. Some railroads impregnate ties, etc., with a weak solution of chloride of zinc (Burnettizing process) in place of the more expensive tar-oil; but this treatment will not benefit ties laid in moist climates or in poorly drained roadbeds, as zinc-chloride being easily soluble in water, will soon leach out of wood; otherwise it would be an excellent preservative.

The efficiency of a chlorine as an antiseptic is unquestioned, and the durability, we may almost say the indestructibility, of such coal tar products which are recognized as the preservative elements are well known. Hence, if these elements can be combined in a form readily absorbed by wood without the intervention of expensive machinery and can be applied by ordinary unskilled workmen to the timber at the place of using, there is not much left to be desired except to get down to the practical use of the treatment. Proper seasoning will considerably increase the life of timber and again will also permit of simpler methods of preservation. Since the decay-germ reaches the wood from the outside and finds its food in the albuminous contents of the wood, it is unnecessary to permeate the wood throughout with such a fluid.

The first step to prolong the life of any timber is proper air seasoning. Too much stress cannot be laid on this subject. The proper preservative when applied should destroy or make harmless those decay-producing germs already in the wood; fill the pores of the wood with an insoluble oil and exclude air and water; require no expensive and complicated machinery nor skilled labor, but be so simple that any one can make the application regardless of season and when and where the wood is to be used, avoiding all unnecessary transportation; be neither explosive or poisonous; be non-corrosive, and under no condition make wood more inflammable than in its natural seasoned state. For electrical transmission service, it is absolutely necessary that the impregnating material should be a non-conductor of electricity.

PRESERVING RAILROAD TIES

E. A. Sterling, forester of the Pennsylvania Railroad to supervise extensive tree planting operations, has just returned from an inspection of the large wood-preserving plants of the Far West and reports that with the growing scarcity of timber for ties and other railroad lumber the large Western railroad systems are going into tree planting and wood preserving on a large scale. Mr. Sterling says that among the railroads in the West now treating timber is the Santa Fé, which has a large creosoting plant at Somerville, Tex., with a capacity of 15,000 ties a day. The Santa Fé is also building a new plant at Albuquerque, N. M., where a crude oil will be substituted for creosote. In addition to treating the timber, the Santa Fé is planting Eucalyptus trees on a 9000-acre tract near San Diego, Cal. The timber manager of this company has been sent to Australia to look up new species of trees.

The Southern Pacific operates two plants at West Oakland, Cal., one at Houston, Tex., and another at Los Angeles, Cal. Red fir and pine are being treated. In the Northwest the Oregon Railway & Navigation Company maintains a zinc chloride and creosoting plant at Wyeth, Ore., while commercial plants are located on the Puget Sound. Among the more important new treating plants in course of erection are two by the Northern Pacific, one very large plant by the Burlington at Galesburg, Ill., four by the Rock Island and two or three by the Illinois Central.

As a protection against a possible diminution of lumber for railroad ties in the future, the Pennsylvania Railroad has undertaken large tree planting operations since the apppointment of a forester. Work upon a large basis is progressing at Mt. Union, Pa., where about 225,000 trees have been planted. At Altoona 250,000 or more red oak trees were set out last spring. At Hollidaysburg a "forest nursery" is being created, about 135 lbs. of seed being planted this year in nursery beds and many trees being set in nursery rooms for use next year.

With the planting of last spring, the Pennsylvania Railroad has about 1000 acres under cultivation. Some 2,250,000 trees have been set out in addition to the seed planted.

The United Railways & Electric Company, of Baltimore, Md., has recently issued a booklet devoted to trolley trips in and out of Baltimore which, besides describing a few pleasing trips out of the city and the lines within the city, gives the location of the principal parks in the city and the suburbs, the hotels, the theaters, the railroad depots and the suburban towns on the company's lines, together with a schedule of all-night cars.

CORRESPONDENCE

INSTRUCTIONS TO TRAINMEN

Editors Street Railway Journal:

The editorial in your issue of Sept. 14, entitled "Instruction to Trainmen," discusses a subject which has received very careful consideration on the part of writers and managers, but from which any direct results are rarely obtained. The plan suggested by you, however, is very practical and in many parts of the country could be carried out economically.

Any operating man or manager will testify to the great number of men hired and qualified, and of the small percentage who remain in the service six months, one year or two years after engagement. Their experience will also undoubtedly show that a large proportion of collisions, derailments and other accidents is caused by these new men, and that it is a serious question whether it is profitable in the long run to keep a man of four months', six months' or a year's service, after he has had his first serious trouble. While the average manager is wrestling with this perplexing question, he is spending about 50 per cent of his time in interviewing candidates, is giving up 100 per cent of one or more other men's time on the same work, and is using up a lot of stationery and other people's time in obtaining a history of the applicant's life and securing his family genealogy. At the same time the company's physician is busily engaged in making a record of the candidate's chest expansion, waist and hip measurement and the per cent of wildkirschenrinde in his blood and is gathering other important data for the benefit of the American Physicians' Congress.

After spending all this special and professional labor, the company turns the poor fellow loose and tells him to go forth and "do things," and the candidate, having passed his senior year's examinations, as a rule receives no further official attention until he gets into trouble. Wherever this is the general procedure its injustice is apparent to any man who has followed railroad or street railway work long enough to appreciate its multitude of perplexing troubles. It is equally self-evident that a close "follow-up system" is the only way by which a greater percentage of these men who cost the company so much time and money can be retained in the service, appreciating more each day the importance of the great work they are engaged in, and acquiring gradually a full knowledge of their special vocations.

To this latter end your plan comes more nearly to being practical than many suggestions heretofore made, except that I think a traveling lecturer and demonstrator who would take in a circuit of one to five cities—depending on the number of men employed and the frequency of visits—would be the most effective plan. His lectures should be accompanied with illustrations by lantern views or some such system, all of which could be determined on when the details are worked out.

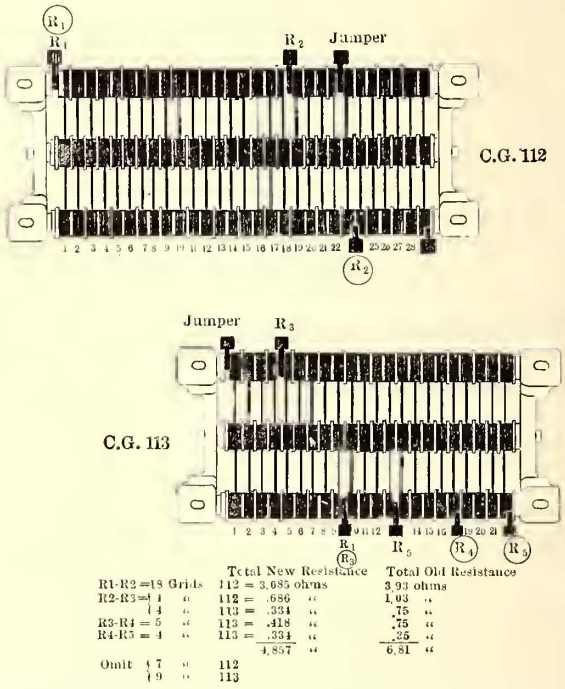
For text-books, I should advocate that the American Street & Interurban Railway Association, through its secretary, Mr. Swenson, should collect data for a book to be called possibly "The American Railway Practical Text-Book." This book could be made to cover every practical operating problem if contributions were suggested and obtained systematically from each railway company. The railway companies could gather these suggestions from those men on their systems who have had instruction work in charge.

W. H. M.

CHANGING RESISTANCE STEPS TO ELIMINATE FUSE AND CONTROLLER TROUBLES.

At the Atlantic City Convention of the American Street and Interurban Railway Engineering Association, during the discussion on control apparatus, J. W. Corning mentioned how he had eliminated controller and fuse troubles by changing the resistance steps. As Mr. Corning, who is electrical engineer of the Boston Elevated Railway Company, has kindly furnished some diagrams illustrating this practice, it is possible to explain his method in further detail.

The company was operating some 25-ft. box cars, equipped with two G E-58 motors and K-10 controllers. Complaints were made of the uneven acceleration of these cars and an investigation with a recording ammeter showed there was bad setting of the resistance connections. It was found that on the last parallel step, just before going into full multiple, there was a peak of



		Total New Resistance	Total Old Resistance
R1-R2 = 18 Grids	112 =	3.685 ohms	3.93 ohms
R2-R3 = 1 "	112 =	.686 "	1.03 "
4 "	113 =	.334 "	.76 "
R3-R4 = 5 "	113 =	.418 "	.76 "
R4-R5 = 4 "	113 =	.334 "	.35 "
		4.857 "	6.81 "
Omit 17 "	112		
19 "	113		

FIG. 1.—DIAGRAM ILLUSTRATING CHANGES IN RESISTANCE GRIDS, WITH THE OLD RESISTANCE STEPS ENCLOSED

about 290 amps in accelerating on a grade of about 5 per cent. By readjusting the resistances the peak has been brought down to about 200 amperes. Since this change has been made, fuse blowing, motor flash-overs and controller short circuits have been practically eliminated. Under the old conditions the motormen were afraid to carry the controller to the last notch, because they often blew fuses when they did it. Hence the tendency was to remain on the next to the last notch a long while before advancing to the last point, which practice resulted in numerous burnouts of resistance grids.

The changes in the resistance connections are shown clearly in the grid diagrams of Fig. 1, under which will be found a statement of the corresponding new and old intervals with a reference to the number of grids removed. From the latter it will be noted that the total resistance in the rheostat circuit has been cut down from 6.81 ohms to 4.857 ohms. The benefits mentioned with regard to reduction of current peaks, when accelerating on a 5 per cent grade, are graphically shown in Fig. 2, the dotted line showing the old and the full line the new conditions.

The acceleration with the old set of connections was made at a rate of advance of the controller handle of four seconds per notch, while the acceleration with the new set of connections was inadvertently made with a rate of advance of the controller handle of three seconds per notch, so that the peaks in the multiple position in the new curve would at a rate of four seconds per notch be slightly lower than shown on the curve with three seconds per notch. It will be understood, therefore, Fig. 2 does not show the full advantage obtained by the readjustment of the steps of the rheostat.

Another point which Mr. Corning mentions in this connection is this: For a given equipment there is a certain current value, which if the motors are called upon to commutate too frequently will cause more roughening of the commutator than the brushes will be able to smooth off during the time that current is off the motors; and if the resistance connections are so made that this greater current is exceeded in normal acceleration, the commutator will go from bad to worse, and motor flashing is likely to occur. This was noticed very particularly in one case where certain equipments were being taken out of service every three days on account of rough commutators and flashing. After the resistance steps had been changed

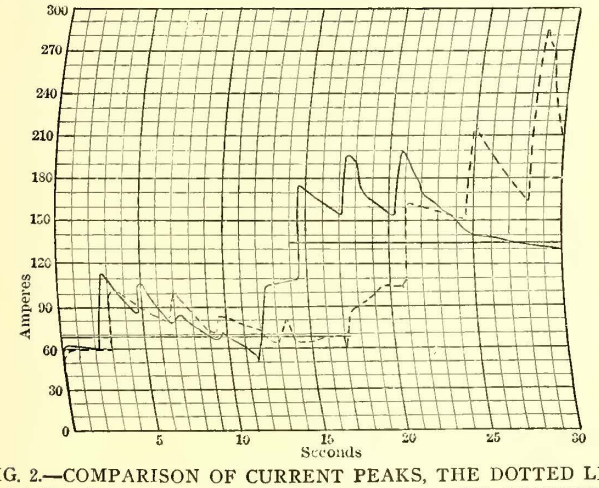


FIG. 2.—COMPARISON OF CURRENT PEAKS, THE DOTTED LINE SHOWING THE IMPROVEMENT EFFECTED BY CHANGING THE RESISTANCE CONNECTIONS

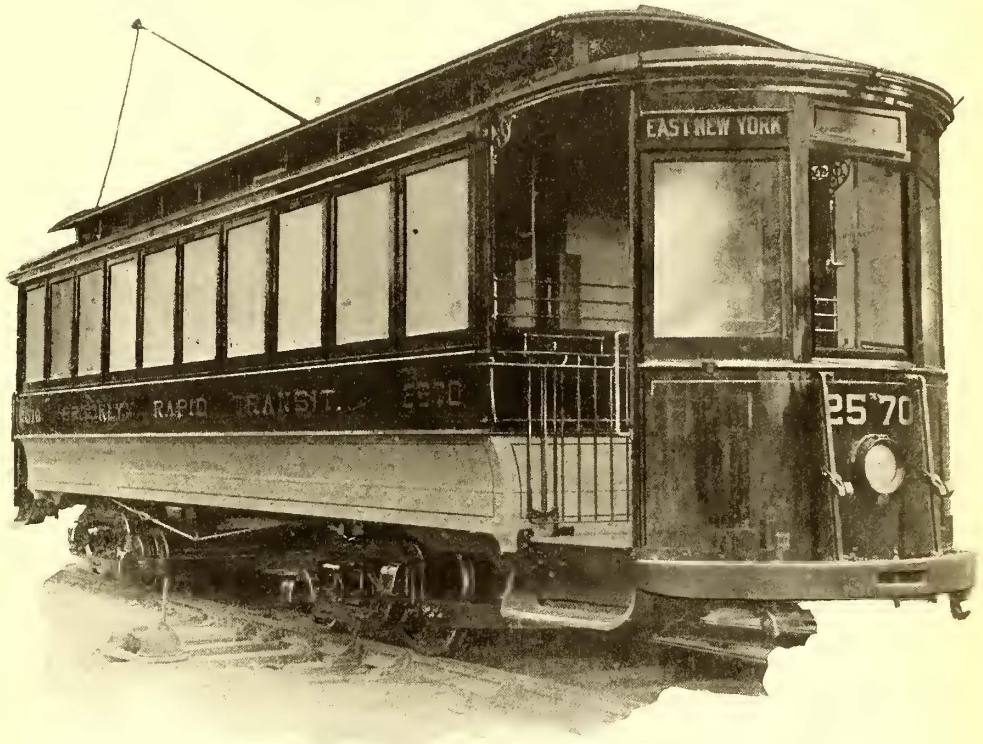
and a great deal better acceleration had been obtained the commutators ran smooth and clean, and the motor flashing was practically eliminated.

It may be of interest to add that the gear reduction of the motors used in this case is 3.42 (19:65) and on lower speed cars with the same equipment is 4.60 (15:69).

The New York, New Haven & Hartford R. R. is now running thirty-five electric trains between New York and Stamford.

NEW SURFACE PASSENGER CAR FOR BROOKLYN

The Transit Development Company, which supplies and maintains the rolling stock for the Brooklyn Rapid Transit Company, is now equipping and placing in service 100 new surface passenger cars of its standard 28-ft. body semi-convertible type. Several improvements have been made on this lot of cars not contained in previous cars of the same type, and a general description at this time should be of interest.



NEW SEMI-CONVERTIBLE CAR WITH 28-FOOT BODY, PLACED IN SERVICE OF THE BROOKLYN LINES

A change in type of car from the company's 42 ft. 6 ins. convertible type, of which 452 have been placed in service prior to the present lot, was made after carefully investigating the peculiar and perplexing traffic conditions existing during the rush hours in Brooklyn, and considering the type of car that would best meet the exacting requirements for handling the enormous and concentrated traffic with which the Transit Development Company is required to cope.

The crowds handled to and from one terminal (the New York end of the New York and Brooklyn Bridge) for several hours during the morning and evening are unquestionably the largest encountered by any street railway system in the world. With this in mind, a medium size car has been designed and arranged for quickly taking on or unloading large crowds at one point. Longitudinal seats are the only kind suited for these conditions, and doors of the accelerator type have been provided for facilitating ingress and egress. The main feature of this door, which is placed near the step, is that the platforms cannot be easily blocked, thus obtaining an unobstructed entrance.

The car is arranged for operation from both ends, and has vestibules open at the sides. The sides are of the usual cove panel type with ⅜-in. whitewood panels, each in two pieces, spliced diagonally opposite.

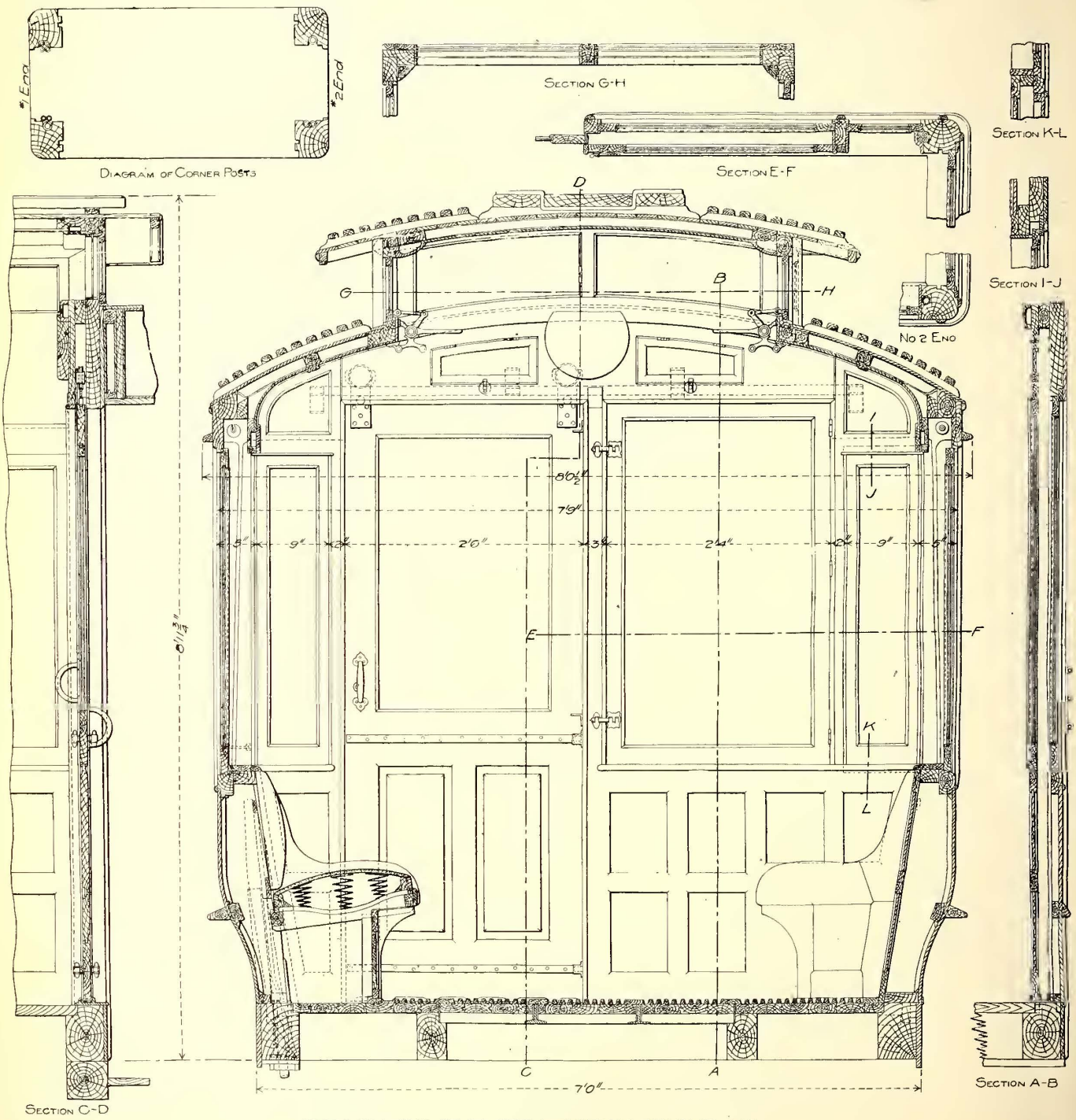
There are ten large removable sash on each side of the car, held in place by malleable iron retainers extending from belt rail to letter board and fastened to posts by three

5/16-in. phosphor bronze screws running through posts, with neat polished bronze cup washers on inside of post. During the summer months these sash are removed and stored.

The following are the general dimensions of the car: Length over corner posts, 28 ft.; length of platform, 4 ft. 7 ins.; length over buffers, 38 ft. 3¾ ins.; length center to center of bolsters, 15 ft. 1¾ ins.; width over sill plates 7 ft.; width over drip rails, 8 ft. ½ in.; height from bottom of sill to top of trolley board, 8 ft. 11¾ ins.

The entire underframe is double mortised and tenoned joints are secured by knee forgings and standard structural steel angles. A steel plate 8 ins. x ⅝ in. is securely bolted to the side sills, extending the entire length of car body. The bolsters are of steel plates framed into underframe top plate 8 ins. x ¾ in. and bottom 8 ins. x 1 in.

The platform bearers extend from the sub-end sill and side sills to buffer angle iron, hung by bolts and steel castings to end sills; the outside bearers are 3½ ins. x 6 ins. x ½ in.



CROSS-SECTION OF LATEST BROOKLYN SURFACE CAR

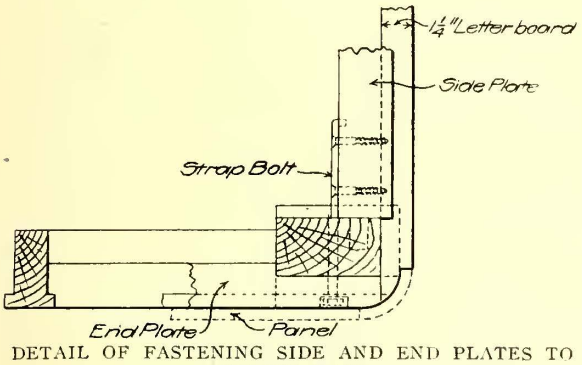
The underframe is of unusually strong and rigid construction. All timbers are of white oak, except the side sills of yellow pine. The side and end sills are 4¾ ins. x 7 ins.; the cross timbers are 3¾ ins. x 5¾ ins.; longitudinals, 3 ins. x 5¾ ins.; auxiliary end sills, 5¾ ins. x 5¾ ins.; sub-end sills, 5⅛ ins. x 4⅞ ins.; trap door timbers, 3¾ ins. x 4½ ins.

angles, reinforced at the bend by a 5 ins. x 3 ins. x ⅜ in. angle, and the middle bearers are of 5 ins. x 3 ins. x ⅜ in. angles, reinforced by an angle of the same size at the bend.

The flooring is of 1¼-in. yellow pine, 3½-in. face tongue and groove run lengthwise and sunk flush with and rabbitted into side sills. Each board is secured to each floor timber with two 2½-in. No. 14 screws, sunk ⅛ in. into

boards and covered with putty. The floor space between is covered with beveled maple strips.

The side posts are of white oak 2¼ ins. thick, with rounded inner edges; each post is mortised into the side sill and plate gained into plate furring and secured to the sill by ½-in. strap bolts. The corner posts are of ash 4⅛ ins. x 5 ins. The strainer rails are gained into and screwed to the post with three strainers between each two posts, to which the panels are screwed and double scrimmed. The sash rails are 3 ins. x 2 ins. gained into posts and wedged in position. The letter boards are of ash.

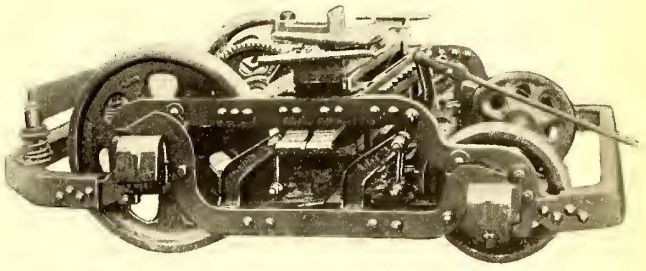


DETAIL OF FASTENING SIDE AND END PLATES TO CORNER POST

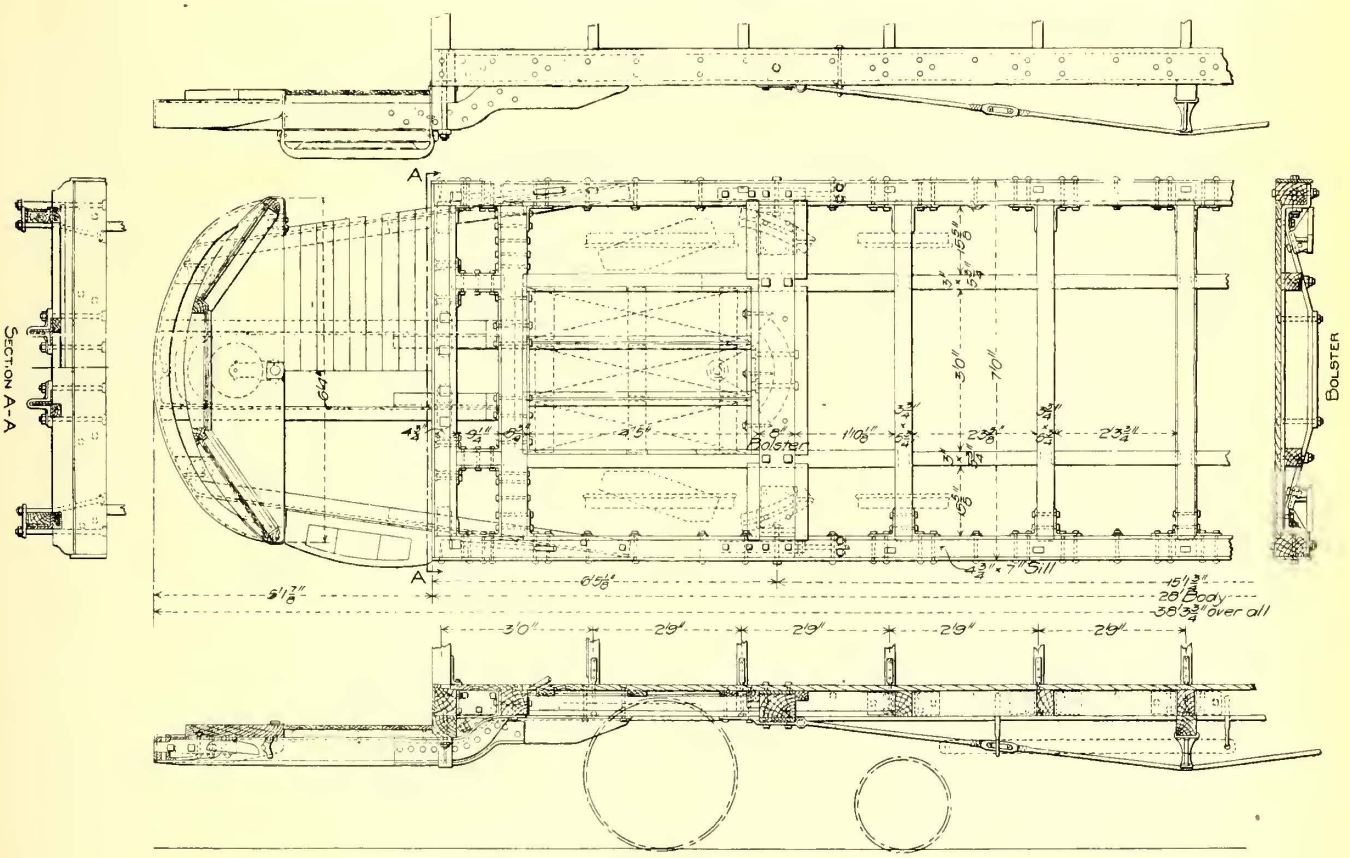
descent lamp is placed in the hood of the vestibule above and is in front of sign for illumination at night. One R. W. Bliss Company's Wood gate is provided on the outer or alighting side of each platform, and one Brooklyn Rapid Transit pantograph gate at the inner side.

All light wiring is run in electrobestos conduit with transite backing. The control wiring and all wires running down in corner posts are run in loricated iron conduit. The cars are equipped with two Westinghouse 93-A2 60-hp motors, geared 17:70, giving a maximum speed of 26 miles per hour at 550 volts. K-28-L controllers are used.

The thoroughly compact arrangement of the maximum traction truck used will at once be noted. The trucks are equipped with double elliptic springs, which give ex-



MAXIMUM TRACTION TRUCK FOR BROOKLYN SERVICE



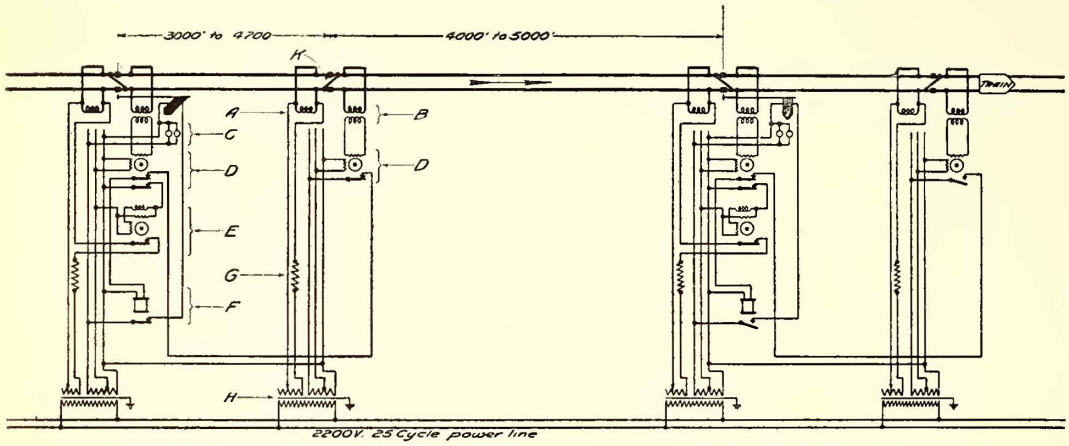
HALF-PLAN AND SECTIONS OF BROOKLYN CAR

The roof framing is of the monitor type of ash, excepting clerestory posts, which are of cherry, and the clerestory sill, which is of yellow pine. A steel carline 5/16 in. x 1¼ ins. is provided at each post, bolted to the upper and lower rafters, turned over at ends and screwed to the plate. The roof is covered with whitewood boards, nailed to the rafters and covered with No. 6 cotton duck.

The destination signs are of a novel design and consist of a four-sided block sign painted black, with destination painted with aluminum paint on each side. An incandescent easily riding qualities. The brake rigging is hung from brackets attached to the equalizer bars, thus providing an even shoe wear and giving an arrangement that will always keep the shoes at the same point on wheel, irrespective of the weight on the truck. The car body swivel plates are provided with conical rollers, which allow the truck to take curves easily and with less friction on wheel flanges. The trucks were designed and built by the Standard Motor Truck Company, subject to approval of superintendent of equipment, Transit Development Company.

THE PHILADELPHIA & WESTERN RAILROAD'S AUTOMATIC ELECTRIC BLOCK SIGNAL SYSTEM

One of the most noteworthy features of the Philadelphia & Western Railroad is the automatic electric block signal system. This road is a double track, high speed, direct current electric line extending westward from the union station at Sixty-Ninth Street, Philadelphia, to Stafford, Pa., a distance of eleven and one-half miles. A description of the road was published in the Street Railway Journal of June 15, 1907, but as the block signal system had not been completed at the time, the following extended description should be of interest.



A—Single Coil Reactance Bond
B—Double Coil Reactance Bond
G—Resistance Grid
D—Track Relay
E—Track Circuit Control Relay
F—Motor Control Relay
G—Resistance Grid
H—Line Transformer
K—Diagonal Bond

FIG. 1.—CIRCUIT PLAN

It has not been customary in the past for suburban lines of this character to do much, if anything, in the way of signalling. The management of the Philadelphia & Western Railroad, however, recognized the importance of block signal protection and wisely determined to install a first-class automatic block system, feeling that the high speeds, heavy grades, density of traffic and other governing conditions fully justified the outlay.

After consideration of the systems proposed it was decided to adopt the one offered by the General Railway Signal Company, of Rochester, N. Y., which is similar to this company's installation in the New York Central Railroad's electric zone, previously described in these columns. The essential features of this system are as follows: The retention of both rails of each track for the return of the propulsion current; cross bonding facilities between all rails of both tracks at the ends of all track circuits and between one rail of each track intermediate between the ends of said sections, wherever desired; the use of ironless reactance bonds, permitting very long track circuits to be operated with a minimum expenditure of energy; the use of alternating currents only for the track circuits and the operation of all the devices connected with the system, thus doing away with all batteries and the expense incident to their maintenance.

Single arm, two position home signals arranged on the normally clear principle are employed with an overlap. On account of the heavy traffic between Philadelphia and Beechwood Park the signals average about 3300 ft. apart and a full block overlap is being employed to permit a two-minute headway. West of the park the signal spacing averages one and one-half miles with a uniform overlap of about 3700 ft., allowing a headway of approximately five minutes. If required by traffic conditions it is intended to put in more signals at a later date.

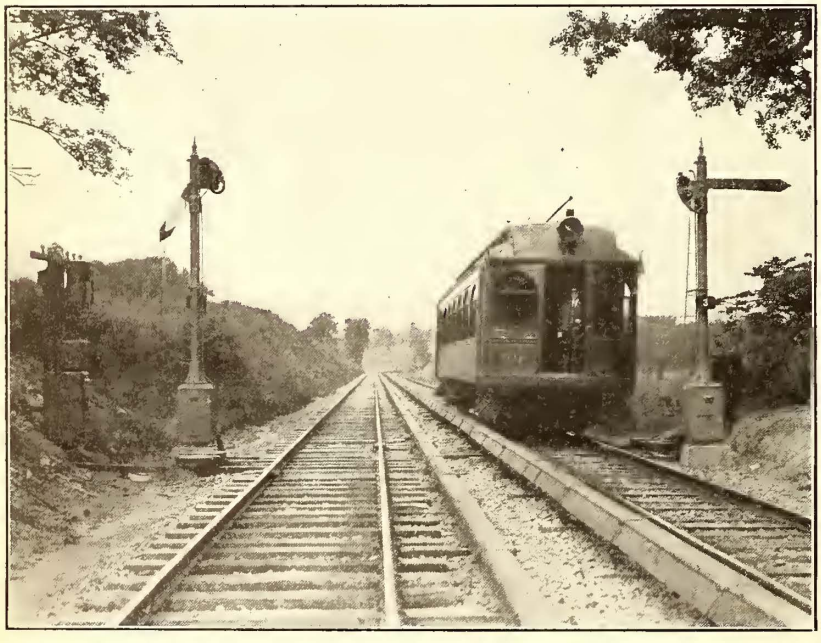


FIG. 3.—SEMAPHORES AND TRANSFORMER POST OF AUTOMATIC BLOCK SIGNAL SYSTEM

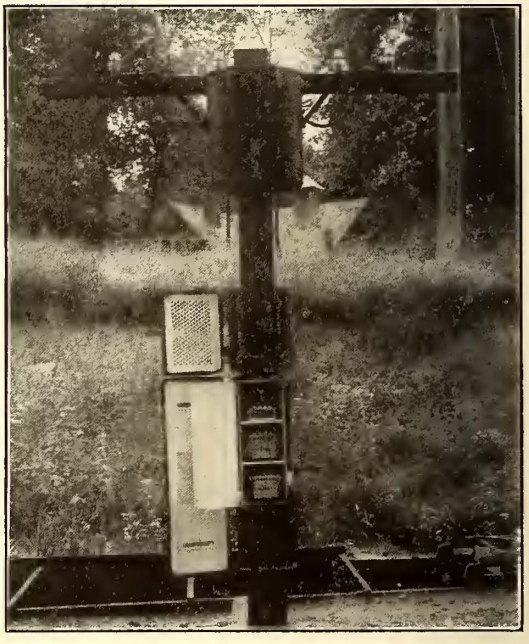


FIG. 4.—RESISTANCE GRIDS IN PERFORATED CAST-IRON BOX

Twenty-five-cycle, single-phase current from transformers in the railway's power plant is used for operating the entire signal system.

Fig. 2 shows the switchboard controlling the two feeder circuits which run in either direction from the power house.

Power is delivered to the switchboard through a remote controlled automatic oil switch not shown in the cut. Each feeder circuit is equipped with an ammeter and an electrically tripped, hand-operated oil switch whereby the system may be relieved in case of a cross on either transmission line. The latter consists of two No. 6 B. & S. hard drawn bare copper wires strung on separate cross arms on the railroad company's high-tension pole line, which is protected by lightning arresters.

"Line transformers" are installed at all signal and overlap locations. They step down directly from the transmission line voltage of 2300 to the voltages required for the signal system. These transformers are protected on the primary side by cartridge fuses mounted in water-tight cast iron boxes and so arranged that a fuse can be replaced without danger. The secondary windings are three in number, a 55-volt winding for the operation of the signal motors, lights and line relays, and provided with a tap for the local phases of all polyphase relays; and two windings for supplying energy to the track circuits, taps being provided on these windings so that the voltage can be varied from 2½ to 15, as required for track circuits of different length. A copper shield is placed between the primary and secondary windings and connected to ground, affording protection in case of a breakdown in insulation. These transformers are manufactured by the General Railway Signal Company. All coils are insulated with an oil and moisture resisting compound by the "vacuum treatment" process, in which the coils are heated in an air-tight tank. After a vacuum has been secured and the moisture thereby extracted, insulating compound is forced into the coil under heavy pressure which causes the liquid to penetrate

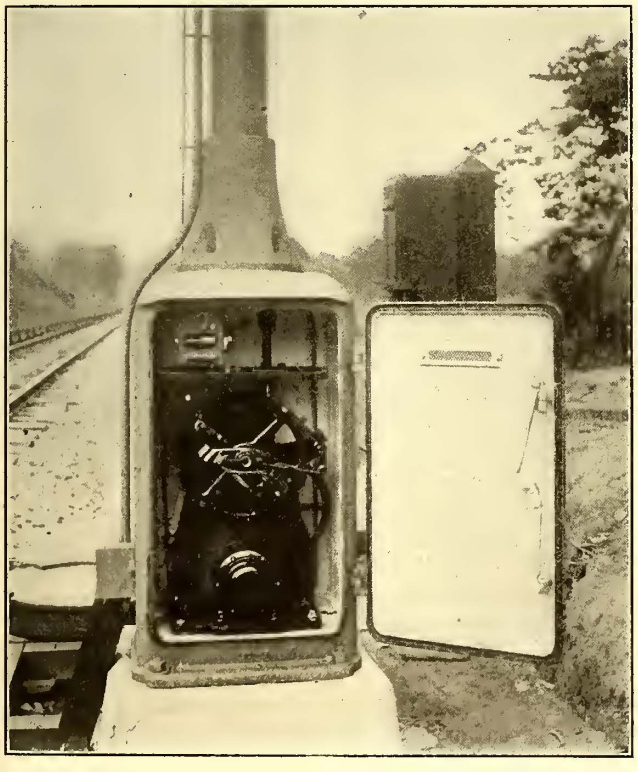


FIG. 6.—SIGNAL MECHANISM EXPOSED

to the heart of the coil, with the result that every wire is surrounded with a highly insulated covering.

Both rails of each track are made available for the propulsion current by ironless "reactance bonds" connected to the rails as shown at *A* and *B* on the circuit plan, Fig. 1. When so connected they form a path of low ohmic resistance and large current capacity for the traction current, and at the same time offer an impedance to the passage of the alternating current from rail to rail, whereby a portion of said current is forced down the rails to operate the track relay. The reactance bond *A* at the transformer end of the track circuit has a single winding connected directly

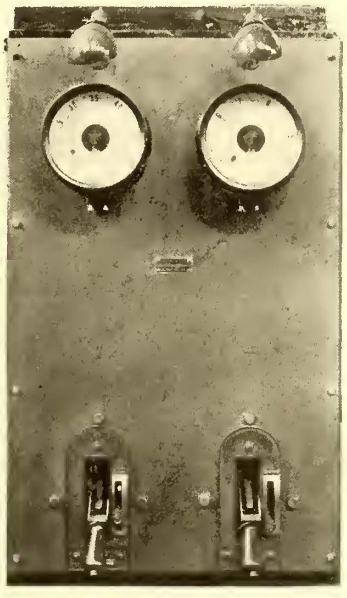


FIG. 2.—SWITCHBOARD CONTROLLING FEEDER CIRCUIT

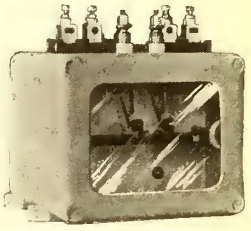


FIG. 5.—TRACK RELAY

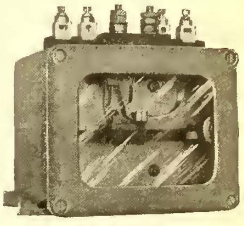


FIG. 8.—TRACK CIRCUIT CONTROL RELAY

to the rails. The bond *B* at the other end of the circuit has two windings, one connected to the rails and the other directly to the relay. The winding connected to the relay acts as the secondary of a transformer, its object being to prevent an excessive flow of direct current through the relay which, owing to the low ohmic resistance of the relay, would otherwise result were the relay connected directly to the track rails. Attention is called to the fact that these bonds are of the ironless type and hence are not subject to saturation due to an unbalanced condition of the traction current in the rails, the reactance, therefore, remaining constant under all such conditions. It is also to be noted that alternate rails in adjacent track circuits are connected by heavy "diagonal bonds" *K* so arranged that the breaking down of any insulated rail joint will short-circuit either the relay or transformer and prevent the giving of a false clear indication. Cross-bonding between tracks may be effected by making connection, at any point desired, to the rails which are made continuous by the diagonal bonds *K*.

The bonds in question are made up of flat copper strips of large cross section wound in the form of a spiral, the turns being suitably insulated from each other. The coils when wound are heavily taped and then impregnated as in the case of the transformer coils. These coils are assembled in pairs in flat iron cases and mounted on extended ties as shown in Fig. 10. A connecting chamber is provided in the case between the coils in which all the coil ends terminate and where all connections to the rails, relays and transformers are made and then concealed by a suitable cover. The copper connections to the rails after leaving the bonds go directly downward and under ground to the rails where, after passing a short distance above ground to insure flexibility, are connected to the rails. This construction conceals the copper as much as possible and reduces theft to a minimum. Energy is supplied to the track circuits directly from the low voltage high current wind-

ings on the line transformer, as shown on the circuit plan (Fig. 1), through adjustable cast-iron resistance grids which limit the current flow when a train is standing at the transformer. These grids are mounted in separate perforated cast-iron boxes as shown in Fig. 4.

The track relays, as shown in Fig. 5 and at *D* (Fig. 1), are of the company's standard polyphase construction. The moving contacts are mounted on a horizontal wooden bar to which motion is imparted by a small split-phase induction motor having two stationary windings. One of these windings is connected directly to the reactance bond secondary, as shown in Fig. 1, and the other directly to a low voltage tap on the line transformer. When thus connected, a phase difference exists between the two coils and rotation of the armature is thereby produced.

Of the energy in the two relay windings, that supplied by the transformer direct is by far the greater. This requires but a small amount of energy from the track to give

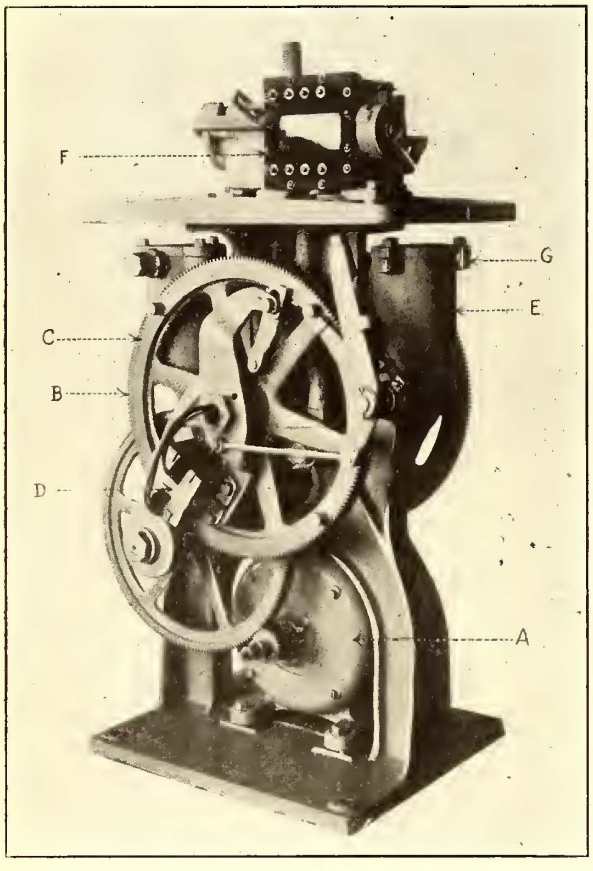


FIG. 7.—DETAIL OF SIGNAL MECHANISM

positive action of the relay, and as a result very long blocks can be operated with comparatively little energy, as evidenced by the fact that in this installation track circuits 8800 ft. long are operated with energy fed in at one end. As alternating current only can cause the relay to operate, it is immune to the effects of direct current. All contacts and other working parts are made visible by glass covered openings. Water-tight construction is effected by using rubber gaskets. These relays are positive in action and give an exceptionally heavy rubbing pressure between the contacts in closing and an extra wide opening when de-energized. Contacts can be provided, as required, up to a maximum of four front and four back per relay. They are insulated to withstand a breakdown pressure of 3000 volts alternating current.

The track circuit control relays, as shown by Fig. 8 and at *E* (Fig. 1), are to hold a given signal at stop until the train is out of the overlap for the next signal in advance. The method for controlling the signals will be evident by reference to the circuit plan, Fig. 1. These relays must be able to carry continuously and break the entire current flowing to the track circuit at the rear of a signal, and of course must continue to do so without injury. These relays as designed will carry an alternating current of from fifty amperes to seventy-five amperes and break the same at twenty-five volts continuously without overheating and without perceptible arcing, although the current required to be carried in practice is much less than this. The construction and operation of these relays is similar to that of the track relays except that the contacts are made very much heavier and the necessary phase displacement to produce rotation is effected by a small reactance coil, placed in series with one of the relay windings.

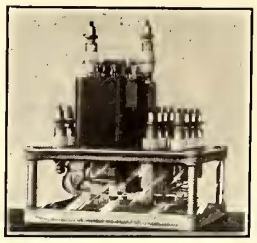


FIG. 9.—MOTOR CONTROL RELAY

Having thus described two combinations of these polyphase relays, the liberty is taken of departing for a moment from the description of the Philadelphia & Western installation to direct attention to the great variety of uses

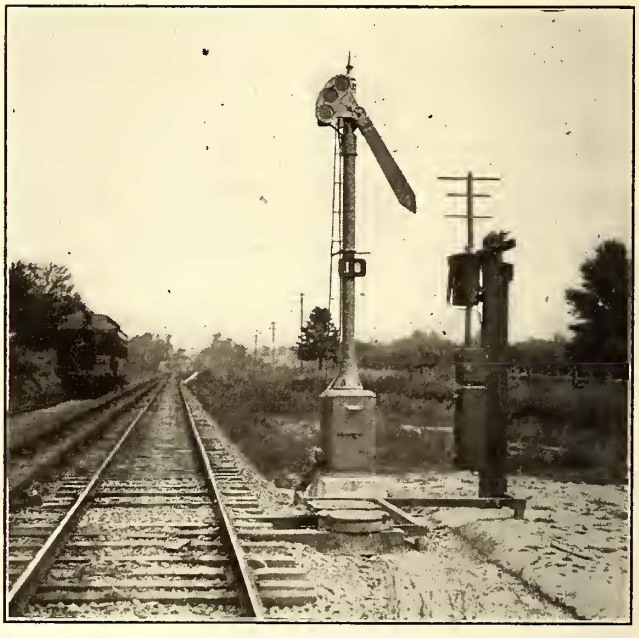


FIG. 10.—REACTANCE BONDS IN CIRCULAR CASES IN PLACE ON EXTENDED TIES

to which these relays can be adapted by simply changing the windings or contacts or by the addition of stock parts.

When wound to a low resistance they may be used as track relays with contacts to the number of four front and four back, and when equipped with heavy contacts they can be used for the control of low voltage heavy currents as already described. When equipped with carbon to carbon contacts they will break small currents of high voltage (up to 600). When wound to a high resistance they may be used as line relays with any reasonable equipment of contacts desired. By adding an upward extension to carry a small semaphore arm they can be used as tower indicators and, when placed in a suitable case, as switch indicators. The movements when placed in a case and equipped with a shutter and suitable contacts can be used as light signals for tunnel work. Furthermore, the feature which this re-

lay possesses of operating in one direction with a given phase relation and in the opposite direction when said phase relation is reversed (and since a given reactance or resistance is necessary to produce rotation in a given direction) the possibility of false operation due to foreign currents or crosses is much more remote than in the case of direct current relays and certain other a. c. relays. This feature also makes it possible in many cases to use but one line wire where two would otherwise be required.

The motor control relay is shown by Fig. 9 and also at F (Fig. 1). It is so controlled by the three track circuits in advance of a given signal that it cannot close until the train is out of the overlap for the next signal in advance as shown by the circuit plan, Fig. 1. This relay directly controls the clearing of the signal and is of the alternating-current tractive type. It is designed so that a uniform magnetic pull is exerted on the armature, notwithstanding the fact that the current in the magnetic coils alternates. In many respects it is similar to the direct-current track and line relays manufactured by this company.

The signal mechanism employed is shown in Fig. 6, and in Fig. 7 is shown a two-arm movement which, although not employed on this installation, will serve to illustrate the principles of operation. The mechanism is operated by a small single-phase induction motor *A* which is connected through suitable gearing to a slot wheel *B*. Projecting from the sides of said slot wheel are pins which as they come around engage the slot dog *C* in such manner as to clear the signal in case the slot is energized. The slot magnet *D* is designed to operate on alternating current and to give a uniform pull without noise and vibration. It has an exceptionally high "drop away" point. The movement of the blade in clearing is limited by the stop arm *E*, said arm becoming effective only when the slot is energized, and is so arranged that the signal blade is brought precisely to, and held at, the clear position no matter what the speed of clearing. The circuit-breaker contacts are enclosed in a dust-proof case *E* with a glass front which is mounted at the top of the mechanism. The dash pot *G* is of the buffer type, allowing a free initial movement of the blade in returning to the stop position. All signals are lighted by two 4 c. p. 50-volt lamps in multiple.

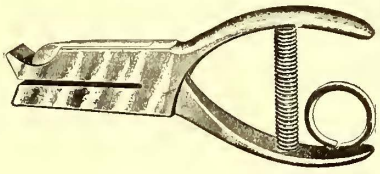
All relays are housed in wooden boxes which in turn are enclosed in cast-iron boxes as shown in Fig. 4. In the lower part of the iron boxes are mounted the terminal boards where all outgoing wires terminate on suitable binding posts and to which all apparatus within the boxes themselves are connected by flexible leads. All transformer secondary fuses are also mounted on this same board. The relay boxes, grid boxes, and line transformers are mounted one above the other on suitable stub poles provided for the purpose as shown, for example, in Fig. 4.

The different circuits employed for the control of the signals are shown in Fig. 1. A train is shown as having just passed out of the overlap. The functions of the pieces of apparatus having been described hereinbefore, the operation of the circuit will be self-evident without comment.

Street railways with cars operated by manual power are in use at Mombasa, in East Africa. The light, narrow gage tracks are laid through the street, and the cars are for hire; like cabs, or are the private property of officials and wealthy residents. They are little four-wheel cars with one or two cross seats, and each is propelled by two natives. Spur tracks are run into private grounds, so that persons can take the cars to their doors.

A STRONG PUNCH FOR STREET RAILWAY SERVICE

Of all the various uses to which punches are put, there is none, perhaps, more severe on the instrument than its use in street railroading. In many cases the punch is almost constantly in service and frequently is used to punch tickets and transfers in bulk, in which event it is likely soon to fail unless there is a large factor of safety. In addition, the punch does service in all kinds of weather, and soon begins to deteriorate rapidly unless it has been carefully nickeled. To meet these requirements a number of punches have been developed, among them one by the Bonney-Vehslage Tool Company, of New York, which has met with favor among street railway companies and has been adopted by a number of them. This punch is very strong, with thumb hole and spiral spring between the handles, and is so designed that the numbers to be punched are plainly visible through the punch. It cuts 1⅛ ins. from the edge and is so arranged that it will take any single die in the company's list, which is very extensive.



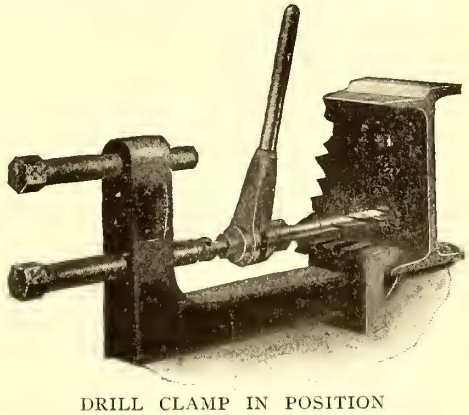
PUNCH THAT SHOWS NUMBERS

MEETING OF THE A. S. M. E.

The fifty-fourth annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies' Building, New York, Dec. 3-6, 1907. Symposiums on foundry practice, giving the experiences of prominent men in that work, have been arranged. Other live topics, such as industrial education, power transmission by friction driving, cylinder port velocities, etc., will be discussed. The committee has arranged an excursion for Wednesday afternoon and an address in the evening.

A NEW TYPE OF DRILL CLAMP

The Security drill clamp is a device for drilling rails which the F. Bissell Company, of Toledo, Ohio, the maker, says remains firmly locked while in use. It has no bend or spring. A vertical headpiece makes the device adjustable. The vertical arm holds two adjusting screws, each one by eight inches, which follow the drill forward. They are of ample size for heavy use and are cupped to receive a ratchet head. Two screws are provided with their centers set respectively two and six inches above the horizontal arm. In use this arm comes tight against the rail base, so these measurements apply to the rail itself. If the screws do not fit the holes a loose bar may be placed across the screw tips and the bar cupped to receive the ratchet. The company is offering this clamp on approval.



DRILL CLAMP IN POSITION

A NEW ELECTRIC RAILWAY SIGNAL

A new automatic electric railway signal has recently been developed by Prof. Alexander Bevan, of Providence, R. I., with special reference to the requirements of single-track service. It is also capable of spacing cars or trains on double-track roads. Each block is provided with two signal boxes and two circuit closers or trolley switches, one being located at each end of a single stretch of track. The signal is operated entirely by trolley current, no batteries being used in its working. It indicates whether the block is clear or occupied, and in which direction the car or cars are moving, a red signal indicating that the car is coming toward, and a green signal that the car is going from the observer. It is operated by the trolley whether the car is coasting or using power.

Fig. 1 is a photographic reproduction of the signal out-

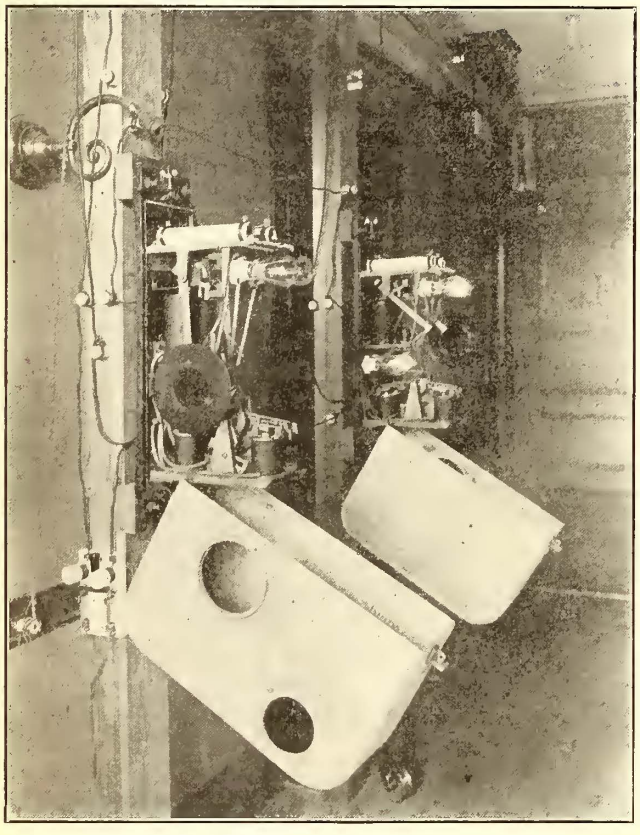


FIG. 1.—SIGNAL OUTFIT FOR ONE BLOCK

fit for a block, and Fig. 2 is a wiring diagram for a block. Any car entering an unoccupied block sets the danger signal at the farther end, and the setting of the danger signal lights a green light directly in front of the moving car, thus giving positive assurance that the danger signal has set. This condition remains until the car leaves the block, when the signals are restored to normal. Should more than one car enter the block, each follower operates a mechanism in the farther signal, which flashes the green lamp in front of the entering car, and prevents the signal from returning to safety until the last car has left the block.

In case either red or green lamp burns out, reserve lamps are arranged to be automatically thrown into circuit until the regular lamps can be replaced. In case of any interruption of current the red semaphore targets drop to danger by gravity. The circuit-closing mechanism is adapted to high-speed service on either trolley or bow construction. The time of contact is practically the same for all speeds, and is sufficiently prolonged at any speed to operate the signal positively. The resistance to the trolley wheel is insignificant, and rebound or double action on the signal is impossible. No straight safety signal can be given without an indication from the distant end that all is clear in the block.

Referring to Fig. 2, when a car enters a block from the right the trolley wheel comes in contact with a switch lever in the overhead circuit closer on the trolley wire. The movement of this lever energizes the setting magnet A, causing the switch bar attached to its armature lever to break connection and open the circuit of the solenoid or semaphore magnet B by the movement of the finger on the ratchet wheel shown. This allows the target in the signal at the opposite end of the block to fall to the danger position. As the target falls it closes the circuit of the green lamp in the signal box at the home end of the block. This green lamp is a cautionary signal and shows through an aperture in the casing either day or night at the entering end of the block, to notify the car that the danger signal at the opposite end of the block has been set. This green light can only be lighted when the danger signal is set at the other end of the block.

When more than one car enters the block from the same direction the setting magnet A is energized by the operation of the circuit closer in the trolley wire at the entering end of the block, and the finger on the ratchet wheel is turned back a step at a time as each car enters after the signals have been set, and this finger is returned again by the closing magnet C a step toward its normal position each time a car leaves the block until but a single car remains in the block. When the last car passes out the finger closes the contacts, throwing current into magnets BB, and pulling up the target from the danger to the safety position. At the same time the circuit leading to the green lamps in the distant signal case at the entering end of the block is broken by the downward movement of the magnets BB. These plunger magnets exert a gradually increasing power to move the target, the power increasing in proportion to the increase of leverage as the target is raised, thereby insuring a smooth and uniform movement and avoiding shocks which result in injury to the parts. The cores of these magnets are also arranged to exert a straight pull, and there being no unnecessary lateral play in the cores, losses of power by leakage are avoided.

A feature of the signal is the construction by which the connection to the green lamps is broken for a short period when each car after the first one enters the block, thus showing to the entering car by the flashing of the green lamp at the entering end that the mechanism has again been operated. This flashing is caused by the movement of the switch bar attached to the armature of magnet A, which remains away from the contacts as long as the switch in the contact box on the trolley remains in contact, which is but a few seconds. The providing of a reserve lamp for both the cautionary and the danger signals is a most important feature of the rear signal, as a lamp is liable at any time to burn out and cause the system to become apparently inoperative. By the solenoid relays shown in Fig. 2, however, at the right of magnets BB, a reserve lamp is at once lighted automatically by the breaking of the circuit in the first lamp, and the system continues operative as if nothing had happened. When it is noticed that the first lamp is not lighted, it is replaced by a new one, which lamp then operates the solenoid automatically to break the circuit to the reserve lamp and cause the first one to be lighted again.

In case of a break in the wiring or other disorder in the apparatus, the danger signal is automatically set, and should this danger-indicating target fail to fall into the danger position, then the green or indicating lamp at the entering end of the block will not be set and the failure of this lamp to light will indicate to the approaching car that the signal is out of order, and there is danger ahead.

The overhead switch is designed to make a positive contact, whether the car is traveling at high or low speed. The contact made by the trolley upon the actuating lever is ordinarily very short, even at moderate speed, and when the car proceeds at a high speed the contact is so short as to be ineffective. For this reason the switch is designed for a prolonged contact released by a dash-pot. The arrangement of the retarding mechanism completely controls the period of contact, entirely independent of the throw of the actuating lever. At high-speed car operation the actuating lever and its engaging mechanism is thrown farther than

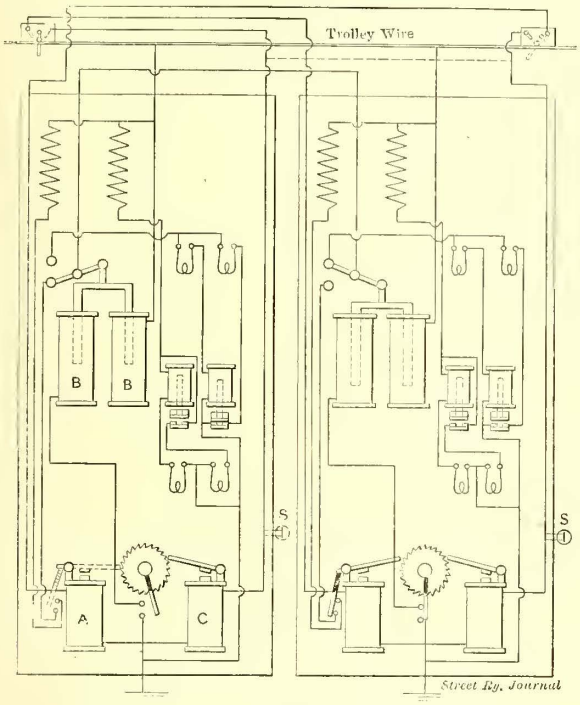


FIG. 2.—WIRING DIAGRAM FOR ONE BLOCK

when the car is passing more slowly. Then again, all trolley wheels are not of the same depth, some after having been worn having deeper projecting flanges. This also has a tendency to throw the actuating lever a greater or less distance. To compensate for this uneven stroke in the mechanism, a vent hole is bored in the dash-pot, so that the attending mechanism will return quickly to a given point. It then moves more slowly until the contacting finger is about to break its connection, when the break occurs quickly. A stop is provided to prevent the lever after being struck from bounding over to the opposite side of the case and giving the clearing indication at the distant end of the block. In case a motorman should pass the overhead trolley circuit closer with his trolley off he would receive no signal to allow him to pass, and if he did proceed under the circumstances it would be by a deliberate infraction of the rules.

In a test of Prof. Bevan's signal on the tracks of the Rhode Island Company, extending over about two weeks, the signals averaged about 80 hours of continuous work, comprising 4000 complete operations. During this test a slight change was made in the air cushions on the contact. None of the parts showed any wear. The number of half trips per day varied from 176 to 565, the total being 3931, making 7862 contacts on the trolley circuit closer. The apparatus worked properly during the entire period of experiment. The number of times the signal operated was equivalent to having it in service on a 20-minute headway for 2.5 months.

In case two cars enter from the opposite ends of the block at the same time, or nearly the same time, both cars can be run back far enough to operate their respective trolley contacts, which clears both signals. The car having the right of way may then proceed regularly, setting the danger signal ahead and leaving a cautionary signal in the rear, while the other car waits for its passage. This arrangement permits any number of cars to follow regularly the car having the right of way, but the signal indicates danger to the car waiting on the siding till all the following cars pass. In Fig. 2 the yoke wire joining the wires leading to the clearing magnets was intended primarily to permit a car to run into a block for the purpose of unloading freight, etc., and then back out and clear the block without having to go through the block to clear the signal. As this yoke wire operates both clearing magnets in multiple from either end of the block, the switches SS can be introduced to enable the conductor of a car which has carelessly or unavoidably entered an unoccupied block against a danger signal, to open the circuit of the clearing magnet in the rear signal, run his car back and clear the signal at the farther end without operating the rear signal, then close the clearing magnet circuit just opened by means of the switch, and thus leave the signals in the condition in which he found them. With this arrangement it is never necessary to remove the trolley from the wire, which might sometimes be objectionable at night.

OHIO MERCHANTS TOUR ELECTRIC RAILWAY LINES

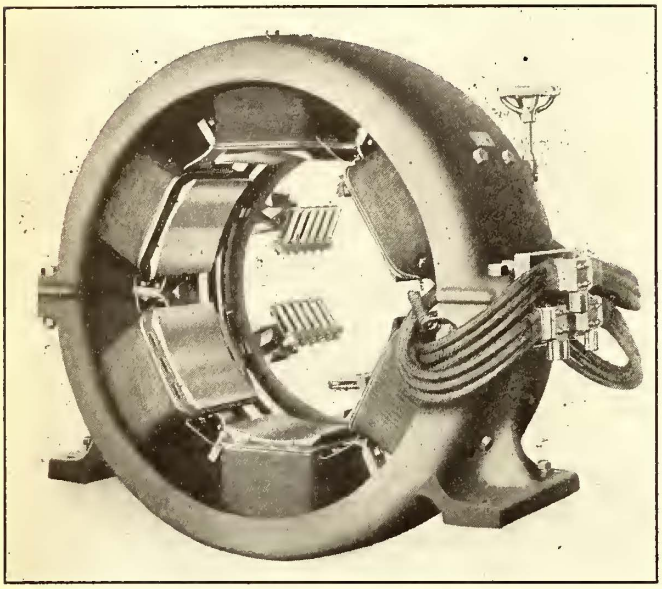
Representatives of forty wholesale houses at Cleveland, Ohio, took a two days' trip over the electric railway lines of the northern part of the state recently. These men are members of the wholesale board of the Cleveland Chamber of Commerce and have for several years made two trips on steam roads each year through various sections of the Central West for the purpose of meeting and getting acquainted with retail merchants who patronize them. These trips are known as trade-extension tours and have been quite successful. This time the board decided upon an electric railway trip that would take them to both the larger and smaller towns close home.

On a Thursday morning the start was made over the Northern Ohio Traction & Light lines, two large coaches having been chartered for the purpose. After stopping at a number of towns en route, they reached Canton in the evening and attended a smoker at the McKinley Hotel. This gave them an opportunity to meet the merchants in a social way, as well as at their business places. A number of towns in that vicinity were visited, including Massillon, and on the return trip stops were made at Barberton and other places. The second evening was given to a smoker at the Buchtel Hotel, Akron. On the return trip the merchants stopped at many small places that would have been omitted from the itinerary on a steam road and they had the advantage of meeting customers at their places of business and sizing up the surroundings, thus getting a better idea of the standing of the various houses and the question of credit that may be extended. The trip also suggests the possibilities of additional business to roads which have a terminus in a large city.

A NEW TYPE OF DIRECT CURRENT GENERATORS

To meet the increasing demands for continuous current direct-driven generators for lighting and power the Sprague Electric Company, of New York, has brought out the new type S generators which embody all the excellent features of the older machines, together with many improvements.

One of the distinctive features of the new generators



TYPE S GENERATOR, WITH ARMATURE REMOVED

is the use of soft steel castings for the magnet yoke. The generators also have a small armature reaction, which means a small number of armature turns, and, consequently, a short length of conductor to be traversed by the main current in the armature. Another advantage of type S generators, due to their small armature reaction, is that the armature is magnetically weaker, and the magnetic effect of the armature current tending to shift the main magnetic field is consequently less. It follows, therefore, that these generators will operate with satisfactory commutation without shifting the brushes at greater overloads than will those having large armature reaction. The use of laminated poles not only prevents eddy-currents in the pole faces and an accompanying loss of energy, but also prevents eddy-currents in the body of the poles whenever there is a change of the magnetic flux.

The generators are made in standard sizes, from 25 kw upward, at speeds recommended for the several sizes by the committee of the American Society of Mechanical Engineers on standardization of engines and dynamos. Their general appearance, as the illustrations herewith show, is quite similar to former types of Sprague direct current multipolar generators. The yoke is circular, with inwardly projecting poles, each surrounded by shunt and series windings. The armature spider supports the commutator so that the shaft may be inserted or withdrawn without disturbing any electrical connections on the armature. The brush rigging is of the well-known type used for years on Sprague generators.

Each of the spools upon which the field coils are wound consists of a thoroughly insulated sheet-iron body with substantial fiber heads. A compound field winding is used. The series coil, formed of flat strip, is wound first. This is separated from the shunt coil, which consists of insulated copper wire, by insulation and a half-inch air space. This air space communicates with the outside air through holes in the fiber heads, affording ample ventilation of the windings with a consequent low and uniform operating temperature.

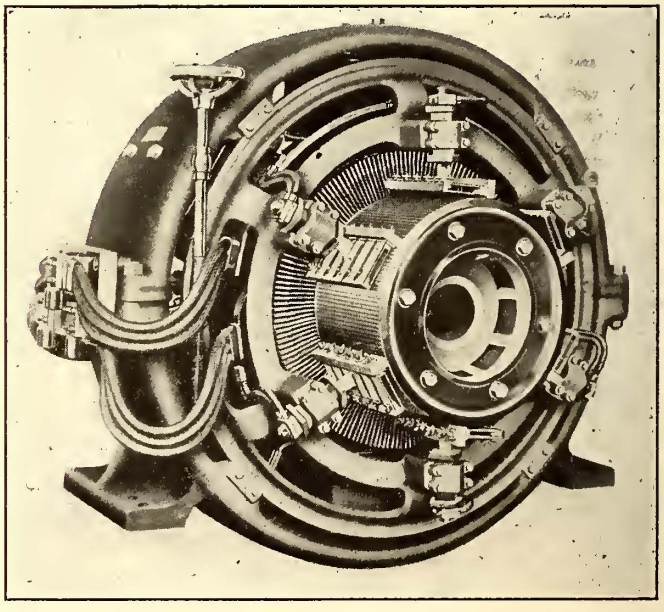
The magnet yoke is made in two pieces, and the division being horizontal enables the upper part to be removed to facilitate handling and inspection. Accurately bored surfaces projecting inwardly from the magnet frame provide seats for the pole pieces. The feet on the lower half of the yoke are drilled for foundation bolts and are provided with jack screws for adjusting and leveling.

The pole pieces are built up of riveted sheet-iron punchings. Each pole is secured to the magnet yoke by two bolts. This construction facilitates the removal of pole pieces and field coils at will. As previously stated, the pole tips are designed to give the proper spreading of the magnetic flux in the air gap, to secure the best results in commutation, and they also serve to hold the field coils in place.

The armature core is built up of thin notched punchings of annealed and japanned sheet-steel clamped between cast-iron plates, which have a projecting flange for supporting the end winding, on a substantial cast-iron spider, and keyed to the latter. Excellent ventilation is provided the core by space plates assembled at the ends and at intervals between the punchings. A large opening through the center of the core permits a free passage of air through the core, windings and commutator, thereby affording additional ventilation. The armature conductors, except where connected to the commutator segments, are without joints.

The commutator consists of hard-drawn copper segments insulated with micanite and clamped by a cast-steel ring to a cast-iron shell rigidly supported by the armature spider. Thick mica cones insulate the segments from the clamping ring, and the mica used between segments is selected to wear evenly with the copper.

The brush holders are liberally designed as regards their current capacity, are light in weight and do not utilize the tension springs for carrying current. There is individual



THE TYPE S GENERATOR READY FOR SERVICE

adjustment for each brush and the removal or replacement of a brush is accomplished with the greatest ease. The brush holders are supported by a cast-iron rocker ring, which fits into a machined seat on the magnet yoke, and is capable of being rotated for adjusting the position of

all the brushes simultaneously. The brushes are of carbon with sufficient area to prevent undue heating.

On generators below 100 kw capacity a single marbleized slate terminal panel is provided, while on the larger machines two such panels are used, one on each side of the frame. The generator terminals are attached to lugs on these panels, and cable lugs are provided for connecting to the outside circuits. The location of the single panel and the position of the positive terminals, where two panels are used, are made to suit the requirements of the customer.

ANCHOR BOTTOM TIE PLATES

It may be said that there are two things worthy of particular consideration in connection with tie plates. First, the design of the plate. This should be such as to protect the tie from cutting and abrasion and resist as strongly as possible the tendency of the track to widen. Second, the material of which the plate is made in order that a maximum of resistance may be offered to the deteriorating effects of the atmosphere, as well as to the effects of service. It is in accordance with these considerations that the Sellers anchor bottom tie plate, made by the Sellers Manufacturing Company, of Chicago, is designed. The bottom of the plate is provided with diagonal corrugations, which offer maximum service to resist track spreading. A shoulder is provided to insure against the shearing strain on the outside spikes. It is said that the corrugations on the bottom compress and engage all of the top fibers of the tie, but do not cut into the tie in such a manner as to allow water and other substances to enter the tie and cause rotting. The corrugations cross the fibers, the theory being that though they firmly grip the tie, they do not enter into the fibers of the wood parallel to the fibers, or, in other words, in the direct line of the lateral pressure, which causes track widening.

The plate is rolled from wrought iron because it is believed this material affords fully as great strength as rolled steel and is better able to stand the effects of the weather and atmosphere. The manufacturer says the constant movement of the rail on the tie plate is caused first by expansion and contraction by varied temperatures, and second, by the creeping of the rail under a moving load, causing a waveline of deflection moving ahead of the load and moving backward as the load passes. Steel in the rails and steel in the tie plate conduces to destructive wear. Iron being fibrous and the fiber running in the direction of the longitudinal motion reduces this abrasion to a minimum and precludes the tie plate from wearing up into the rail, as it is most likely to do when two identical metals are brought in contact.

The Sellers tie plate is made in any size, weight and thickness desired and punched for any size rail with two, three or four hole punchings. The manufacturer says that the plate when properly applied will not buckle and will hold the track to gage on the sharpest curves and under the most severe conditions. It is the usual method when installing the plate to insert it under the rail and spike it to gage. The weight of a train is considered sufficient to seat the plate and the spike may then be driven home. The plate is being used by many of the leading railroads throughout the country, though more particularly in the West.

SOFT DRAWN STEEL INSTRUMENT CASES

To give the best results an instrument case should be dust proof, it should be capable of being made fume and moisture proof, and in addition the material of which the case is made should be of such a character as thoroughly to protect the instrument from the disturbing effects of external magnetic fields. In designing cases for "American" switchboard instruments the American Instrument Company, of Newark, N. J., has given special attention to these points and has produced a case drawn from sheet steel uniformly soft and of the same thickness throughout, which is said to be a very efficient magnetic shield and to possess the other virtues mentioned. Careful laboratory tests and tests under actual working conditions have been performed to determine just what influence strong external fields would have upon the readings of a permanent magnet moving coil instrument, when housed in the type of case described above, and the illustrations, Fig. 1 and Fig. 2, show the result of one of these tests. Fig. 1 shows an instrument without the ornamental name plate carrying constant current of the value indicated by the pointer. This current was maintained at constant value and a magnet the same as regularly used in the instruments placed on the case directly over the poles of the inside magnet. The very slight change of reading resulting from this is shown in Fig. 2. With the polarity of the outside magnet reversed the effect upon the reading was even less than indicated, which shows the unusual efficiency of the case and its special adaptability for use in close proximity to cables carrying heavy variable currents or other strong magnetic fields. To prevent the entry of dust these improved cases have ample bearing surface where separate parts join, and the scale openings are covered by unusually large glasses, and the full size of the front of the case cemented in position. Where necessary they can easily be made proof against moisture and injurious fumes. James G. Biddle, of Philadelphia, is general sales agent for the company

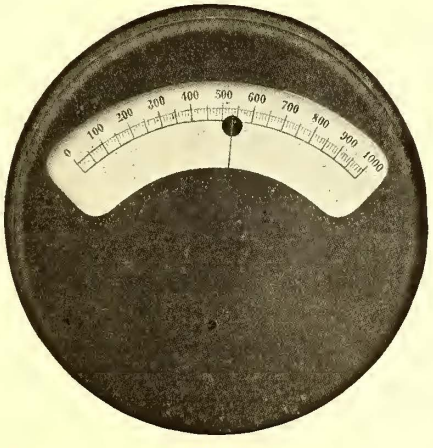


FIG. 1.

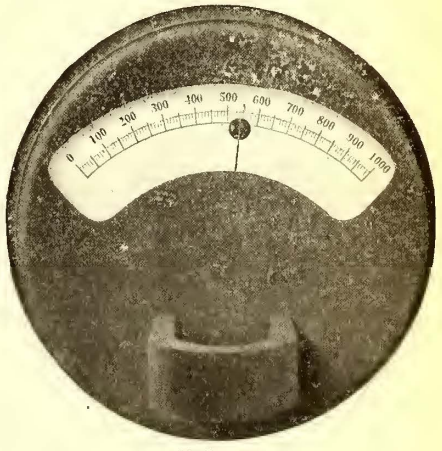


FIG. 2.

The Missouri Traction Company has been incorporated to build an electric railway from St. Joseph to Excelsior Springs and Mirabile, Mo.

EMERGENCY VALVE FOR STRAIGHT AIR-BRAKE EQUIPMENTS AND A PNEUMATIC GOVERNOR

The Allis-Chalmers Company, of Milwaukee, has designed a straight air emergency valve which makes it possible to equip with straight-air trains of two to four cars and secure to them all of the advantages of the simplicity and positive action of the straight system and, at the same time, possess the automatic safety features to be applied in case of a break in couplings or hose connections. This, it will be readily seen, puts the control of the brakes in the hands of the conductor as well as in those of the motorman, and the application of the emergency valve adds to the equipment the emergency device only.

The working parts of the emergency valve consist merely of a slide valve operated by a piston and a release spring moving in the air chamber. The train pipe is required as a part of the equipment only in cases where the motor car pulls trailers on which there is no controlling apparatus. Where two or more motor cars or the motor and the trailer car are provided with a controlling device, no additional hose connections are required, as in such cases it is only necessary to connect all reservoirs by means of an auxiliary hose in addition to the one provided for the straight air-brake train pipe. The manner of applying the straight air brake, when equipped with the emergency valve, remains unchanged, since there is an unobstructed opening between the straight air train pipe and the brake cylinders when the emergency valve is in released position. A passage between the main reservoir and the emergency line is provided to maintain, throughout the train, pressure in the latter equal to that in the main reservoir, while pressure is being raised in the main reservoir by the compressor. An additional orifice between the main reservoir and the emergency line, connecting the latter to the slide valve chamber, while being in direct communication with the auxiliary reservoir, also keeps the auxiliary reservoir charged to the same pressure as the emergency line and main reservoir.

Should a conductor's valve be opened or the train become disconnected, air is allowed to escape to the atmosphere from the emergency line, causing rapid reduction of pressure on that side of the piston towards the emergency line and unbalancing the pressure, the result being that the greater pressure in the auxiliary reservoir forces the piston and slide valve to the extreme length of their travel. In this way the reservoir is disconnected from the emergency line and is connected directly to the brake cylinder through a large orifice, which results in an instant equalization of the pressure in the brake cylinder and the auxiliary reservoir, thereby causing maximum brake pressure to be applied almost instantaneously, since the supply of air from the auxiliary reservoir has a much shorter distance to flow to reach the brake cylinder than is the case when it must travel from the main reservoir through the main air pipe, as in regular straight air-brake systems. In the same way the opening from the main reservoir to the emergency line is closed by the piston when it has travelled the full length of its stroke, which permits no escape of reservoir air through the open emergency line.

The type "OB" pneumatic governor, now offered by the Allis-Chalmers Company, received its first test in actual service on the Manhattan Elevated Railway, New York City, where it was put through a series of 284,000 continuous operations, breaking a current of 35 to 40 amperes, at 600 volts, without any attention whatever during the period of the test, which would be equivalent to about two and one-half years' service under ordinary conditions. The claims made for the governor are that it is light, compact and substantial, and suited to serve continuous service. The main body contains a compression spring and piston upon which the air pressure acts. The cap is machined to receive and secure the diaphragm; it is bolted to the main body and tapped for pipe to connect to the main reservoir. The cap is so arranged that pipe connections may be brought from any side to the governor, which is in direct communication with the main reservoir. The diaphragm is made of pure rubber. The piston and rod are made of steel. The compression spring, which is enclosed within the main body and well protected against tampering, acts upon the piston. The pressure is varied by adjustment of screws acting upon the spring washer, whereby the spring may be compressed or relieved to suit requirements. The piston-rod end is so shaped as to engage with a trip-hammer, and moves this over the center position past the pivot point. When the pressure in the cap chamber above the diaphragm increases, the piston is forced downward, compressing the spring.

The hammer being forced by the piston rod past the dead center, and aided by a spring in the housing, delivers a sharp blow to the yoke, carrying the contact blades through which the current is opened and closed, which are made of bronze metal and well insulated against short circuit or ground. The copper tips are quickly separated and the arc completely extinguished by the powerful magnetic field.

As the air pressure is reduced the compressed spring at once commences to return to its former position; the piston rod again comes in contact with the trip-hammer and reverses the movement of the latter; the yoke, being carried over the center line of pivot point by the hammer, returns with a snap, aided by the springs and closes the circuit. This quick return is important, as it prevents arcing and gives a wiping effect to the contact tips. The yoke is firmly held in either position by the tension spring, and, in addition, is securely locked by the trip-hammer. The quick brake mechanism is mounted upon a substantial brass frame and securely fastened to the main body. The blowout coil and chute are mounted upon an insulating block, which, in turn, is attached to the frame.

The small tension springs are protected by brass tubing, and are interchangable, without affecting the accelerating action of the mechanism. The electric terminals are brought out through the governor body and are well insulated by means of insulating bushings. They may be connected to either side of the line. All pins and moving parts are made of hard brass, thus preventing corrosion. No lubrication to moving parts is necessary. The mechanism is protected against dust and water by a light and strong cover, easily removable, which permits free access to the moving parts. The variation of maximum and minimum pressure is accomplished by the adjustment of a set screw. The governor may be set between the pressure of sixty-five and ninety-five pounds with an operating margin of ten pounds. For example, the governor can be adjusted to cut out at eighty-five pounds pressure, and it will automatically cut in and start the compressor when the pressure drops to seventy-five pounds. Care should be exercised in connecting the governor to the air reservoir. The piping must be carried directly from reservoir and insulation coupling inserted in the line. The governor will operate successfully in any position, and can be mounted below the cars or under a car seat. It occupies a space of 12 ins. in height, 7 ins. in length and 5½ ins. in width.

TURBINES FOR THE UTILIZATION OF EXHAUST STEAM

Willans & Robinson, of Rugby, Eng., well known for their high-speed turbines and steam engines, have been recently engaged on the construction of turbines for the utilization of exhaust steam, and have under construction at their Rugby Works two machines of the normal output of 1350 kw with an overload capacity of 2000 kw. The machines are for the works of Sir Bernard Samuelson & Company, Middlsbrough, and have been arranged to take steam from a number of non-condensing blowing engines, used for supplying air to a number of blast furnaces. They are coupled to three-phase generators working with a periodicity of 40 with a pressure of 3000 volts and running at a speed of 2400 r. p. m., and will work in parallel with a number of other turbines in the same district to supply power to iron works and the local power distribution company.

Each turbine exhausts into a surface condenser of the Willans & Robinson's type designed to give a vacuum of 29 ins. with a temperature of circulating water of 60 degs. F. The quantity of steam to be dealt with at normal load is 45,000 lbs., and about 70,000 lbs. at the overload. A special feature of the plant is the arrangement of relief valves. All low pressure steam that is not required for doing work in the turbine is by-passed into the condenser, so that all the steam output of the blowing engine is returned to the boilers as condensed water. The condensing plant is fitted with Edwards type three-throw air pumps driven by means of three-phase induction motors through machine-cut gearing. The circulating pumps are of the centrifugal type, and are also driven by low-tension induction motors. The water for circulating about 4500 gallons per minute is pumped from the river and is forced through 27-in. cast iron mains to the turbine house, a distance of some 250 yards.

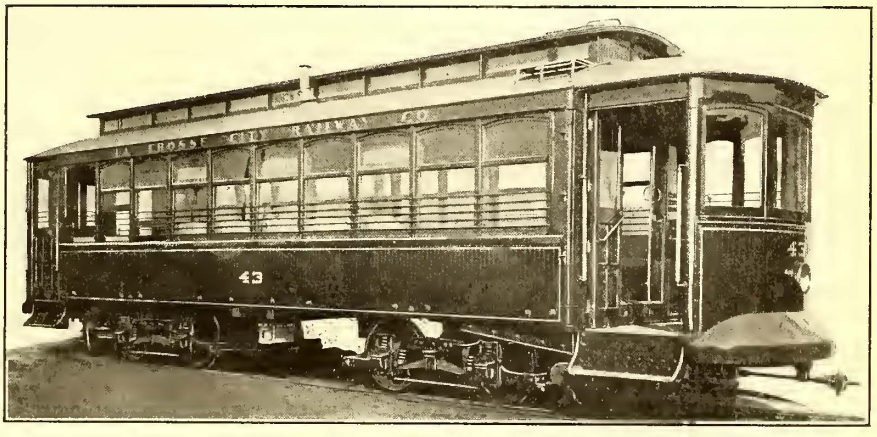
Willans & Robinson have also on hand 200-kw exhaust turbines for the South Wales District, arranged to work in conjunction with heat accumulators. The exhaust steam in this case is furnished by colliery winding engines. Among other sets on hand at the works at Rugby is a 500-kw exhaust turbo-alternator for supplying power to an iron works and colliery in the Staffordshire district working in conjunction with a vertical non-condensing blowing engine. The Willans & Robinson exhaust turbine is suitable not only for driving electric generators, but also for driving blowers, exhausters, ventilators and also high lift centrifugal pumps. The firm also supply high pressure steam turbines of all outputs from 2000 to 10,000 hp, and have supplied years nearly 250,000 hp in steam tur- or have on order within the last three years nearly 250,000 hp in steam turbines, the machines being exported to all parts of the world.

The Public Service Commission of the first district of New York has ordered an increase in the service on the Madison and Fourth Avenue surface lines. The order sets forth the number of cars which shall constitute the minimum hourly service in the day, and only the evening rush hour is left out. Mr. Maltbie says the rush hour situation demands more study.

SEMI-CONVERTIBLE CARS FOR LA CROSSE

The North Side in La Crosse is separated from the main part of the city by the La Crosse River and has a population of 8000. It contains many factories is the terminus of four divisions of the Chicago, Milwaukee & St. Paul Railway and the site of the shops of the Chicago, Burlington & Quincy Railway. As the situation stands at present all traffic between North La Crosse and La Crosse proper is handled by one double-track line which crosses the river on the only available bridge connecting the two sections. The total mileage in La Crosse at present is fifteen miles, of which about four miles are double track. All lines center at Fourth and Main streets, the business center of the city; a ten-minute headway is maintained. Improvements under way consist of a half-mile extension south from Gunds' Brewery and a half-mile extension to be built east on Main Street from Sixteenth to Twenty-fifth Street next spring. An addition to the car barn at Third and La Crosse Streets is now being made to accommodate the new cars. A new storage barn for trailers and extra cars will be built on property owned by the company on the North Side; this work will also be accomplished next spring. Upon the completion of the new water power plant of the La Crosse Water Power Company at Hatfield, the company will install a motor generator set of 300-kw capacity and use this as its main power unit. The plant is now under construction and will generate 5000-8000 hp, to be used in La Crosse and Winona, Minn.; the power will also be used to operate a proposed interurban line between the cities mentioned about thirty-six miles in length.

Four semi-convertible cars built by the American Car Company have recently been placed in operation on the busiest line in La Crosse. They have generous aisle space and commodious seats, the seats being 35 ins. long and aisle 24 ins. wide. On account of the low window sills five-bar guards are provided. The doors are protected in a like manner. The bottom framing includes 12 in. x 3/8 in. sill plates—a standard feature of this type of car which obviates the use of inside and under truss rods in cars of this length. The plates are screwed to the posts and are an additional means of stiffening. The seats are of Brill make; the inside finish is of cherry; ceilings of 3-ply birch. The No. 27-G1 trucks are employed. The chief dimensions of the cars follow: Length over end panels, 28 ft.; over crown pieces, 38 ft.; width over sills, including sheathing, 8 ft. 2 ins.; height from floor to ceiling, 8 ft. 5⅜ ins.; from track to under side of sills, 32⅝ ins.; size of side sills, 4 ins. x 7¾ ins.; end sills, 5¼ ins. x 6 13/16 ins.



CAR FOR SERVICE IN LA CROSSE

MEETING OF THE AMERICAN RAILWAY ASSOCIATION

The fall session of the American Railway Association was held at the Waldorf-Astoria, New York City, on Wednesday, Oct. 30, 1907. There were present seventy-five members, represented by 175 delegates. The executive committee reported that the present membership of the association comprises 331 members, operating 235,457 miles; also forty-six associate members, operating 1457 miles.

Among the subjects discussed of interest to electric railway companies were those of a standard location of third-rail, definitions and terms used in electrical equipment and a standard rail and wheel. The definitions are given below, while the report on standard location, which requires illustrations, will be published next week. The committee on standard rail and wheel sections presented a progress report which was referred back to the committee with instructions to investigate further, and with authority to employ experts for this investigation. The committee made no express recommendations, though the suggestions offered were, in the main, concurred in. The committee is composed of G. L. Peck, of the Pennsylvania, chairman; J. T. Richards, of the Pennsylvania; Julius Kruttschitt, of the Union Pacific; W. J. Wilgus, of the New York Central; R. Montford, of the Louisville & Nashville; E. C. Carter, of the Chicago & Northwestern; William Garstang, of the "Big Four"; R. Ettinger, of the Southern Railway, and W. E. Fowler, of the Canadian Pacific. Special attention was called by the committee to the disputed percentage of discard from the ingot, and it is understood that in the further investigations special attention will be given to this point in order to reach a specification satisfactory to the railroads and the manufacturers.

REPORT OF THE COMMITTEE ON THIRD-RAIL

This committee consisted of W. G. Besler (chairman), vice-president and general manager, Central Railroad of New Jersey; D. D. Carothers, chief engineer, Baltimore & Ohio Railroad; J. F. Deems, general superintendent of motive power, rolling stock and machinery, New York Central lines; Theo. N. Ely, chief of motive power, Pennsylvania Railroad; Geo. Gibbs, chief engineer of electric traction, Long Island Railroad; J. M. Graham, vice-president, Erie Railroad; W. Renshaw, superintendent of machinery, Illinois Central Railroad; W. J. Wilgus, vice-president, New York Central & Hudson River Railroad. The terms suggested were as follows:

1. Third-Rail.—An electrical conductor placed adjacent and parallel to the track rails as a means of conducting electric current to the locomotive or cars. It is maintained in permanent relation to the tracks by suitable supports and is insulated from ground.

2. Third-Rail Contact Shoe.—A conductor attached to the car or locomotive for the purpose of collecting current from the third-rail.

3. Third-Rail Contact Surface.—The surface of a third-rail with which the contact shoe makes contact.

4. Top Contact Third-Rail.—A third-rail with the contact surface on the top.

5. Under Contact Third-Rail.—A third-rail with the contact surface on the bottom.

6. Gauge of Third-Rail.—The distance measured on the plane of the track between the gauge line of the nearest track rail served to the nearest gauge line of the third-rail.

7. Elevation of Third-Rail.—The distance at right angles to the plane of the track between the top of track rail and the contact surface of the third-rail.

8. Third-Rail Support.—The support which holds the third-rail in position as regards elevation and gauge.

9. Third-Rail Insulator.—That part of the third-rail support which isolates, electrically, the third-rail from the ground, ties, track work and other grounded structures.

10. Third-Rail Protection.—A covering employed to guard the third-rail against the weather and from accidental contact of persons and material.

11. Third-Rail Platform Protection.—The guard used at low station platforms to protect the contact shoes from persons on the platform.

Note.—This term applies principally to the protection along edges of platforms when the third-rail is on the opposite side of the track from the platform.

12. Third-Rail End Incline.—The sloping approach at the end of a section of third-rail made to receive contact shoes moving in line with the third-rail and bring them from their free position to contact with the normal surface of the third-rail.

13. Third-Rail Side Incline.—The sloping approach at the side of a third-rail made to receive contact shoes moving laterally toward the third-rail and guide them from their free position to contact with the normal surface of the third-rail.

14. Third-Rail Tie.—The tie which is extended beyond the end of the standard track ties to provide a base for the third-rail support.

15. Third-Rail Anchorage.—A device that holds the third-rail in position longitudinally, preventing creeping.

16. Third-Rail Jumper.—A cable connecting the ends of the third-rail at openings made necessary by track and road crossings or other local conditions.

Note.—On surface roads the third-rail jumpers are usually placed in conduit under ground.

17. Third-Rail Jumper Head.—A device placed at the end of a conduit for third-rail jumper to protect and insulate the end of the jumper.

Note.—This is usually an insulated structure projecting above the track ballast and from which the third-rail jumper may be flexibly attached to the third-rail.

18. Third-Rail Bond.—An electrical conductor bridging a joint in the third-rail used to secure electrical continuity of the third-rail.

19. Third-Rail Feeder.—The connection between the source of power supply and the third-rail.

Note.—This is usually a cable carried either overhead or in conduits underground.

SEEING VIENNA BY TROLLEY

In accordance with a recent permit from the City Council, the Vienna Municipal Tramways have instituted a "Seeing Vienna" service, with specially furnished parlor cars. At present there are four principal routes, each including some noteworthy points of interest, but as the service develops other routes will be added. Most of the trips are planned to last a day, so that the cars may stop at the more important institutions long enough for the passengers to be guided through them. Tourists, of course, may return via another line if they desire to save time. When the cars are engaged by parties, the management is prepared to follow any desired route provided the same does not interfere with regular operation.

The excursions offered are fully described in 5½ in. x 8 in. 36-page handbooks which contain many fine half-tone illustrations of the objects seen on the particular route. Each book also contains a bird's-eye view of Vienna on which the four principal excursion trips are shown by differently colored lines.

The Youngstown & Southern Railway has begun the operation of through cars between Youngstown and Lisbon. An hourly schedule will be maintained, the cars leaving Youngstown on the even hour and Lisbon on the half hour. The distance is about twenty-eight miles and the trip will be made in one hour and twenty-five minutes, with a fare of 60 cents, or 25 cents less than that charged by the steam roads. A portion of the trip is made over the tracks of the Youngstown & Ohio River Railroad.

LONDON LETTER

(From Our Regular Correspondent.)

Two disastrous accidents occurred during tl e past month: one in Halifax and the other in Birmingham. The Halifax accident seems to have been the more serious, resulting in three persons being killed and thirty injured. It was one of the first of the workman's cars from Sowerby Bridge, and was practically full of workmen. Halifax is a particularly hilly city, and it was on one of these long hills, known as Bolton Brow, that the accident occurred. After safely reaching the top of the hill the car began to run down the hill backward. The conductor applied the brakes, and both he and the driver stuck to their posts, shouting to the passengers to keep their seats, trusting that the car would not leave the rails and stop when it reached a level. The car, however, left the rails at the bottom of the hill, smashed into a building and turned over, with the result already stated. The Birmingham disaster, which resulted in one person being killed and sixteen injured, also occurred to a workman's car, which left the city about 7 o'clock in the morning. It is stated in this case that the motorman complained to an inspector who boarded the car that the brake was not working well, and in going down a steep hill the car seems to have run away, and as there was a sharp turn at the bottom of the hill, the inevitable result was that the car overturned after leaving the rails and smashed into a stone wall. The cause of these accidents will undoubtedly be carefully investigated by the Board of Trade, and it would appear that, though much thought has been given to the subject of braking electric cars in these cities, a thoroughly satisfactory solution has not yet been arrived at. There appears to be no doubt that a constant immunity from accident on these steep grades makes drivers more reckless than they ought to be, with the result that sometimes, when even a partial failure of the brake takes place, a serious accident occurs. An accident almost of the same nature to that which took place at Halifax was happily obviated on the Nottingham by the presence of mind of the driver of another following car. As the cars were going up a steep hill the one in front suddenly began to run backward. The driver of the following car increased the speed of his car and stopped the runaway before it got up any great speed; then, putting on full power, he succeeded in pushing the runaway to the top of the hill.

There is only one London company which seems to have made any financial success of the motor bus. This is the Great Eastern London Motor Omnibus Company, which runs into the northeastern suburbs. Perhaps the success of this company is attributable to the fact that the directors and officials are all men who have had long and extended experience in tramway work, and took up the motor omnibus business a year or two ago as a new enterprise. All of the other motor omnibus companies are in a bad way, and the largest of them all, the company which runs the well-known "Vanguard" service, is evidently in a serious condition, the pound shares being purchasable on the market for perhaps one or two shillings. The two largest horse omnibus companies, which have also gone in to a large extent for motor omnibus traffic, appear to have failed miserably. The London General Omnibus Company, the largest of these companies in London, whose hundred pound shares stood perhaps at two or three hundred pounds only a few years ago, has had to face such reduced profits, evidently from the use of the petrol motor omnibus, that its shares are now quoted at about half their par value, the dividend having been passed at the last annual meeting. While the motor omnibus has carried many passengers, and has given good service at increased speed, the depreciation has been so great that most of the companies, as has been stated, are in a lamentable condition. Perhaps the newer types of motor omnibuses may be more satisfactory. In the meantime it is interesting to note that the Electrobus Company, which came out a year or two ago, has now had for nearly a year some half dozen electrobuses on the streets, operating very successfully. This company is using the regular storage-battery system, and it will be extremely interesting to find out whether or not it is actually going to pay in the long run. The history of the storage battery as applied to electric traction is a sad one. Its application to an omnibus in London, however, may be different, and in conversation with the managing director of the company, the writer was told that so far the results had been most satisfactory. These results, however, are, in the writer's opinion, due to the contracts which the company originally made. It has contracts for the maintenance of the batteries, the maintenance of the wheels, and practically the maintenance of the whole operating parts, so that its expenses are known and the success depends entirely upon the receipts. Except for depreciation upon the body of the omnibus, therefore, the company is not concerned with depreciation on any of the other parts. It would be interesting to find out, however, whether the sub-contractors have met with losses and whether these sub-contracts can be renewed. As far as comfort is concerned, the electrobus is infinitely superior to the other omnibuses.

The recent report of the Highways Committee of the London County Council is, on the whole, satisfactory reading, as on the southern system, which is the furthest advanced toward completion, a profit of more than £90,000 has been realized. This profit, however, has been greatly depleted by the losses on the northern system, which has been undergoing the process of electrification. The total result is a net balance of between £9,000 and £10,000, after providing liberally for all expenses. The report is the most satisfactory yet, and would undoubtedly go to show that, when the system is completed, which will not, however, be for two or three years yet, a handsome profit should be shown on the system. Details of this account will be found in another column.

No settlement has yet been made of the disputes between the London County Council and its men, and the latter are still holding meetings to protest against their alleged grievances. The medical examination still appears to be the chief bugbear, though many other questions still await settlement. The writer recently had a conversation with Mr. Fell, chief officer of the tramways, and so far as he can gather it would appear that this objection to medical inspection is after all a ridiculous one. An examination is absolutely necessary and will doubtless have to be made in due time. Nothing, however, has yet been decided, and it is hoped that the whole unpleasantness will gradually pass away. In the meantime the work of electrification is proceeding satisfactorily and new routes are constantly being opened to the public. The most important ones recently opened in South London are the new extensions from Tooting Broadway, the effect of which will be to bring Mitcham, Wimbledon, Kingston and Hampton Court into direct tramway connection with the center of London, with only one change at Tooting.

There is also proceeding a general linking up of the tramway systems all around the southwestern portions of London, and it would appear at last that the Crystal Palace will be reached by a County Council tramway. There has, however, been great hostility to this extension from the inhabitants of Dulwich, who are naturally proud of their beautiful roads and do not wish them desecrated. A rather circuitous route has, however, been adopted, which will not interfere with these beautiful wooded roads, and the work will be commenced at an early date.

J. B. Hamilton, manager of the Leeds Tramways, was recently appointed arbiter in the dispute between Kirkcaldy Corporation and the Wemyss Tramway Company with regard to the through running powers of the latter company over the Kirkcaldy lines. It has now been agreed to a make a trial of the arbiter's recommendation, and to transpose the termini on the upper and lower routes of the Kirkcaldy system, to enable the cars from Wemyss or Galatown to run through to Whyte's Causeway, the lower route to extend only from Junction Road to the Linktown. It was estimated by the convener of the Tramway Committee that the new arrangements would probably mean a saving of £1,000 yearly.

A new tramway track brake which has been invented in the offices of the Leeds City Tramways Department was recently tested and proved very effective. The brake, which is electrical and mechanical, presents several novel features, but the chief point is that it is impossible for the motorman to skid his wheels on applying the brake. The Board of Trade has issued licenses to the Leeds Tramways Committee to put three of these brakes into operation, and they are now being used with success on the system. We hope to publish fuller details in a later issue when the particulars are available.

Bacup Town Council has resolved that £5,200 be offered to the Rossendale Valley Steam Tramways Company for its undertaking within the borough, and also that in the event of Rawtenstall Corporation not expressing satisfaction with the corporation's powers under its agreement for the purchase of tramways, the town clerk take steps to promote a bill in the next session of Parliament to acquire such powers.

At a recent meeting of the Harton Parish Council, a deputation from the Whitburn Parish Council attended and laid before the members the desirability of a tramcar service between South Shields and Sunderland being established. The present travel-

ing facilities, it was submitted, were inadequate to the needs of the neighboring parishes, and also expensive to the residents. The deputation was under the impression that if the matter was taken up seriously by the parish councillors, and the various authorities approached, it would be brought to a satisfactory issue.

The tramways committee of the York Corporation has unanimously resolved to recommend the City Council to apply to the Board of Trade in November for a light railway order or a provisional order authorizing the City Council to make, lay down, and construct or to lease, for the purpose of an electric tramway system, four routes, from the railway station as a center, to the city boundary at Fulford, Tadcaster Road, Acomb Road and Haxby Road, respectively. It was also unanimously resolved that before exercising any of these powers a poll of the citizens shall be taken to determine whether the corporation shall work the tramways or lease the same to a company.

A. C. S.

LONDON COUNTY COUNCIL TRAMWAYS

The Highways Committee of the London County Council has issued an account of the receipts and expenditures for the year ended March last in connection with the whole of the Council's tramways undertaking. The tramways system in March of the present year extended over a total length of 116¾ street miles, all of which is worked by the Council, with the exception of a short length of three-eights of a mile, which is worked by the Metropolitan Electric Tramways Company. The capital expenditure on the undertaking up to March 31, 1907, amounted to £6,946,310 11s., of which £2,064,621 4s. 5d. represents expenditure during the year 1906-7. The total debt repaid up to the same date amounted to £603,173 7s. 9d. out of revenue, and £209,573 5s. 7d. from the proceeds of sales of horses and old materials, etc. The debt outstanding on March 31, 1907, was £6,133,563 17s. 8d., or, deducting £24,658 for the value of surplus land, £6,108,905 17s. 8d.

The total receipts from the undertaking during the year and the working expenses were as follows:

	Electric Traction	Horse Traction	Total
Total receipts....	£829,258 19s. 5d.	£585,345 7s. 9d.	£1,414,603 18s. 2d.
Working exp.....	478,418 11s. 0d.	596,697 15s. 4d.	1,075,116 6s. 4d.
Surp. on working..	£350,839 19s. 5d.	£11,352 7s. 7d. (Deficiency)	£339,487 11s. 10d.

The undermentioned charges have to be set against the surplus on working, namely:

Debt charges	£324,656 10s. 2d.
Income tax	1,425 18s. 5d.
Interest on purchase money	3,275 18s. 1d.
Parliamentary expenses	4,780 6s. 5d.
Deficiency on Drake buildings	74 1s. 1d.
	£334,211 14s. 2d.
Less net interest in cash balances	4,397 17s. 4d.
	£329,813 16s. 10d.
Leaving a net balance of	£9,673 15s. 0d.

The balance brought forward on the appropriation account on April 1, 1906, was £31,249, and the surplus revenue balance of £9,673 15s. for the year 1906-7 increased this amount on March 31, 1907, to £40,923 1s. 11d. Out of this sum £35,000 has been transferred to the renewals reserve fund, and the balance of £5,923 1s. 11d. is being carried forward in the accounts for the current year.

The total number of passengers carried and the car miles run during the year were as follows: Number of passengers—electric traction, 183,062,063; horse traction, 131,165,027; total, 314,227,090. Number of car miles run—electric traction, 16,267,579; horse traction, 13,862,718; total, 30,130,297. Of the total number of pasengers 20.12 per cent were carried at ½d. fares, 62.29 per cent at 1d., 8.78 per cent at 1½d., 6.22 per cent at 2d., 1.38 per cent at 2½d., 1.08 per cent at 3d., .09 per cent at 3½d. and .04 per cent at 4d. The average fare per passenger was 1.05 d., as compared with .99d. in 1905-6. In considering the above percentages it should be borne in mind that ½d. fares were not introduced on the northern tramways until February, 1907, and that 3½d. and 4d. fares are only in operation on certain routes on the southern tramways, on which, however, the percentage of passengers at these fares represents a fair proportion of the whole. The total number of units generated up to March 31, 1907, at the Greenwich generating station since its opening on May 26, 1906, was 25,009,345, and the cost amounted to about .676d. a unit, including interest and sinking fund charges. The tramways stud on March 31, 1907, numbered 5,848 car horses and 20 cart horses. The average weekly cost for provender and litter during the year was 8s. 11.29d. a horse, as compared with 8s. 2.59d. in 1905-6.

SHOP MEN REORGANIZE

At a meeting of the shop foremen of the Public Service Corporation Company of New Jersey it was suggested that the electric railway shop foremen's association be reorganized, with the result that a new staff of officers was elected, as follows: W. Rickes, president, Public Service Corporation; Henry Dupras, vice-president, Public Service Corporation; J. R. Case, secretary, Public Service Corporation; H. W. Wightman, treasurer, Public Service Corporation.

LARGE ORDER FOR ELECTRIC RAILWAY EQUIPMENT

J. G. White & Company, operating managers and purchasing agents for the Eastern Pennsylvania Railways Company, have just ordered $200,000 worth of electric railway material for the Tamaqua & Middleport Railway, the connecting link between Mauch Chunk and Pottsville. The order includes all the material required for the permanent way and overhead electrical work of a standard interurban railway. Considerable grading has already been done. When the line is finished Pottsville and neighboring towns will be nearer New York in actual time by trolley to Mauch Chunk and the Lehigh Valley Railroad than by the usual railroad detour through Philadelphia.

1908 M. C. B. AND M. M. CONVENTIONS

At a meeting of the executive committees of the Master Car Builders' and American Railway Master Mechanics' Associations, at the Hotel Belmont, New York City, Oct. 21, it was decided to hold the 1908 annual conventions of those associations at Atlantic City, N. J. The Master Car Builders' Association will meet June 17, 18 and 19, and the American Railway Master Mechanics' Association, June 22, 23 and 24. The headquarters of the associations will be at the Marlborough-Blenheim. The same special rates made by certain of the Atlantic City hotels last June will apply for the 1908 conventions. The meetings of the associations, as well as the exhibits, excepting track exhibits, will be on Young's Pier. The track exhibits will be placed not more than four blocks from the pier. Nearly all of the exhibits will be under cover, 60,000 sq. ft. net (exclusive of aisles), of space having been allotted for exhibits. In June last the exhibitors on the Steel Pier used about 55,000 sq. ft., exclusive of aisles.

POWER OF INDIANA RAILROAD COMMISSION CONTESTED

A suit to contest the power of the Indiana Railroad Commission has been filed by the Big Four Railroad Company in the Superior Court of Indianapolis. The railroad commission on Sept. 26 made a ruling to the effect that steam and electric lines were in the same class relative to freight traffic and ordered the Big Four Railroad to turn over to the Indiana Union Traction Company, at Winchester, cars loaded with coal for the Farmland Stone Company, a concern engaged in crushing stone, about six miles from Winchester, on the line of the traction company. The Stone Company filed a petition for such an order, which was resisted by the steam road.

In the suit just filed the Big Four alleges in its complaint that the railroad commission law is unconstitutional in that it seeks to give the Commission powers that properly belong to all three departments—Legislative, Executive and Judicial. The complaint cites a number of other reasons why the order of the Commission should be set aside, but the principal one, aside from the unconstitutionality of the law and the one upon which it depends most for a reversal of the order, is the alleged inadaptability of the rolling stock of the railroad to the tracks of the traction company. While the suit is to set aside the one ruling of the Commission, back of it is a feeling that the steam roads are going to test to the limit of their power the control of the Commission over railroad affairs in Indiana.

REPORT OF SPOKANE & INLAND FOR YEAR

The Spokane & Inland Empire Railroad Company has filed its first annual report with the State Railroad Commission, covering the year ended June 30, 1907. It shows the company was organized Jan. 15, 1906, under the laws of Washington, and is a merger by reason of its ownership of the entire capital stock of the following companies: Coeur d'Alene & Spokane Railway Company, Ltd., organized Oct. 20, 1902, under the laws of Idaho; Spokane & Inland Railway Company, organized Dec. 13, 1904; Spokane Terminal Company, March 1, 1905, and Spokane Traction Company, March 15, 1903; the last three named being Washington corporations.

The Spokane & Inland Division, Sept. 24, 1906, begun the operation of 34 miles. This mileage was increased as follows: 11 8-10 miles Feb. 1, 1907; April 5, 24 8-10 miles; June 1, 47 6-10 miles. The Coeur d'Alene & Spokane division, July 19, 1907, begun the operation of an extension to Hayden Lake, Idaho, 8 2-10 miles. The company operated 123½ miles aside from its street-car lines in Spokane. The stock of the Spokane Terminal Company is owned jointly by the three companies.

The company has $20,000,000 capital, of which half is preferred. The total amount issued and outstanding is $9,733,900 common and $521,000 preferred, and on the preferred stock a 2½ per cent dividend was declared during the year. Of an authorized issue of $15,000,000 mortgage bonds the company has issued $418,000 of 5 per cent obligations, of which $4,216,000 is now outstanding. Capital stock represents $99,121.45, and bonds represent $31,214.45, or a total of $130,335.90 per mile of line. The total cost of the road to June 30, 1907, is given at, for construction, $12,981,741.69, and for equipment, $959,725.18, or a total of $13,941,466.87, or at the rate of $112,886.35 per mile.

The gross earnings from operations of the entire line for the year aggregated $478,784.08, less operating expenses of $259,604.80, leaving a net income from operation of $219,179.28. To this was added $189,204.56; net income from the city traction lines, $37,864.37; intrest received from funds loaned, $146,687.24; rent of buildings, $4,652.95; and there was also added $60 earnings as interest on bonds owned by the company of the Spokane Country Club. This made a total net income from all sources of $408,443.84. From this the company paid $7,500 in taxes, a dividend aggregating $91,940 and interest on funded debt of $146,992.89, leaving the surplus for the year $162,010.95. The gross income from the city traction lines was $180,927 and the expenses were $142,964. A summary of the expenses of the entire line shows $29,461 for maintenance of way and structures, $19,959 for maintenance of equipment, $176,100 for conducting transportation and $34,083 for general expenses, which aggregate 54.22 per cent of the earnings of the entire line.

The company reports the following contracts with other companies: With the United States for the transportation of mails, at $2,747.47 per annum. With Spokane International Railway for interchange of freight, dated April 14, 1905; on lumber this company received 3 cents per 100 pounds; on other freights, rates are divided on a mileage basis, with minimum of 25 cents for one shipment. With Great Northern for interchange of freight, dated May 9, 1907, divided on mileage basis, with minimum of 25 cents. Agreement with Coeur d'Alene & St. Joe Transportation Company for interchange of passengers and freight, the company receiving the local rate.

None of the equipment of the company is mortgaged. The mortgages on the other property are $287,272 a mile for the 11-10 mile track on the property used in freight and passenger terminals in Spokane; $16,176 a mile for the 30 9-10 miles of track from Spokane to Coeur d'Alene; $7,644 a mile for the 25 9-10 miles of traction lines in the city, and $5,000 a mile for the 91 49-100 miles of the Spokane & Inland trackage. The entire line employs 182 men at an average compensation of $3.01 a day.

The road carried a total of 672,412 passengers, receiving a revenue of $274,781, or a little more than 40½ cents per passenger, or about 18½ mills per passenger mile. It carried 194,583 tons of freight, receiving $144,252, an average of about 72.6 cents a ton, or less than 2½ cents a ton mile. The income of operation of a mile of road was $1,774.

The company added 7 locomotives during the year and now has 12 in service; 22 cars to the passenger service, making 50 in use; 74 box cars and 40 flats to the freight department, making 318 in freight service. It uses in company work 1 caboose, 1 officer car, 19 gravel cars. The total cars owned by the company are 395.

THE YONKERS STRIKE SETTLED

The strike in Yonkers, N. Y., of the employes of the street railways in that city has been settled. The old motormen and conductors have returned to work on the condition that their grievances would be settled by the railway officials within a reasonable time. The railway officials made it a condition that before anything was done, the employes must return to work and also that under no circumstances would the union be recognized. To this the striking employes consented, and regular service on the lines was resumed on Tuesday, Oct. 29. During the particularly trying period of the past week, Waddell & Mahon, labor trouble specialists, of New York, handled the situation in Yonkers. This firm had 200 of their best men on the scene and operated the cars as far as it was possible to do so. On account of the political situation in the city of Yonkers, however, no support from the police department or the city authorities was forthcoming. Tracks were torn up in front and behind the cars, barrels of pitch and tar were placed upon the tracks and set on fire in order to stop the operation of cars. When the authorities of the city realized that the company was determined to operate its cars at all hazards, they decided to support the company, and conferences were held with the railway and city officials, the result of which was that a settlement of the strike was made. The company, however, gained what it was contending for, viz., non-recognition of the union and the right to treat with its employes independently of the union after the employes had returned to work.

PROPOSED LINES OUT OF NEW YORK PURCHASED BY NEW YORK, NEW HAVEN & HARTFORD RAILROAD

The acquirement by the New York, New Haven & Hartford Railroad of the Milbrook Company, a holding concern which controls the New York, Westchester & Boston and the New York & Port Chester Railway Companies and their affiliated concerns, was announced Tuesday, Oct. 29, by Oakleigh Thorne, president of the Trust Company of America. Mr. Thorne and Marsden J. Perry, president of the Union Trust Company, of Providence, and a director in the Trust Company of America, owned the control of the Milbrook Company, which was organized recently as the holding company. Mr. Thorne said that negotiations between the Milbrook Company and the New York, New Haven & Hartford had been pending for some time. The New York, Westchester & Boston Railway Company is capitalized at $20,000,000 authorized, and $19,000,000 outstanding. The par value of the stock is $100. The bonded debt of the company is an issue of $15,000,000 first gold fives, due Oct. 1, 1954, subject to call in 1909. The Knickerbocker Trust Company is trustee for the company.

In December, 1906, the New York & Portchester was acquired, and the latter company was allowed by the Railway Commissioners to issue a mortgage for $20,000,000 and to increase its stock to the same amount. The financial status of the Westchester Company in October, 1906, was that $11,000,000 of the stock—substantially all that had been issued—was deposited with the voting trustees, this amount including $10,000,000 guaranteeing the contract. While all the underwriting for the $15,000,000 of Westchester bonds had been taken, only about $4,500,000 was paid in, of which $1,077,000 had been spent in construction on that part of the road within New York City limits and $1,600,000 in Westchester County.

Details obtained at New Haven of the sale of the Milbrook Company to the New York, New Haven & Hartford Road make it appear that the transfer was arranged a number of months ago, and has been in the hands of a committee consisting of four of the New Haven directors. The property was paid for nearly a year ago, and, therefore, involves the creation of no new obligations on the part of the New Haven. The New Haven, it is said, intends to undertake the building of the system as soon as the conditions of the money market allow, and it is called for by public convenience. Northward, the proposed system will extend to New Rochelle, Westchester, Mount Vernon and White Plains. It will connect with the Harlem River & Port Chester Road, which is owned by the New Haven, at West Farms, and southward its most immediate connection will be with the subway at 177th Street.

THE CLEVELAND SITUATION

On application of T. H. Hogsett and H. J. Crawford, the Circuit Court, on Wednesday, issued a restraining order, good until Tuesday of this week, preventing the Forest City Railway Company from using the tracks of the Cleveland Electric Railway Company on Bridge Avenue in order to operate its cars over this route to the Public Square. Judges Winch and Henry asserted that they felt themselves disqualified to hear the suit, but that they could do no less than preserve the present status quo until Tuesday, when they would endeavor to have a court present, made up from other circuits in the state. Attorneys for the Forest City Railway Company endeavored in every way to prevent the order from being put into effect, but the court said that the delay to the company would be immaterial. Judge U. L. Marvin dissented from the action taken.

The mayoralty campaign is waxing warm as the time for election draws near. The greatest fight against Mayor Johnson is being made on the allegation that he is advocating the zone system, because he favors a settlement of the street railway controversy upon a 3-cent basis within the city regardless of the effect it may have upon the people of the suburban towns. When forced to discuss this point, he declares that he is not in favor of that system, but that he wants the settlement made between the company and the city and that the fare in the suburbs will not be changed, unless it is found possible to reduce them. If this can be done with a sufficient revenue merely to cover expenses, he says he will insist upon that course. So far he has fought shy of talking of the costly improvements that the company has included in its offer of seven tickets for a quarter, although a subway is needed and rapid transit lines must be built if the city continues to grow and spread over more space, as it has done in the past. Congressman Burton holds to his plan of settlement, and says that he is satisfied that the companies will accept it, and that a settlement may be made within a very short time, although he has had no assurance from the Cleveland Electric to this effect.

The Cleveland Electric Railway Company refused to send representatives to the meeting of the Council committees on ordinances and street railways, called a few days ago to decide upon terms on which the Forest City Railway Company might use the tracks of the old company in the so-called free territory. President Andrews sent a letter to the committees stating that he did not consider the ordinance under which they were acting as valid until the decision of the court before which it is now in question has been received, and, therefore, did not think it necessary to have representatives present. The committee adjourned without taking any action.

In reply to an accusation of the *Press* that the Cleveland Electric has spent large amounts of money in an effort to retain its franchises, President Andrews issued an open letter stating that the money referred to had been spent in defending the company in its rights. Had the city authorities been less zealous in their endeavors to organize competing companies and had the company not been put to the expense of preventing the confiscation of its property to other interests, the money spent thus would have gone for extensions and betterments, and the people would have benefited by it, he says. Further, the letter states that the company has at all times been willing to surrender its legal rights and make a new contract to operate at the lowest fare that would return a reasonable profit on the actual value of the system. He also repeated the statement that the company was willing to leave the rate of fare to arbitration, as was offered at the meetings of the City Council months ago.

Judge Lawrence refused to stop the operation of the cars of the Low-Fare Railway Company on East Fourteenth Street when his decision on that point was rendered a few days ago. Instead, he said, the question would be before the Circuit Court in a few days and he would preserve the status quo on that point, as he did not want to issue an order that would render congestion at the Public Square greater at this time than it would otherwise be.

The suit of Peter Witt, city clerk, against the Cleveland Electric to prevent the expenditure of money for publicity has been on hearing the entire week before a notary, who is taking evidence. The suit seems to have resolved itself into an attempt to prove that the company and the Republican central committee have been purchasing the space of several newspapers printed in foreign languages for campaign purposes. Mayor Johnson uses some of this matter in his speeches, and the Cleveland *Press* makes use of much of it in endeavoring to substantiate charges it has made against the company and the candidates on the Republican ticket.

In an exhaustive report of the affairs of the Municipal Traction Company, made by Haskins & Sells, expert public accountants, at the instance of Charles A. Otis, it is shown that $34,515.45 has been lost in operation within the past six months. This examination was dated as of June 30 of this year, as the books and papers since that time are not in shape to bring the figures down to a later date. The report states that much difficulty was encountered in getting at some of the facts, as items that should have appeared on the books were not to be found and papers that were necessary in making a proper examination were not furnished to the accountants. From the manner in which the business is transacted and the peculiar condition of the stock account, it would seem that the company is really a company only in name.

From the figures shown on the company's books Haskins & Sells have prepared the following balance sheet:

GENERAL BALANCE SHEET, PER BOOKS, JUNE 30, 1907.

ASSETS.

Capital stock of the Forest City Railway Company 10 shares par value $100 each		$ 900.00
Current assets:		
Cash in hand and on deposit	$ 4,155.72	
The Forest City Railway Company Current account	1,504.91	
Total		5,660.63
Total assets		$ 6,560.63
Profit and Loss—deficit		5,499.46
Total		$12,060.09

LIABILITIES.

Current liabilities:		
Accounts payable—including amount reserved for unrecorded bills for coal	$10,375.57	
Outstanding tickets	1,684.52	
Total		$12.060.09
Total liabilities		$12,060.09

With the exception of a monthly entry covering fuel consumed, the books only show cash receipts and disbursements. An examination of the minutes, and conversation with the various officers of the company, disclosed the fact that there were assets and liabilities which did not appear on the books, and Haskins & Sells, after determining what these were and making the various adjustments which they found to be necessary, prepared the following general balance sheet:

GENERAL BALANCE SHEET, AS ADJUSTED, JUNE 30, 1907.

ASSETS.

Subscribers to capital stock—Unpaid subscriptions		$ 9,000.00
Capital stock of The Forest City Railway Company, 10 shares, par value $100 each		900.00
Working assets:		
Prepaid car licenses—unexpired proportion	$134.19	
Rent of land and buildings payable in advance—unexpired proportion	420.97	
Total		555.16
Current assets—Cash in hand and on deposit		4,415.48
Total assets		$14,870.64
Profit and Loss—deficit		34,515.45
Total		$49,386.09

LIABILITIES.

Capital stock—100 shares, par value $100 each		$10,000.00
Current liabilities:		
Accounts payable	$10,366.54	

The Forest City Railway Company—Current account	8,766.45	
The Forest City Railway Company—Rental account	150.00	
Outstanding tickets	1,684.52	
Hired power—accrued	2,524.17	
Viaduct track rental—accrued	172.33	
Water rent—accrued	200.00	
Tax on earnings—accrued	661.14	
City and county taxes—accrued	1,953.24	
Corporation franchise tax of the Forest City Railway Company—accrued	916.63	
Total		$27,395.02
Reserves:		
For fire insurance	$1,100.00	
For claims for damages	1,391.07	
For depreciation of track, electric Line and buildings	9,500.00	
Total		11,991.07
Total liabilities		$49,386.09

From the figures shown on the company's books, the following statement of income and profit and loss was prepared:

STATEMENT OF INCOME AND PROFIT AND LOSS—PER BOOKS—FOR THE PERIOD FROM NOV. 1, 1906, TO JUNE 30, 1907.

Car earnings—Passengers		$75,541.44
Operating expenses		53,649.63
Profit from operation		$21,891.81
Taxes—Car licenses		230.00
Profit from operation after deducting taxes		$21,661.81
Other income:		
Dividend on stock held by W. B. Colver, trustee	$110.16	
Profit on labor	351.67	
Total		461.83
Gross profit		$22,123.64
Deduction from income—"Dividends" (Rent of Leased Lines)		27,923.10
Profit and loss—Deficit June 30, 1907		$ 5,499.46

AN IMPORTANT OPERATING AGREEMENT AT BOSTON

An interesting agreement for the joint use of tracks has just been formalized between the Boston Elevated Railway Company, operating the surface and the elevated lines within the limits of Boston, and the Boston & Northern Street Railway Company, which controls two or three lines built into the Boston Company's territory before the Boston companies were consolidated.

The Boston & Northern Company controls by lease the tracks of the old Boston & Revere Electric Street Railway, which form a double-track line through a sparsely populated district, largely over open marsh land on private right of way or in the reserved space of the boulevard leading to Revere Beach. The line skirts the shore, with one end joining the regular beach lines of the Boston & Northern in the thickly settled part of the Revere Beach Reservation and the other forming a dead end in an outlying, but well-settled, section of East Boston, known as Orient Heights. The line within the Boston boundary, at Orient Heights, is the only part in the midst of any population except the short section at the beach end.

Within a short distance of the Boston & Northern tracks in Orient Heights is the terminus of the Bennington Street line of the Boston Elevated Company, which runs into the East Boston Tunnel and so to Scollay Square. It is over this route that the Orient Heights people prefer to travel, but since the Boston & Northern Company operated in their section they have been obliged to pay two fares, one to each company, or else to walk to the Boston Company's tracks. The matter was taken to the city government and to the Railroad Commissioners, and after considerable discussion the companies concluded it was best for the Boston & Northern Company practically to abandon that part of its line lying within the limits of Boston to the Boston Company, after which the Boston Company should build a connection between its Bennington Street line and the other company's tracks, and thenceforth operate its Bennington Street cars over the Boston & Northern tracks as far as the Boston boundary line. This was approved Oct. 25, by the Railroad Commission, and will now give the Orient Heights population a five-cent fare without change of cars directly into the East Boston Tunnel. That is, they ride to and from all other parts of Boston on the same basis as the people of suburbs where no outside company owns tracks, except that all persons riding on street cars in the East Boston Tunnel have to pay a one-cent toll to the city.

A similar situation has developed in Malden and Chelsea, thickly settled suburban cities where the service is partly by Boston Elevated and partly by the Boston & Northern; and the local demand is already strong to have the Boston Company take over the outside company's trackage so far as these cities are concerned and deal with it as if it were all in Boston Elevated Company's territory. Attempts have been made to get the Railroad Commission to recommend this course, as they did in the West Roxbury & Roslindale case; but the commission, so far, has held aloof on account of the fact that the cities now struggling against the mixed control are outside the city limits of Boston, and therefore not so manifestly entitled to the five-cent fare.

Secondary results of this Orient Heights agreement are that the companies will run their cars to connect at the Boston boundary line, affording a direct route from Scollay Square, Boston, to Revere Beach, on payment of two fares, and they will arrange their summer schedules "so as to develop and adequately accommodate the traffic to and from Revere Beach." This may mean "through" cars in time of beach crowds.

THE WESTINGHOUSE RECEIVERSHIP

The developments of the past week indicate more fully the real conditions surrounding the appointment of receivers for the Westinghouse Electric & Manufacturing Company, the Westinghouse Machine Company, and the Nernst Lamp Company than were available when the last issue of this paper went to press. Investigations made by the receivers show very clearly that the cause of the trouble was not a falling off in business, but was brought about by the state of the money market, making it expedient for those interested to ask for the appointment of receivers. The unusual number of orders requiring large outlays for material and a constant drain of the payroll, without any immediate returns, because of the long time required before completion and payment, at a time of unusual financial stringency, created the difficulty. Such orders for machinery covered work which must extend over a period of months and sometimes years before realization on investment, and therefore required borrowed capital. It was the great stringency of the money market which prevented the renewal of the customary sources of ready money, and therefore made necessary prompt action to conserve the interests of the stockholders, creditors and all concerned. That the action was wise and timely is the consensus of opinion of the most conservative financial men in the country. There is no question that the various properties will be returned to the stockholders unimpaired in value as soon as the money market regains its equilibrium.

The splendid organizations of the different companies will be preserved to receive and execute orders with the same satisfaction to the customer as heretofore. There has not been even a momentary pause in the operations and orders are being filled with dispatch. So much confidence is felt in the men appointed as receivers for the several companies affected that the future success of these interests promises to be as marked as in the past. It is the understanding that no change in the general policy for the conduct of the business is contemplated. The attitude and ability of the receivers appointed is such that great confidence is felt everywhere that in a comparatively short time they will be warranted in restoring to Mr. Westinghouse and his copartners the properties which stand as a monument to the genius of the man whose name they bear.

AFFAIRS IN CHICAGO

Everybody interested in Union Traction properties has been summoned to appear in Judge Grosscup's court Thursday, Oct. 29, and show cause why the new plan of reorganization then to be presented should not be approved. The notices for the meeting sent out read:

"To whom it may concern: The undersigned will, on Oct. 31, at 2 p. m., in the room of the United States Circuit Court, hear all persons on the proposed plan of reorganization as now amended and promulgated by the Chicago Railways Company, pursuant to the ordinance of the City Council of Chicago, passed Feb. 11, 1907.

"Peter S. Grosscup,
"John C. Gray, *Arbitrators.*"

The idea is to try to gain the consent of all bondholders, the thing which the United States Court of Appeals in overruling Judge Grosscup's former order said was essential. In the meantime, the other banks acting as trustees for bonds are scheduled to file foreclosure suits, so if an agreement is reached the property can be transferred to the railways company on foreclosure sale.

Julien T. Davies before leaving Chicago told Judge Grosscup that the Guaranty Trust Company's position in the traction suit would not change, even if the City Council refused a further extension of time for accepting the ordinance, unless the money accruing to bonds in interest were spent on rehabilitation. Grosscup told Mr. Davies that he could experiment with a sale of the property to ascertain whether he could get the value of the liens, but doubted whether it would be possible to force a sale without the consent of all the mortgages.

NEW ORLEANS RAILWAY & LIGHT COMPANY'S EARNINGS

The income account of the New Orleans Railway & Light Company, including leased and controlled companies, for the month of September and for nine months, ending Sept. 30, shows as follows:

September.	1906.	1907.
Gross earnings	$441,807	$466,160
Operating expenses	239,823	268,142
Net earnings	$201,983	$198,018
Fixed charges	157,463	165,664
Net income	$ 44,520	$ 32,354
Other deductions	2,892	3,919
Surplus	$ 41,627	$ 28,434
For Nine Months.	1906	1907.
Gross earnings, all sources	$4,218,184	$4,456,560
Operating expenses	2,296,807	2,414,090
Net earnings	$1,921,376	$2,042,470
Fixed charges	1,376,999	1,483,462
Net income	$544,377	$559,008
Other deductions	24,849	29,157
Surplus	$519,527	$529,851

NEW CATALOGUE

The Stuart-Howland Company, of Boston, has just issued its illustrated catalogue of electrical supplies No. 3, which is one of the most voluminous as well as one of the most complete books of its kind which has ever reached this office. The apparatus is classified alphabetically and is very fully illustrated by outlines or small sketches of the apparatus listed. The book contains 784 pages and is handsomely bound in cloth.

Thirty patrolmen have been detailed to ascertain the cause of the congestion of cars in the Public Square, Cleveland, during the evening rush. It is said they will make a close inspection of the operation of both companies. While doing this they will also ascertain whether the companies have provided jacks for each car and other equipment with which the city has said they shall be provided.

UNITED STATES PATENTS ISSUED OCTOBER 22, 1907

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

868,648. Semaphore Signal; Fred B. Corey, Schenectady, N. Y. App. filed March 27, 1907. A motor-driven semaphore in which the motor itself acts as a brake to arrest the movement of the arm and means to prevent the backward rotation of the motor.

868,651. Insulated Metal Cross-Tie; Alva C. Dinkey, Pittsburg, Pa. App. filed Dec. 31, 1906. A metallic tie having an insulating plate on its top, a metallic bearing plate resting on the insulating plate and secured to the tie, the rail being secured thereto by means of bushed rivets.

868,664. Process of Making Rail-Bonds; Albert B. Herrick, Ridgewood, N. J. App. filed May 5, 1904. Consists in forming the bond strands into the desired shape upon a suitable pattern, and then fitting solder strips to said structure over the portions of the same that are to be utilized for the terminals of the bond.

868,736. Submarine Amusement Device; Dixon E. Washington, Chicago, Ill. App. filed March 25, 1907. Embodies the principles of the diving bell.

868,751. Electrical Connector; Frederick H. Ayer, Chicago Heights, Ill. App. filed Feb. 23, 1907. The bond wire is three-sided in cross-section, each side being formed on an arc described from the intersection of the other two sides.

868,777. Braking Apparatus; Patrick H. Griffin, Buffalo, N. Y. App. filed Jan. 28, 1907. The inner side of the wheel has a ring to which the brake shoe is applied instead of to the tread of the wheel.

868,780.—Trolley Wheel Guard; Charles Harkness, Providence, R. I. App. filed Feb. 16, 1905. A pair of guard plates loosely mounted upon the axle of the trolley wheel and having convex rollers at their extremities.

868,781. Electric Switch; Chester S. Hill, Williamsport, Pa. App. filed July 16, 1906. A specially shaped magnet carried by the car in close proximity to the ground, actuates, when energized, certain circuit-closing devices in the roadbed.

868,845. Street Car Fender; Charles O. Conner, Heppner, Ore. App. filed March 13, 1907. Details of construction.

868,864. Electric Controlling System; Ray P. Jackson, Wilkinsburg, Pa. App. filed Nov. 23, 1904. Means for preventing a circuit-breaker from closing after it has been caused to open by an overload on the motors, until after the reversing switch has been moved to its "off" position.

868,889. Trolley Operating Valve; Robert H. Rogers, Schenectady, N. Y. App. filed Nov. 17, 1905. Pneumatic apparatus for controlling trolley or third-rail collector shoes.

868,908. Railway Car Brake; Seth A. Crone, New York, N. Y. App. filed Nov. 26, 1906. A brake shoe head comprising a forged metal face plate in one integral piece and a back composed of two pieces riveted to the face plate and forming at their meeting portions suitable jaws or flanges for connection with the brake beams.

868,910. Railway Car Brake; Seth A. Crone, New York, N. Y. App. filed July 24, 1907. The brake head is so constructed that it may be temporarily applied to the wheel in the case of breakage or loss of the brake shoe.

868,911. Electric Railway System; John L. Crouse, New York, N. Y. App. filed Dec. 29, 1904. Relates to systems employing both trolley and third-rail conductors at different points. Covers electrical means for controlling the respective shoes or collectors.

868,929. Electric Control System; Ray P. Jackson, Wilkinsburg, Pa. App. filed April 3, 1905. Means for retaining the reversing switch in closed-circuit position after it has been moved to that position, until after the circuit breaker is opened.

868,949. Emergency Railway Brake; William Taylor, Youngstown, Ohio, and Hosea Napay, Pittsburg, Pa. App. filed Jan. 15, 1907. A main vertically movable brake beam carrying top brake shoes at its ends, a pair of supplemental brake bars each carrying a side thrust brake shoe, and a common operating device for the brake beam and brake bars.

868,993. Means for Resetting Automatic Controlling Devices for Vehicles or Trains; Frank E. Kinsman, Plainfield, N. J. App. filed Jan 29, 1906. A train embodying a fluid-pressure brake system and made up of power-operated vehicles each of which has thereon the following cooperative elements: A valve in the said brake system, an automatic trip controlling the valve

and movable from one position to another, and a fluid-pressure system including a cylinder and a resetting piston for resetting the trip—said cooperative elements on each vehicle being independent of the others.

869,009. Automatic Railway Switch Adjuster; Owen Morkert, Perry Township, Tippecanoe County, Indiana. App. filed May 27, 1907. Details of mechanical apparatus for automatically opening or closing a railway switch by means of a coil spring.

869,027. Electric Railroad; William G. Spiegel, New York, N. Y. App. filed July 17, 1906. Relates particularly to means for avoiding sparking in a sectionally energized third-rail thrown into circuit in advance of the train and disconnected after the passage of the train.

869,034. Car Replacer; Eugene C. Waldorf, Buffalo, N. Y. App. filed March 11, 1907. Adjustable guide-plate designed to be pivoted at one end upon the receiving platform of the replacer and immediately above the central rib, so as to permit of the adjustment of its opposite end to the right or left of the center as occasion may require.

869,070. Combined Railroad Tie and Clamp; Clark P. Dey, Keystone, Wash. App. filed Feb. 18, 1907. A hollow tie formed of sheet metal the edges of which overlap at the upper portion, a rail clamp carried by the tie and a fastening member securing the rail clamp to the tie and passing through the said overlapping edges of the sheet material.

869,083. Amusement Device; Harry C. Hebig, Closter, N. J. App. filed July 26, 1907. A passenger-carrying platform embracing a metallic globe which is universally movable, and anti-friction bearings between the platform and globe. Has a ziz-zag inclined runway.

869,122. Car Seat; Hubert Witte, St. Louis, Mo. App. filed April 20, 1906. Details of construction of a revolving car seat.

869,178. Railroad Tie; Samuel S. Harper, Philadelphia, Pa. App. filed March 16, 1907. A railway tie formed of concrete with an internal hollow metallic strengthening member, the concrete within the strengthening member being cored out through part of the length of the tie and solid below the rails.

869,183. Car Fender; Henry C. Jordan, Portland, Ore. App. filed March 4, 1907. Details of construction.

869,196. Railway Signal; Robert D. Peters, Knox, Ind. App. filed July 25, 1905. Details of construction of an electrically operated semaphore signal having a semaphore arm directly connected to the motor shaft which has stops limiting its movement to a quarter of a revolution.

PERSONAL MENTION

MR. JOHN W. CROX has resigned as general superintendent of the Morris County Traction Company, of Morristown, N. J.

MR. R. R. SMITH, general manager of the Evansville & Southern Indiana Traction Company, of Evansville, Ind., has resigned to become connected with the Louisville Railway Company.

MR. GEORGE S. RICE has resigned as chief engineer of the Public Utilities Commission of the first district of New York, his resignation to take effect Dec. 1, but will continue in the service of the commission as assistant engineer in charge of construction work. Mr. H. B. Seaman is his successor as chief engineer.

MR. GEORGE H. CHURCH has resigned as superintendent of the Middletown Street Railway, of Middletown, Conn., and also of the Berlin and Meriden lines, to become connected with Mr. L. Suzio, of Meriden, a general contractor, who has several important street railway contracts. Mr. Church will be succeeded by Mr. F. A. Hewitt, of the Eastern Pennsylvania Railways Company, of Pottsville, Pa.

MR. CHARLES A. COOLIDGE has been appointed general superintendent of the Oregon Electric Railway Company's interurban electric line between Portland and Salem, with headquarters in the Corbett Building, at Portland. Mr. C. D. Phillips, now chief dispatcher of the Peoria Terminal Company, at Peoria, Ill., has been appointed chief dispatcher of the company. Mr. Coolidge, who is to be superintendent of the line, has been general manager of the Astoria Electric Company's light plants and railway lines in this city during the past eight years.

MR. GEORGE CAYWOOD, who has been appointed chief engineer and superintendent of power stations of the Twin City Rapid Transit Company, to succeed Mr. D. W. Dozier, whose resignation from the company was announced in the STREET RAILWAY JOURNAL of Oct. 26, has been connected with the Allis-Chalmers Company for the past ten years, during which time he has had charge of the installation of a number of the most important plants contracted for by that company. Among the work with which Mr. Caywood has been connected has been the installation of plants for the Northwestern Elevated Railroad Company, of Chicago; the Cincinnati Gas & Electric Company, of Cincinnati, Ohio; the Toledo Railway & Light Company, of Toledo, Ohio, and the Union Light & Power Company, of St. Louis, Mo. Mr. Caywood entered upon his duties Nov. 1.

MR. J. L. ADAMS, general manager of the central division, Mr. A. W. Jordan, assistant general passenger and freight agent, and Mr. George Bush, chief clerk to Mr. D. G. Edwards, vice-president of the Ohio Electric Railway, in charge of traffic, have all resigned from the company. Mr. Adams came to the Schoepf lines from the Hartford, Manchester & Rockville Railroad, in Connecticut, about a year and a half ago. Mr. Jordan was formerly in charge of the traffic department of the old Columbus, London & Springfield lines when they were in the hands of receivers and Mr. Theodore Stebbins was general manager. He accepted service under the Schoepf management and for many months previous to the appointment of the present general passenger and freight agent managed the traffic department of all the Schoepf lines in Ohio, as acting general passenger and freight agent. The jurisdiction of Mr. W. A. Gibbs, general manager of the eastern division, will be extended over the central division until next spring. This will necessitate the moving of Mr. Gibbs' headquarters from Newark to Columbus in order that he may be in touch with both divisions.

MR. RICHARD T. LAFFIN, vice-president and general manager of the Manila Electric Railroad & Light Company, has resigned, having completed the task of establishing the operating organization of this property, and the management is now assumed by Mr. C. B. Graves, who has been Mr. Laffin's assistant since the property was placed in operation three years ago, officiating as manager of the lighting and power department. Mr. Laffin is still interested financially in the Manila properties, and resigns to take the management of another group of public utility properties in which J. G. White & Company, Inc., are largely interested. It is considered by Mr. Laffin and J. G. White & Company, operating managers of the Manila Electric Railroad & Light Company, that Mr. Graves is well qualified to continue the successful administration and maintain the policies inaugurated by Mr. Laffin, which have made the Manila company so successful. Mr. Graves has extended experience in the management of electrical properties in the tropics. At one time, before becoming connected with the Manila Electric Railroad & Light Company, he was electrical engineer and assistant manager of the extensive properties of the Sao Paulo Tramway, Light & Power Company, Soa Paulo, Brazil.

MR. H. S. SEAMAN, who, as noted elsewhere in this issue, has been appointed chief engineer of the Public Service Commission of the first district of New York to succeed Mr. Geo. S. Rice, resigned, is a native of New York and graduated from Swarthmore College, Pennsylvania, in 1881. He spent a year doing engineering work for the Erie Railroad Company, after which he entered the employ of the Edgemore Bridge Company. A year later he became associated with the engineering force of the Kings County Elevated Railway Company, a subsidiary concern of the Brooklyn Rapid Transit Company. Following this he was connected with the bridge department of the Pennsylvania Railroad Company, and afterward was assistant engineer of the firm of Wilson Brothers, of Philadelphia. Later Mr. Seaman returned to the Erie Railroad and had much to do with the construction of new bridges along that line between New York and Buffalo. For a while following this he was a construction superintendent for the New York, New Haven & Hartford Railroad Company, and at the time the New York subway was built he was employed as an engineer by the contractor for the Fourth Avenue section. He is now a consulting engineer in the Bridge Department of New York and will remain in that position until Dec. 1. He is a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Engineers' Club, the American Institute of Mining Engineers, and the Brooklyn Engineers' Club.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments" which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit. ‡ Including Rapid Railway system, Sandwich, Windsor & Amherstburg Railway, and Detroit, Monroe & Toledo Short Line Railway.

Company.	Period.	Total Gross Earnings.	Operating Expenses.	Net Earnings.	Deductions From Income.	Net Income, Amount Available for Dividends.
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Sept. '07	185,341	96,174	89,168	43,279	45,889
	1 " " '06	163,290	87,967	75,323	40,597	34,726
	9 " " '07	1,459,784	832,588	627,197	383,160	244,037
	9 " " '06	1,293,354	765,173	528,181	361,599	166,582
CHAMPAIGN ILL. Illinois Traction Co.	1m., Sept. '07	344,966	*187,938	157,028	.....	.....
	1 " " '06	266,844	*140,070	126,774	.....	.....
	9 " " '07	2,722,483	*1,534,073	1,188,409	.....	.....
	9 " " '06	2,163,308	*1,193,276	970,032	.....	.....
CHARLESTON, S. C. Charleston Consolidated Ry., Gas and Elec. Co.	1m., Aug. '07	64,437	40,400	24,037	13,517	10,520
	1 " " '06	56,290	36,147	20,143	13,017	7,126
	6 " " '07	367,378	226,067	141,311	81,100	60,211
	6 " " '06	328,504	198,855	129,649	77,950	51,699
CHICAGO, ILL. Aurora Elgin & Chicago Ry. Co.	1m., Aug. '07	150,597	73,463	77,134	26,986	50,148
	1 " " '06	131,434	62,657	68,778	24,939	43,838
	1 " Sept. '07	139,194	72,335	66,859	24,654	42,205
	1 " " '06	125,851	63,289	62,562	24,772	37,790
	3 " " '07	442,043	220,706	221,337	79,150	142,188
	3 " " '06	393,083	190,917	202,166	74,651	127,515
Chicago & Milwaukee Elec. R. R. Co.	1m., Sept. '07	111,117	42,791	68,326	.....	.....
	1 " " '06	97,156	39,865	57,291	.....	.....
	9 " " '07	785,401	325,437	459,964	.....	.....
	9 " " '06	633,542	252,759	380,784	.....	.....
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co.	1m., Aug. '07	53,125	*16,585	18,540	6,796	11,744
	1 " " '06	31,707	*13,749	17,958	7,108	10,850
	8 " " '07	192,712	*100,954	91,758	56,868	34,890
	8 " " '06	178,225	*95,626	82,599	55,422	27,177
Cleveland, S. W. & Columbus Ry. Co.	1m., Sept. '07	75,993	40,493	35,500	.....	.....
	1 " " '06	64,371	33,490	30,881	.....	.....
	9 " " '07	568,891	326,780	242,112	.....	.....
	9 " " '06	482,635	272,789	209 846	.....	.....
COLUMBUS, GA. Columbus Elec. Co.	1m., Aug. '07	31,955	*19,368	12,587	10,511	2,076
	1 " " '06	25,002	*13,584	11,417	8,762	2,655
	12 " " '07	347,908	*200 950	146,958	115,643	31,315
DALLAS, TEX. Dallas Elec. Corp'n	1m., Aug. '07	93,404	*67,040	26,364	19,259	7,105
	1 " " '06	84,527	*56,042	28,485	15,250	13,235
	12 " " '07	1,079,196	*804,407	274 789	206,295	68,494
	12 " " '06	1,009,862	*633,716	376,147	182,987	193,159
DETROIT, MICH. Detroit, Jackson & Chicago Ry.	1m., Sept. '07	39,694	*32,511	7,183	16,575	†9,392
	8 " " '07	284,743	*224,680	60,063	123,225	†63,162
‡Detroit United Ry. Co.	1m., Sept. '07	630,411	*390,152	240,259	116,389	123,870
	1 " " '06	596,237	*349,545	246,692	107,519	139,173
	9 " " '07	5,111,875	*3,116,802	1,995,073	1,028,939	966,134
	9 " " '06	4,595,685	*2,714,808	1,880,877	924,576	956 301
DULUTH, MINN. Duluth St. Ry. Co.	1m., Sept. '07	74,398	35,439	38,959	17,922	21,037
	1 " " '06	67,763	35,198	32,565	17,860	14,705
	9 " " '07	625,672	309,624	316,048	159,808	156,241
	9 " " '06	570,47	297,926	272,544	158,645	113,898
E. LIVERPOOL, O. East Liverpool Tr. & Lt. Co.	1m., July, '07	37,978	19,439	18,539	11,607	6,931
	1 " Aug. '07	37,439	18,688	18,751	11,722	7,028
E. ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Aug. '07	192,844	96,714	96,130	.....	.....
	1 " " '06	167,350	83,961	83,389	.....	.....
	8 " " '07	1,376,762	737,532	639,23	.....	.....
	8 " " '06	1,237,183	620,208	616,975	.....	.....
EL PASO, TEX. El Paso Cos.	1m., Aug. '07	42,131	*33,185	8,946	5,260	3,686
	1 " " '06	32,048	*24,501	7,547	4,084	3,463
	12 " " '07	465,224	*357,769	107,455	55,568	51,887
	12 " " '06	349,202	*237,271	111,931	45,903	66,028
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Aug. '07	125,118	70,047	55,071	.....	.....
	1 " " '06	105,691	63,119	42,571	.....	.....
	8 " " '07	811,890	487,028	324,862	.....	.....
	8 " " '06	698,650	431,496	267,154	.....	.....
FT. WORTH, TEX. Northern Texas Tr. Co.	1m., Aug. '07	97,930	*57,597	40,333	11,330	29,003
	1 " " '06	79,066	*54,731	24,335	9,942	14,393
	12 " " '07	1,001,144	*616,389	384,755	124,468	260,287
	12 " " '06	777,442	*485,207	292,235	119,283	172,952
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Aug. '07	99,467	*56,144	43,323	13,426	29,897
	1 " " '06	83,586	*49,195	34,391	11,958	22,432
	12 " " '07	1,010,543	*632,857	377,687	148,121	229,565
	12 " " '06	865,994	*541,737	324,257	148,006	176,250
HOUGHTON, MICH. Houghton County St. Ry. Co.	1m., Aug. '07	25,337	*13,332	12,006	3,976	8,030
	1 " " '06	25,694	*12,512	13,183	3,912	9,271
	12 " " '07	246,392	*152,174	94,219	47,295	46,924
	12 " " '06	217,630	*143,927	73,702	46,303	27,399
HUDSON, N. Y. Albany & Hudson R. R. Co.	2m., Aug. '07	85,788	53,134	32,654	18,083	14,571
	2 " " '06	81,700	55,597	26,103	17,583	8,520
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Aug. '07	523,641	263,230	260,411	155,906	104,505
	1 " " '06	470,579	230,576	240,002	143,864	96,138
	3 " " '07	1,552,902	810,017	742,885	463,734	279,151
	3 " " '06	1,398,342	709,240	689,102	429,350	259,751
LEXINGTON, KY. Lexington & Interurban Rys. Co.	1m., Aug. '07	59,085	32,917	26,169	.....	.....
	1 " " '06	51,547	31,223	20,324	.....	.....
	8 " " '07	361,588	235,188	126,400	.....	.....
	8 " " '06	333,135	225,367	107,768	.....	.....
MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Sept. '07	345,728	171,388	174,339	104,073	70,266
	1 " " '06	320,156	143,373	176,783	94,050	82,733
	9 " " '07	2,890,838	1,449,335	1,441,503	880,947	560,556
	9 " " '06	2,622,839	1,280,410	1,342,429	791,918	550,511
Milwaukee Lt., Ht. & Tr. Co.	1m., Sept. '07	93,180	36,720	56,461	59,447	†2,987
	1 " " '06	80,706	27,482	53,224	31,410	21,814
	9 " " '07	635,760	267,447	368,313	390,121	†21,808
	9 " " '06	535,664	205,282	330,381	239,244	†91,137
MINNEAPOLIS, MINN. Twin City R. T. Co.	1m., Aug. '07	558,227	260,782	297,444	115,142	182,303
	1 " " '06	605,728	263,624	342,104	114,758	227,346
	8 " " '07	3,978,826	1,929,161	2,049,666	921,600	1,128,066
	8 " " '06	3,683,286	1,714,124	1,969,162	889,394	1,079,768
MONTREAL, CAN. Montreal St. Ry. Co.	1m., Aug. '07	329,755	184,844	144,911	67,208	77,703
	1 " " '06	300,278	158,415	141,863	59,430	82,433
	11 " " '07	3,164,399	1,946,389	1,218,010	524,555	693,455
	11 " " '06	2,794,948	1,686,679	1,108,179	434,240	673,93
NEWBURGH, N. Y. Orange Co. Tr. Co.	3m., Sept. '07	60,961	31,630	29,331	9,120	20,211
	3 " " '06	37,922	29,504	8,418	8,061	357
NEW ORLEANS New Orleans Ry. & Lt. Co.	1m., Sept. '07	441,807	239,823	201,984	160,356	41,628
	1 " " '06	466,161	268,142	198,019	169,584	28,435
	9 " " '07	4,218,185	2,296,808	1,921,377	1,401,849	519,528
	9 " " '06	4,456,561	2,414,090	2,042,471	1,512,620	529,851
NORFOLK, VA. Norfolk & Portsmouth Tr. Co.	1m., Aug. '07	307,488	171,544	135,944	.....	.....
	1 " " '06	162,623	105,231	57,392	.....	.....
	8 " " '07	1,681,686	1,038,747	642,939	.....	.....
	8 " " '06	1,120,196	738,923	381,273	.....	.....
PHILADELPHIA American Rys. Co.	1m , Sept. '07	270,058	.....	.....	.....	.....
	1 " " '06	258,097	.....	.....	.....	.....
	3 " " '07	866,217	.....	.....	.....	.....
	3 " " '06	808,538	.....	.....	.....	.....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Aug. '07	17,327	*9,704	7,623	1,786	5,837
	1 " " '06	17,383	*6,950	10,433	1,844	8,589
	12 " " '07	118,337	*79,132	39,206	21,516	17,690
	12 " " '06	107,642	*70,763	36,880	21,731	15,149
ROCHESTER, N. Y. Rochester Ry. Co.	3m., Sept. '07	741,464	422,128	319,336	107,392	211,944
	3 " " '06	648,613	386,861	261,752	107,389	154,363
	9 " " '07	1,954,859	1,166,168	788,691	359,826	428,865
	9 " " '06	1,690,757	1,008,581	682,176	300,896	381,280
ST. LOUIS, MO. United Railways Co. of St. Louis	1m., Sept. '07	930,606	*588,883	341,723	232,404	109,319
	1 " " '06	884,121	*530,915	353,206	231,802	121,404
	9 " " '07	8,116,337	*5,299,016	2,817,321	2,083,731	733,590
	9 " " '06	7,632,958	*4,785,673	2,847,285	2,086,147	761,138
SAVANNAH, GA. Savannah Electric Co.	1m., Aug. '07	54,417	*37,798	16,619	12,250	4,369
	1 " " '06	59,333	*33,424	25,909	11,537	14,372
TACOMA, WASH. Puget Sound El. Ry. Co.	1m., Aug. '07	165,079	102,734	62,345	33,664	28,681
	1 " " '06	142,603	86,203	56,400	26,240	30,160